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Partie 214: Protocole d'application: Données de base pour la construction automobile

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10303 may be subject of patent rights. ISO shall not be held responsible for any or all such patent rights.

International Standard ISO 10303–214 was prepared by Technical Committee ISO/TC 184/SC4, *Industrial automation systems and integration*, Subcommittee SC4, *Industrial data*.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application interpreted constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1.

A complete list of parts of ISO 10303 is available from the internet:

<http://www.nist.gov/sc4/editing/step/titles>

The structure of this International Standard is described in ISO 10303-1. The numbering of the parts of this International Standard reflects its structure:

— Parts 11 to 14 specify the description methods,

— Parts 21 to 29 specify the implementation methods,

— Parts 31 to 35 specify the conformance testing methodology and framework,

— Parts 41 to 50 specify the integrated generic resources,

— Parts 101 to 108 specify the integrated application resources,

— Parts 201 to 236 specify the application protocols,

— Parts 301 to 336 specify the abstract test suites,

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— Parts 501 to 520 specify the application interpreted constructs, and

— Parts 1001 to 1009 specify the application modules.

Should further parts of ISO 10303 be published, they will follow the same numbering pattern.

Annexes A, B, C, D, and E form a normative part of this part of ISO 10303. Annexes F, G, H, J, and K are for information only.

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Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the life cycle of a product independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and archiving.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application interpreted constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303–1. This part of ISO 10303 is a member of the application protocol series.

This part of ISO 10303 specifies an application protocol (AP) for automotive mechanical design processes. This application protocol defines the context, scope, and information requirements for various development stages during the design of a vehicle and specifies the integrated resources necessary to satisfy these requirements. This application protocol addresses the requirements of the automotive industry covering cars, trucks, busses, and motorcycles. It may also be applicable to other forms of vehicles, such as rail, agricultural, and construction vehicles.

A typical vehicle consists of the body, power train, chassis, and interior parts.

The body describes the body shell and the body in white (see 3.11.1).

EXAMPLE 1 Typical constituents of the body are the frame, doors, roof, engine hood, windshield, and bumpers.

The power train includes the engine, transmission, and driveline.

EXAMPLE 2 Typical constituents of the power train are gearbox, pistons, and exhaust pipe.

The chassis includes all parts that are involved with the vehicle's handling.

EXAMPLE 3 Typical constituents of the chassis are the front axle, rear axle, steering gear, suspension components, wheels, shock absorbers, and brakes.

Interior parts include parts that are built into the interior of the vehicle and not related to the power train.

EXAMPLE 4 Typical interior parts are seats, instrument panel, power windows, air conditioning system, and stereo equipment.

Only the mechanical aspects of a vehicle and its components are covered by this AP; the electrical, electronic, hydraulic, and pneumatic aspects are not covered.

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EXAMPLE 5 For a battery or a switch, product characteristics such as shape, material, or mass are covered but the electrical functionality is not covered.

Finite element analysis (FEA) is not supported by this AP.

Figure 1 shows the processes included in the development of a vehicle. The illustrations are taken from car body development. The application activity model (AAM) given in annex F provides a further detailed graphical representation of the processes and information flows.

These processes include:

— product definition;

— styling;

— design;

— evaluation;

— production planning;

— tool design;

— tool manufacturing;

— quality control.

Figure 2 shows the planning model for this AP. It provides a high level overview of the information supported by the AP on the basis of the units of functionality as defined in 4.1. UoF abbreviations can be found in the upper right corner of the boxes.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of the application protocol and summarizes the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are

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not imported into the AIM. The expanded listing given in annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

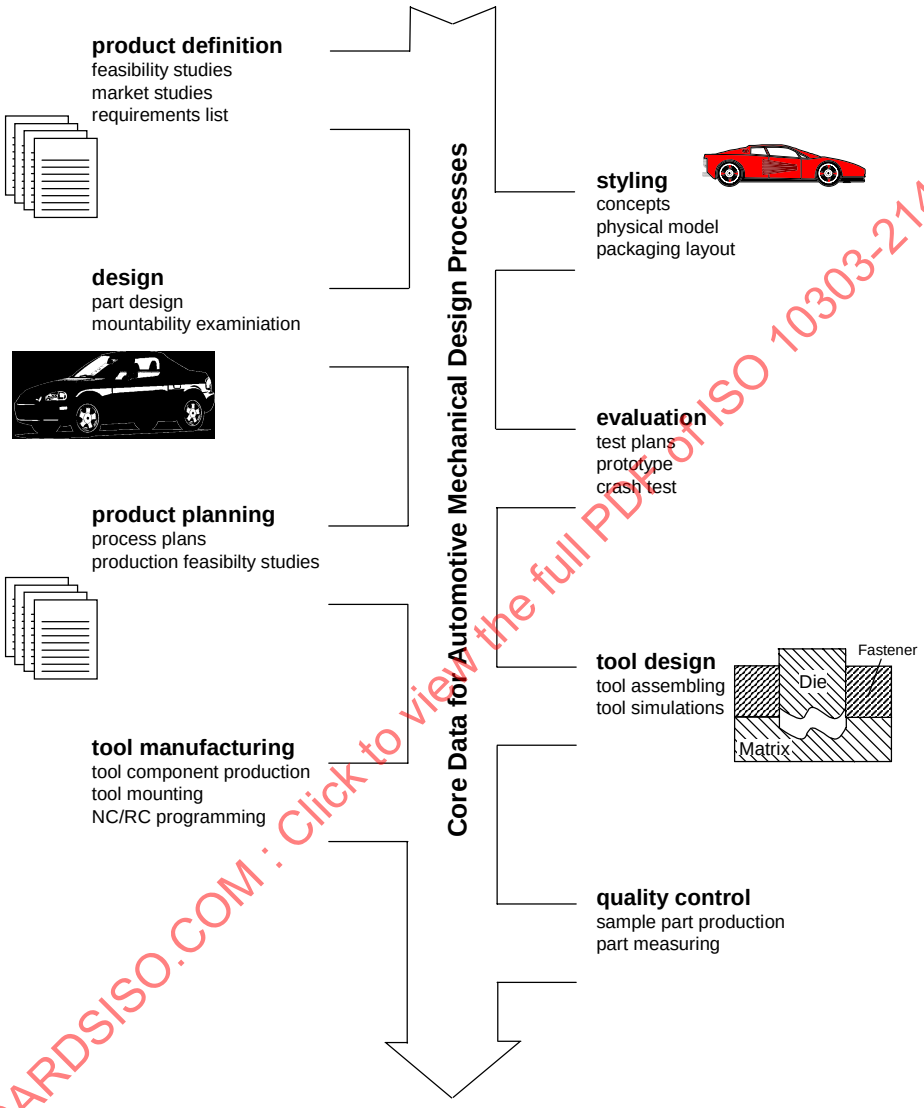
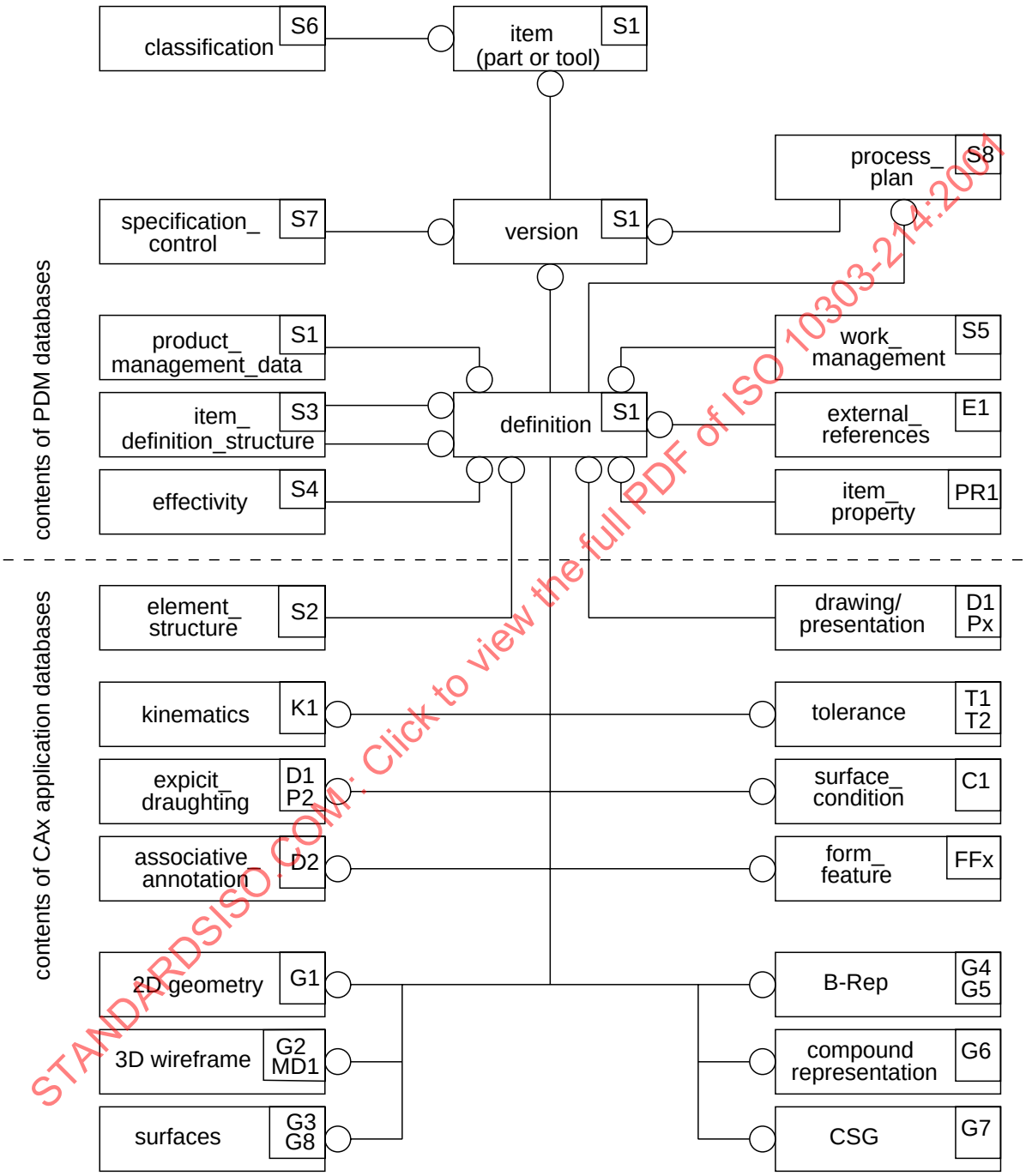


Figure 1 – Automotive mechanical design processes

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Figure 2 – Data planning model

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Industrial automation systems and integration — Product data representation and exchange — Part 214: Application protocol: Core data for automotive mechanical design processes

1 Scope

This part of ISO 10303 specifies the use of the integrated resources necessary for the scope and information requirements for the exchange of information between the applications that support the development process of the mechanical aspects of automotive vehicles.

NOTE - The application activity model in annex F provides a graphical representation of the processes and information flows that are the basis for the definition of the scope of this part of ISO 10303.

The following are within the scope of this part of ISO 10303:

— products of automotive manufacturers and of their suppliers. These products include parts, assemblies of parts, tools, assemblies of tools, and raw materials. The considered parts include the constituents of the car body, of the power train, of the chassis, and of the interior. The tools include those specific to the products produced and used by various manufacturing technologies.

EXAMPLE 1 Typical manufacturing technologies are:

a) for primary shaping: moulding or casting;

b) for transforming: bending or stamping;

c) for separating: milling or turning;

d) for coating: painting or surface coating;

e) for fitting: welding or riveting.

The raw materials include those used to produce the parts or the tools;

— process plan information describing the relationships between parts and the tools used to manufacture them and to manage the relationships between intermediate stages of part or tool development;

— product definition data and configuration control data for managing large numbers of variants of automotive products during the design phase;

— data describing the changes that have occurred during the design phase, including tracking of the versions of a product and of the data related to the documentation of the change process;

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— identification of physically realized parts or of tools, e.g., for prototype building;

— identification of standard parts, based on international, national, or industrial standards;

— release and approval data for product data;

— data that identify the supplier of a product and related contract information;

— the following eight types of representation of the shape of a part or of tool:

  a) 2D – wireframe representation;

  b) 3D – wireframe representation;

  c) geometrically bounded surface representation;

  d) topologically bounded surface representation;

  e) faceted – boundary representation;

  f) boundary representation;

  g) compound shape representation;

  h) constructive solid geometry representation.

— representation of the shape of parts or tools that is a combination of two or more of these eight types of shape representation;

— data that pertains to the presentation of the shape of the product;

— representation of portions of the shape of a part or a tool by form features;

— product documentation represented on drawings;

— references to product documentation represented in a format other than those specified by ISO 10303;

EXAMPLE 2 Other formats include physical clay models, digital data in other standard formats such as NC – data encoded according to ISO 6983 [18], or text data encoded according to ISO/IEC 8879 (SGML) [20].

— simulation data for the description of kinematic structures;

EXAMPLE 3 The simulation data for a windshield wiper may include the geometry of the windshield as well as the kinematic structure of the wiper including all necessary links and joints.

— properties of parts or of tools;

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— data defining surface conditions;

— dimensional data and geometrical tolerance data.

The following are outside the scope of this part of ISO 10303:

— product definition data pertaining to any life cycle phase of a product not related to the design phase;

— business or financial data for the management of a design project;

— a general parametric representation of the shape of a part or of a tool;

— data describing the pneumatic, hydraulic, electric, or electronic functions of a product;

— continuous kinematics simulations over time;

— data describing the input or the results of finite element analysis.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10303 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 286 – 1:1988, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits.*

ISO 286 – 2:1988, *ISO system of limits and fits – Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 639 – 2:1998, *Codes for the representation of names of languages – Part 2: Alpha-3 code.*

ISO 965 – 1:1998, *ISO general–purpose metric screw threads – Tolerances – Part 1: Principles and basic data.*

ISO 1101, *Geometric Product Specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run–out – Revision of ISO 1101:1983.*

ISO 1302:1992, *Technical drawings – Method of indicating surface texture.*

ISO 2768 – 1:1989, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications.*

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ISO 2768 – 2:1989, *General tolerances – Part 2: Geometrical tolerances for features without individual tolerance indications.*

ISO 3098 – 1:1974, *Technical drawings – Lettering – Part 1: Currently used characters.*

ISO 3098 – 2:1984, *Technical drawings – Lettering – Part 2: Greek characters.*

ISO 3166-1:1997, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes.*

ISO 4287 – 1:1984, *Surface roughness – Terminology – Part 1: Surface and its parameters.*

ISO 7083:1983, *Technical drawings – Symbols for geometrical tolerancing – Proportions and dimensions.*

ISO/IEC 8824 – 1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*

ISO 8859 – 1:1998, *Information technology – 8-bit single–byte coded graphic character sets – Part 1: Latin alphabet No. 1.*

ISO 10303 – 1:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 1: Overview and fundamental principles.*

ISO 10303 – 11:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 11: Description methods: The* EXPRESS *language reference manual.*

ISO 10303 – 21:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303 – 22:1998, *Industrial automation systems and integration – Product data representation and exchange – Part 22: Implementation methods: Standard data access interface.*

ISO 10303 – 31:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 31: Conformance testing methodology and framework: General concepts.*

ISO 10303 – 41:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 41: Integrated generic resource: Fundamentals of product description and support – Revision of ISO 10303 – 41:1994.*

ISO 10303 – 42:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 42: Integrated generic resource: Geometric and topological representation – Revision of ISO 10303 – 42:1994.*

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ISO 10303 – 43:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 43: Integrated generic resource: Representation structures – Revision of ISO 10303 – 43:1994.*

ISO 10303 – 44:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 44: Integrated generic resource: Product structure configuration – Revision of ISO 10303 – 44:1994.*

ISO 10303 – 45:1998, *Industrial automation systems and integration – Product data representation and exchange – Part 45: Integrated generic resource: Materials.*

ISO 10303 – 46:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 46: Integrated generic resources: Visual presentation.*

ISO 10303 – 47:1997, *Industrial automation systems and integration – Product data representation and exchange – Part 47: Integrated generic resource: Shape variation tolerances.*

ISO 10303 – 49:1998, *Industrial automation systems and integration – Product data representation and exchange – Part 49: Integrated generic resources: Process structure and properties.*

ISO 10303 – 101:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 101: Integrated application resources: Draughting.*

ISO 10303 – 105:1996, *Industrial automation systems and integration – Product data representation and exchange – Part 105: Integrated application resource: Kinematics.*

ISO 10303 – 202:1996, *Industrial automation systems and integration – Product data representation and exchange – Part 202: Application protocol: Associative draughting.*

ISO 10303 – 203:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 203: Application protocol: Configuration controlled design.*

ISO 10303 – 501:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 501: Application interpreted construct: Edge-based wireframe.*

ISO 10303 – 503:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 503: Application interpreted construct: Geometrically bounded 2D wireframe.*

ISO 10303 – 504:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 504: Application interpreted construct: Draughting annotation.*

ISO 10303 – 506:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 506: Application interpreted construct: Draughting elements.*

ISO 10303 – 507:2001, *Industrial automation systems and integration – Product data representation and exchange – Part 507: Application interpreted construct: Geometrically bounded surface.*

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ISO 10303 – 508: – [1)], *Industrial automation systems and integration – Product data representation and exchange – Part 508: Application interpreted construct: Non-manifold surface.*

ISO 10303 – 509: – [1)], *Industrial automation systems and integration – Product data representation and exchange – Part 509: Application interpreted construct: Manifold surface.*

ISO 10303 – 510:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 510: Application interpreted construct: Geometrically bounded wireframe.*

ISO 10303 – 511:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 511: Application interpreted construct: Topologically bounded surface.*

ISO 10303 – 512:1999, *Industrial automation systems and integration – Product data representation and exchange – Part 512: Application interpreted construct: Faceted boundary representation.*

ISO 10303 – 514:1999, *Industrial automation systems and integration – Product data representation and exchange – Part 514: Application interpreted construct: Advanced boundary representation.*

ISO 10303 – 515:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 515: Application interpreted construct: Constructive solid geometry.*

ISO 10303 – 517:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 517: Application interpreted construct: Mechanical design geometric presentation.*

ISO 10303 – 519:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 519: Application interpreted construct: Geometric tolerances.*

ISO 10303 – 520:1999, *Industrial automation systems and integration – Product data representation and exchange – Part 520: Application interpreted construct: Associative draughting elements.*

ISO 12085:1996, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Motif parameters.*

ISO 13565 – 1:1996, *Geometrical Product Specifications (GPS) – Surface texture: Profile method; Surfaces having stratified functional properties – Part 1: Filtering and general measurement conditions.*

ISO 13584 – 20:1998, *Industrial automation systems and integration – Parts library – Part 20: Logical resource: Logical model of expressions.*

ISO 13584 – 26:2000, *Industrial automation systems and integration – Parts library – Part 26: Logical resource: Information supplier identification.*

ISO 13584 – 42:1998, *Industrial automation systems and integration – Parts library – Part 42: Description methodology: Methodology for structuring part families.*

[1)] To be published.

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3 Terms, definitions, abbreviations, and symbols

3.1 Terms defined in ISO 10303 – 1

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 1 apply.

— application;

— application activity model (AAM);

— application context;

— application interpreted model (AIM);

— application object;

— application protocol (AP);

— application reference model (ARM);

— application resource;

— assembly;

— component;

— conformance class;

— conformance requirement;

— data;

— data exchange;

— generic resource;

— implementation method ;

— information;

— information model;

— integrated resource;

— interpretation;

— PICS proforma;

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— presentation;

— product;

— product data;

— product information;

— resource construct;

— structure;

— unit of functionality (UoF).

3.2 Terms defined in ISO 10303 – 31

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 31 apply.

— preprocessor;

— postprocessor.

3.3 Terms defined in ISO 10303 – 42

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 42 apply.

— arcwise connected;

— bounds;

— boundary;

— boundary representation solid model (B-Rep);

— closed curve;

— closed surface;

— connected;

— constructive solid geometry (CSG);

— coordinate space;

— curve;

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— cycle;

— dimensionality;

— domain;

— extent;

— finite;

— geometric coordinate system;

— geometrically founded;

— geometrically related;

— inside;

— interior;

— list;

— model space;

— open curve;

— open surface;

— orientable;

— overlap;

— parameter range;

— parameter space;

— placement coordinate system;

— self – intersect;

— set;

— space dimensionality;

— surface;

— topological sense.

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3.4 Terms defined in ISO 10303 – 44

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 44 apply.

— bill-of-material structure (BOM);

— constituent;

— form, fit and function of a product;

— lot.

3.5 Terms defined in ISO 10303 – 45

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 45 apply.

— material;

— material property.

3.6 Terms defined in ISO 10303 – 46

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 46 apply.

— annotation;

— layer;

— picture;

— planar;

— presentation information;

— symbol;

— visualization.

3.7 Terms defined in ISO 10303 – 47

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 47 apply.

— form tolerance;

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— profile tolerance;

— toleranced feature.

3.8 Terms defined in ISO 10303 – 105

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 105 apply.

— base;

— frame;

— joint;

— link;

— mechanism;

— motion;

— pair;

— placement;

— world coordinate system.

3.9 Terms defined in ISO 10303 – 202

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303 – 202 apply.

— application interpreted construct (AIC);

— externally defined;

— predefined.

3.10 Terms defined in ISO 13584 – 42

For the purpose of this part of ISO 10303, the following terms defined in ISO 13584 – 42 apply.

— basic semantic unit (BSU)

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3.11 Other terms and definitions

For the purpose of this part of ISO 10303, the following definitions apply.

3.11.1
body in white
Parts of the vehicle body that form the body shell and ensure its stability

3.11.2
vehicle
Land conveyance for the transportation of goods or passengers

EXAMPLE A cart, a lorry, a motor-car, and a bus are examples of a vehicle.

3.12 Symbols and abbreviations

For the purpose of this part of ISO 10303, the following symbols and abbreviations apply:

C1	surface_condition UoF
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CSG	Constructive Solid Geometry
D1	explicit_draughting UoF
D2	associative_annotation UoF
E1	external_reference_mechanism UoF
FF1	user_defined_feature UoF
FF2	included_feature UoF
FF3	generative_featured_shape UoF
G1	wireframe_model_2d UoF
G2	wireframe_model_3d UoF
G3	connected_surface_model UoF
G4	faceted_b_rep_model UoF
G5	b_rep_model UoF

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G6	compound_model UoF
G7	csg_model UoF
G8	geometrically_bounded_surface_model UoF
K1	kinematics UoF
LMC	Least Material condition
MD1	measured_data UoF
MMC	Maximum Material condition
NURBS	Non Uniform Rational B-Spline
P1	geometric_presentation UoF
P2	annotated_presentation UoF
P3	shaded_presentation UoF
PR1	item_property UoF
RGB	Red, green blue colour space
S1	product_management_data UoF
S2	element_structure UoF
S3	item_definition_structure UoF
S4	effectivity UoF
S5	work_management UoF
S6	classification UoF
S7	specification_control UoF
S8	process_plan UoF
T1	dimension_tolerance UoF

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T2 geometric_tolerance UoF

|| delimiter of the expression that represents an absolute value of a mathematical term

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4 Information requirements

This clause specifies the information required for core data for automotive mechanical design processes.

The information requirements are specified as a set of units of functionality, application objects, and application assertions. These assertions pertain to individual application objects and to relationships between application objects. The information requirements are defined using the terminology of the subject area of this application protocol.

NOTE 1 - A graphical representation of the information requirements is given in annex G.

NOTE 2 - The information requirements correspond to those of the activities identified as being within the scope of this application protocol in annex F.

NOTE 3 - The mapping table specified in 5.1 shows how the integrated resources and application interpreted constructs are used to meet the information requirements of this application protocol.

4.1 Units of functionality

This subclause specifies the units of functionality for the Core Data for Automotive Mechanical Design Processes application protocol.

NOTE 1 - One or more UoFs, grouped together, provide a solution to identified data flows derived from the AAM (see annex F). The grouping of the UoFs is documented in clause 6.

This part of ISO 10303 specifies the following units of functionality:

NOTE 2 - Following the name of each UoF, its abbreviation is shown in brackets. The abbreviations consist of one or two letters and a number. The letters indicate a logical group to which the UoF belongs. The logical groups identified are shown in table 1.

Figure 5 gives an overview for the UoFs, their logical groups, and the interdependencies among the UoFs and the logical groups.

— surface_condition (C1);

— explicit_draughting (D1);

— associative_annotation (D2);

— external_reference_mechanism (E1);

— user_defined_feature (FF1);

— included_feature (FF2);

— generative_featured_shape (FF3);

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Table 1 – Logical grouping of UoFs

Information type	Abbreviation
surface condition	C
draughting	D
external reference	E
form features	FF
geometry	G
kinematics	K
measured data	MD
property	PR
presentation	P
product structure	S
tolerance	T

— wireframe_model_2d (G1);

— wireframe_model_3d (G2);

— connected_surface_model (G3);

— faceted_b_rep_model (G4);

— b_rep_model (G5);

— compound_model (G6);

— csg_model (G7);

— geometrically_bounded_surface_model (G8);

— kinematics (K1);

— measured_data (MD1);

— item_property (PR1);

— geometric_presentation (P1);

— annotated_presentation (P2);

— shaded_presentation (P3);

— product_management_data (S1);

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— element_structure (S2);

— item_definition_structure (S3);

— effectivity (S4);

— work_management (S5);

— classification (S6);

— specification_control (S7);

— process_plan (S8);

— dimension_tolerance (T1);

— geometric_tolerance (T2).

The units of functionality and a description of the functions that each UoF supports are given below. The application objects included in the UoFs are defined in 4.2.

4.1.1 surface_condition (C1)

This unit of functionality provides the capability to represent surface properties and surface treatments of a material. It covers surface characteristics which may be defined by a designer to achieve the required functionality of a part or to satisfy aesthetic requirements.

The definition of the presentation of the surface characteristics information is dealt with in the associative_annotation UoF (D2).

The following application objects are used by the surface_condition UoF:

— Coating_layer (see 4.2.75);

— Contact_ratio (see 4.2.102);

— Default_setting_association (see 4.2.132);

— Default_surface_texture (see 4.2.133);

— Hardness (see 4.2.254);

— Measurement_path (see 4.2.314);

— Surface_condition (see 4.2.492);

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— Surface_condition_association (see 4.2.493);

— Surface_texture (see 4.2.500);

— Surface_texture_parameter (see 4.2.501);

— Tactile_appearance (see 4.2.504);

— Treatment_result (see 4.2.538);

— Visual_appearance (see 4.2.560).

4.1.2 explicit_draughting (D1)

This unit of functionality specifies the representation of annotation elements in an explicit form used in technical drawings. Additionally, it defines the organizational structure and management data for technical drawings.

This UoF is based on ISO 10303 – 201 and establishes the information requirements for the exchange of part definition data in the form of CAD drawings with explicit annotation. Annotation elements are either defined in a two-dimensional coordinate system, related to the area or view, or in the same coordinate system as the geometry which may be two- or three-dimensional. The annotation elements themselves are always planar.

This UoF also provides the objects needed for the management of drawing sheets, drawing views, symbols, and dimensioning.

The following application objects are used by the explicit_draughting UoF:

— Annotation_curve (see 4.2.16);

— Datum_feature_callout (see 4.2.124);

— Datum_target_callout (see 4.2.126);

— Dimension (see 4.2.149);

— Dimension_callout (see 4.2.150);

— Dimension_curve (see 4.2.151);

— Dimension_sequence_pair (see 4.2.152);

— Drawing (see 4.2.170);

— Drawing_assignment (see 4.2.171);

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— Drawing_sequence (see 4.2.172);

— Drawing_sheet (see 4.2.173);

— Geometric_tolerance_callout (see 4.2.244);

— Projection_curve (see 4.2.407);

— Surface_condition_callout (see 4.2.494).

4.1.3 associative_annotation (D2)

This unit of functionality specifies the representation of annotation elements in an associative form, i.e., with an association to the annotated geometry.

This unit of functionality is based on ISO 10303 – 202 and allows the exchange of drawings that maintain an association between the annotation and the geometric shape of a part. Associated annotation elements are either defined in a two-dimensional coordinate system related to the area or view, or in the same coordinate system as the geometry which may be two- or three-dimensional. The annotation elements themselves are always planar. In the case dimensions that are associated with geometry or other annotation, the associativity is maintained between the calculated value of the size or distance, the presentation of the value, and the elements from which this value is calculated.

This UoF also allows a reference to tolerance information within geometric dimensions (see UoF T1).

The following application objects are used by the associative_annotation UoF:

— Associated_draughting_callout (see 4.2.29);

— Associated_fill_area (see 4.2.30);

— Associated_leader (see 4.2.31);

— Associated_projection_curve (see 4.2.32).

4.1.4 external_reference_mechanism (E1)

This unit of functionality provides a reference mechanism to specify external documents that are associated with objects defined in this part of ISO 10303. These documents may contain data that are not in scope of this part of ISO 10303. This includes conventional non-digital data and digital data in other computer interpretable formats.

NOTE - See clause 5.2.1.11 for a discussion of how the information requirements of this unit of functionality are satisfied.

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EXAMPLE 1 Technical drawings on paper, standards documents, or hand-written documents, are examples of non-digital data referenced by the external reference mechanism.

EXAMPLE 2 CAD data in a system's native format, text documents in SGML [20], or NC-data in ISO 6983 [18] are examples of digital data referenced by the external reference mechanism.

The following application objects are used by the external_reference_mechanism UoF:

— Accuracy (see 4.2.1);

— Axis_placement (see 4.2.33);

— Cartesian_coordinate_space (see 4.2.44);

— Cartesian_coordinate_space_2d (see 4.2.45);

— Cartesian_coordinate_space_3d (see 4.2.46);

— Detailed_model_element (see 4.2.145);

— Digital_document (see 4.2.147);

— Digital_file (see 4.2.148);

— Document (see 4.2.155);

— Document_assignment (see 4.2.156);

— Document_content_property (see 4.2.157);

— Document_creation_property (see 4.2.158);

— Document_file (see 4.2.159);

— Document_file_relationship (see 4.2.160);

— Document_format_property (see 4.2.161);

— Document_location_property (see 4.2.162);

— Document_representation (see 4.2.163);

— Document_size_property (see 4.2.164);

— Document_structure (see 4.2.165);

— Document_type_property (see 4.2.166);

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— Document_version (see 4.2.167);

— Document_version_relationship (see 4.2.168);

— External_file_id_and_location (see 4.2.185);

— External_geometric_model (see 4.2.186);

— External_geometric_model_with_parameters (see 4.2.187);

— External_model (see 4.2.189);

— External_picture (see 4.2.190);

— Geometric_model (see 4.2.238);

— Geometric_model_relationship (see 4.2.239);

— Geometric_model_relationship_with_transformation (see 4.2.240);

— Geometric_model_version (see 4.2.241);

— Hardcopy (see 4.2.253);

— Item_shape (see 4.2.274);

— Named_size (see 4.2.321);

— Partial_document_assignment (see 4.2.341);

— Physical_document (see 4.2.351);

— Physical_model (see 4.2.354);

— Physical_representation (see 4.2.355);

— Rectangular_size (see 4.2.427);

— Shape_description_association (see 4.2.448);

— Shape_element (see 4.2.449);

— Shape_element_relationship (see 4.2.450);

— Specific_document_classification (see 4.2.463);

— Specific_document_classification_hierarchy (see 4.2.464);

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— Template_instance (see 4.2.512);

— Transformation (see 4.2.533);

— Transformation_2d (see 4.2.534);

— Transformation_3d (see 4.2.535).

4.1.5 user_defined_feature (FF1)

This unit of functionality provides the capability to categorize an area of interest in a shape as a feature and to associate parameters as additional information – not intended for shape generation – with this area in the shape. Using this mechanism, multiple aspects of the shape that are identified as features, may be combined into a compound general feature. The type of the feature and of the associated parameters are individually specified by the user.

The following application objects are used by the user_defined_feature UoF:

— Feature_occurrence (see 4.2.200);

— General_compound_feature (see 4.2.219);

— General_feature (see 4.2.221);

— Included_feature (see 4.2.261);

— Path_parameter (see 4.2.344);

— Profile_parameter (see 4.2.402).

4.1.6 included_feature (FF2)

This unit of functionality provides the capability to identify areas of interest on an already designed shape as a particular kind of feature whose type and defining parameters are specified in this part of ISO 10303.

NOTE 1 - Usually, these features have a certain meaning to the user, such as a correspondence to a manufacturing process operation managed or manageable by the user.

This part of ISO 10303 distinguishes between form features for sheet-type parts or tools and form features for solid-type parts or tools. Among these features are hole, pocket, boss, slot, rib, thread, bead and joggle as well as transition features such as fillet, edge round, and chamfer. Mechanisms for the replication of features and to build up compounds of features are also included. Figure **??** shows the features for solid-type parts covered by this UoF. Figure 4 shows the features for sheet-type parts covered by this UoF.

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Within this UoF, a variation of the feature parameters does not result in a change of the shape of the part where the features are applied, i.e., the shape, which is defined explicitly, is not dependent on the feature parameters.

NOTE 2 - The parameters may be used to specify the areas of interest in a more appropriate way, e.g., to support manufacturing planning.

This UoF is based on the user_defined_feature UoF.

The following application objects are used by the included_feature UoF:

— Angle_specification (see 4.2.11);

— Angle_taper (see 4.2.12);

— Bead_end_type (see 4.2.38);

— Bead_feature (see 4.2.39);

— Boss_feature (see 4.2.42);

— Boss_top_condition (see 4.2.43);

— Catalogue_thread (see 4.2.48);

— Chamfer (see 4.2.51);

— Chamfer_angle (see 4.2.52);

— Chamfer_definition (see 4.2.53);

— Chamfer_offset (see 4.2.54);

— Circular_boss (see 4.2.57);

— Circular_closed_profile (see 4.2.58);

— Circular_offset_pattern (see 4.2.59);

— Circular_omit_pattern (see 4.2.60);

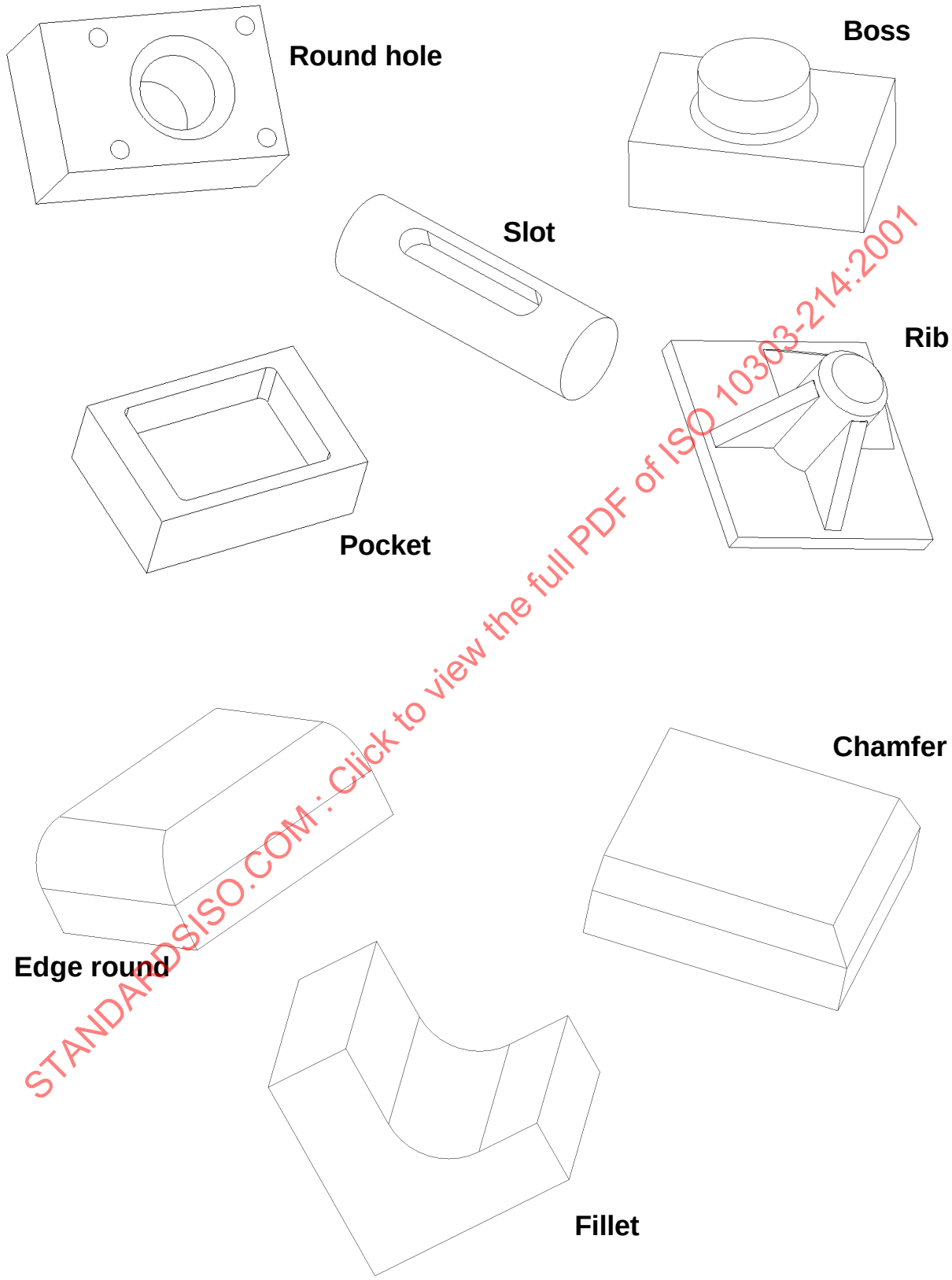
— Circular_path (see 4.2.61);

— Circular_pattern (see 4.2.62);

— Closed_profile (see 4.2.72);

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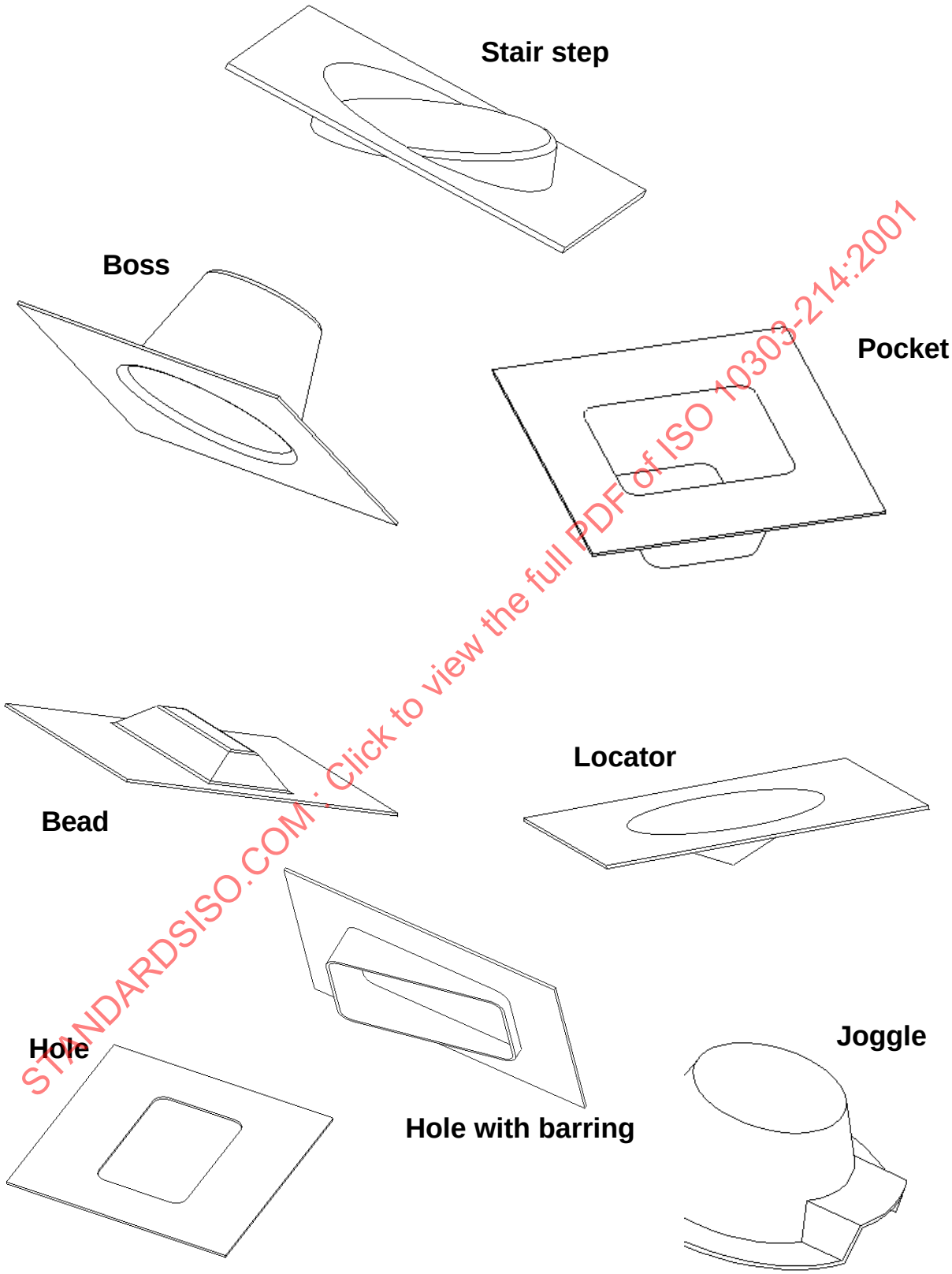
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Figure 3 – Features for solid-type parts

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Figure 4 – Features for sheet-type parts

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— Closed_profile_usage (see 4.2.73);

— Complete_circular_path (see 4.2.79);

— Compound_feature_in_panel (see 4.2.85);

— Compound_feature_in_panel_element (see 4.2.86);

— Compound_feature_in_panel_element_relationship (see 4.2.87);

— Compound_feature_in_solid (see 4.2.88);

— Compound_feature_in_solid_element (see 4.2.89);

— Compound_feature_in_solid_element_relationship (see 4.2.90);

— Compound_hole (see 4.2.91);

— Conical_bottom (see 4.2.95);

— Constant_radius_edge_round (see 4.2.97);

— Constant_radius_fillet (see 4.2.98);

— Default_chamfer (see 4.2.128);

— Default_draft_angle (see 4.2.129);

— Default_edge_round (see 4.2.130);

— Default_fillet (see 4.2.131);

— Default_setting_association (see 4.2.132);

— Defined_thread (see 4.2.135);

— Diameter_taper (see 4.2.146);

— Directed_taper (see 4.2.154);

— Edge_round (see 4.2.177);

— Face_termination (see 4.2.193);

— Feature_definition (see 4.2.199);

— Fillet (see 4.2.205);

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— Flat_bottom (see 4.2.207);

— Flat_slot_end_type (see 4.2.208);

— Flat_with_radius_bottom (see 4.2.209);

— Flat_with_taper_bottom (see 4.2.210);

— Form_feature_in_panel (see 4.2.212);

— General_boss (see 4.2.214);

— General_bottom_condition (see 4.2.215);

— General_closed_profile (see 4.2.218);

— General_compound_feature_in_solid (see 4.2.220);

— General_open_profile (see 4.2.225);

— General_path (see 4.2.227);

— General_pattern (see 4.2.228);

— General_pocket (see 4.2.229);

— General_top_condition (see 4.2.236);

— Hole_bottom_condition (see 4.2.257);

— Hole_feature_in_panel (see 4.2.258);

— Joggle_feature (see 4.2.277);

— Joggle_termination (see 4.2.278);

— Linear_bead_end_type (see 4.2.298);

— Linear_path (see 4.2.300);

— Locator_feature (see 4.2.302);

— Ngon_profile (see 4.2.323);

— Open_bead_end_type (see 4.2.327);

— Open_profile (see 4.2.328);

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— Open_profile_usage (see 4.2.329);

— Open_slot_end_type (see 4.2.330);

— Panel_hole_with_barring (see 4.2.336);

— Partial_circular_path (see 4.2.339);

— Partial_circular_profile (see 4.2.340);

— Path (see 4.2.342);

— Planar_bottom_condition (see 4.2.358);

— Planar_top_condition (see 4.2.359);

— Pocket_bottom_condition (see 4.2.365);

— Pocket_feature (see 4.2.366);

— Process_feature_in_panel (see 4.2.379);

— Process_feature_in_solid (see 4.2.380);

— Profile (see 4.2.401);

— Profile_usage (see 4.2.403);

— Radiused_bead_end_type (see 4.2.418);

— Radiused_slot_end_type (see 4.2.419);

— Rectangular_boss (see 4.2.420);

— Rectangular_closed_pocket (see 4.2.421);

— Rectangular_closed_profile (see 4.2.422);

— Rectangular_offset_pattern (see 4.2.423);

— Rectangular_omit_pattern (see 4.2.424);

— Rectangular_open_pocket (see 4.2.425);

— Rectangular_pattern (see 4.2.426);

— Replicate_base_assignment (see 4.2.432);

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— Replicate_feature (see 4.2.433);

— Rib_feature (see 4.2.435);

— Round_hole (see 4.2.439);

— Rounded_u_profile (see 4.2.440);

— Slot_end_type (see 4.2.457);

— Slot_feature (see 4.2.458);

— Spherical_bottom (see 4.2.474);

— Square_u_profile (see 4.2.476);

— Tee_profile (see 4.2.511);

— Thread_feature (see 4.2.517);

— Thread_specification (see 4.2.518);

— Through_hole_bottom_condition (see 4.2.519);

— Through_pocket_bottom_condition (see 4.2.520);

— Transition_feature (see 4.2.537);

— Value_termination (see 4.2.548);

— Vee_profile (see 4.2.551);

— Woodruff_slot_end_type (see 4.2.563).

4.1.7 generative_featured_shape (FF3)

This unit of functionality provides the capability to use a subset of those features specified within the included_feature UoF, in a way that the application of the features on a base shape results in a modified shape. Within this UoF, the identification of feature parameters is related to the intent to study the consequences of a variation of these parameters on the resulting shape.

Additionally, this UoF supports the definition of sequences of 'operations', i.e., the application of one or more features to a base shape with the possibility to represent the resulting shapes at the various intermediate stages.

This UoF is based on the included_feature UoF.

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The following application objects are used by the generative_featured_shape UoF:

— Feature_placement (see 4.2.202);

— Featured_shape (see 4.2.203);

— Placed_feature (see 4.2.356).

4.1.8 wireframe_model_2d (G1)

This unit of functionality provides the capability to represent geometry as a two-dimensional wireframe model, i.e., of two-dimensional points and curves.

NOTE - The difference between 3D and 2D geometric elements is specified by the presence or absence of a third coordinate value.

Composite curves for the geometric representation of paths and loops are included in this UoF. The types of points and curves excluded from this UoF are point_on_surface and curve_on_surface. All unbounded curves in this UoF are explicitly trimmed unless they are closed in order to facilitate the data exchange, the visualization on the screen, and to limit calculation time.

Surface data and all topological information are outside the scope of this UoF.

The following application objects are used by the wireframe_model_2d UoF:

— B_spline_curve (see 4.2.36);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Composite_curve (see 4.2.83);

— Curve (see 4.2.108);

— Curve_set_2d (see 4.2.111);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Ellipse (see 4.2.183);

— Hyperbola (see 4.2.260);

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— Line (see 4.2.296);

— Offset_curve (see 4.2.325);

— Parabola (see 4.2.337);

— Point (see 4.2.367);

— Point_on_curve (see 4.2.373);

— Polyline (see 4.2.377);

— Trimmed_curve (see 4.2.539);

— Wireframe_model_2d (see 4.2.561).

4.1.9 wireframe_model_3d (G2)

This unit of functionality provides the capability to represent geometry as a three-dimensional geometrically bounded wireframe model.

NOTE - The difference between 3D and 2D geometric elements is specified by the presence or absence of a third coordinate value, respectively.

All application objects of the wireframe_model_2d UoF (G1) are included for the 3D case in the wireframe_model_3d UoF (G2).

Composite curves for the geometric representation of paths and loops are included in this UoF. The types of points and curves excluded from this UoF are point_on_surface and curve_on_surface. All unbounded curves in this UoF are explicitly trimmed unless they are closed.

Surface data and all topological information are outside the scope of this UoF.

The following application objects are used by the wireframe_model_3d UoF:

— B_spline_curve (see 4.2.36);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Composite_curve (see 4.2.83);

— Curve (see 4.2.108);

— Curve_set_3d (see 4.2.112);

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— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Ellipse (see 4.2.183);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Offset_curve (see 4.2.325);

— Parabola (see 4.2.337);

— Point (see 4.2.367);

— Point_on_curve (see 4.2.373);

— Polyline (see 4.2.377);

— Trimmed_curve (see 4.2.539);

— Wireframe_model_3d (see 4.2.562).

4.1.10 connected_surface_model (G3)

This unit of functionality provides the capability to represent geometry as a surface model that is topologically bounded.

Topological relationships are modelled explicitly by using objects, i.e., face, loop, edge, and vertex. The bounded surfaces in this UoF are connected. A model shall be manifold. A facility to associate transition information with a pair of adjacent faces or with a pair of adjacent edges is provided. Trimming and composition of curves and surfaces are represented by applying topological objects, i.e., vertex, edge, loop, and face.

This UoF contains the same geometric representations of points, unbounded curves, and unbounded surfaces as in UoF G2 and in UoF G8 but, unlike these UoFs, does not support geometric constructs for bounding and connecting geometric objects. The connected_surface_model UoF has the additional functionality of representing points and curves in the parameter space of curves and surfaces, respectively.

EXAMPLE Examples for curves represented in the parameter space of surfaces are intersection curves or seam curves.

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The following application objects are used by the connected_surface_model UoF:

— B_spline_curve (see 4.2.36);

— B_spline_surface (see 4.2.37);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Conical_surface (see 4.2.96);

— Curve (see 4.2.108);

— Curve_on_surface (see 4.2.110);

— Cylindrical_surface (see 4.2.114);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Edge_loop (see 4.2.176);

— Edge_transition (see 4.2.178);

— Ellipse (see 4.2.183);

— Face (see 4.2.191);

— Face_bound (see 4.2.192);

— Face_transition (see 4.2.194);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Offset_curve (see 4.2.325);

— Offset_surface (see 4.2.326);

— Oriented_edge_curve (see 4.2.334);

— Parabola (see 4.2.337);

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— Plane (see 4.2.360);

— Point (see 4.2.367);

— Point_on_curve (see 4.2.373);

— Point_on_surface (see 4.2.374);

— Polyline (see 4.2.377);

— Shell (see 4.2.451);

— Spherical_surface (see 4.2.475);

— Surface (see 4.2.489);

— Surface_model (see 4.2.496);

— Surface_of_linear_extrusion (see 4.2.497);

— Surface_of_revolution (see 4.2.498);

— Toroidal_surface (see 4.2.530);

— Vertex_loop (see 4.2.552);

— Vertex_point (see 4.2.553).

4.1.11 faceted_b_rep_model (G4)

This unit of functionality provides the capability to represent geometry as a B-rep model with planar faces and implicit topology.

The faceted B-rep model is represented by an outer shell and an arbitrary number of internal voids, each represented by a closed shell. A requirement, included to provide internal consistency checks, is that each face shall be associated with a plane surface. All the face boundaries are implicitly defined by poly loops. One of these poly loops is defined as the outer boundary. The edges are all straight lines but are not explicitly defined. The edge information can be deduced from the poly loop definitions.

This UoF shares the basic geometric definitions of point, line, and plane with the UoFs G3 and G5. It also shares the definition of a manifold solid B-rep and the topological concepts of closed shell and face with the UoF G5.

NOTE - A faceted B-rep model, as defined in this UoF, would not be considered to be a valid example of a B-rep model in the UoF G5; it could however be converted to such a model by explicitly creating lines, edges and vertices and converting the face bounding poly loops in UoF G4 to edge loops as required by the UoF G5.

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The following application objects are used by the faceted_b_rep_model UoF:

— Cartesian_point (see 4.2.47);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Faceted_b_rep (see 4.2.195);

— Faceted_b_rep_model (see 4.2.196);

— Faceted_closed_shell (see 4.2.197);

— Faceted_face (see 4.2.198);

— Plane (see 4.2.360);

— Point (see 4.2.367);

— Poly_loop (see 4.2.376).

4.1.12 b_rep_model (G5)

This unit of functionality provides the capability to represent geometry as B-rep model with a consistent topological structure and explicitly defined geometry for faces and edges.

The B-rep model is represented by one or more B-rep solids. Each B-rep solid consists of a single closed shell, which represents its exterior, and an arbitrary number of closed shells corresponding to internal voids. Each shell consists of a collection of faces. Each face is defined by a surface and by loops of edges bounding the surface. The edges meet at vertices and have their geometry defined by curves. The geometry of the curves and surfaces can be complex but is required to be directly defined.

The definitions of geometric objects in this UoF as well as the definitions of the topological objects vertex, edge, path, loop, and face are identical to those in the UoF G3.

NOTE - Any B-rep model, defined in UoF G5, could be represented in UoF G3 as a collection of faces with no loss of geometric precision but losing the information of a solid model, e.g., inner and outer domain of the B-rep solid.

The following application objects are used by the b_rep_model UoF:

— B_rep (see 4.2.34);

— B_rep_model (see 4.2.35);

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— B_spline_curve (see 4.2.36);

— B_spline_surface (see 4.2.37);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Closed_shell (see 4.2.74);

— Conical_surface (see 4.2.96);

— Curve (see 4.2.108);

— Curve_on_surface (see 4.2.110);

— Cylindrical_surface (see 4.2.114);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Edge_loop (see 4.2.176);

— Edge_transition (see 4.2.178);

— Ellipse (see 4.2.183);

— Face (see 4.2.191);

— Face_bound (see 4.2.192);

— Face_transition (see 4.2.194);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Oriented_edge_curve (see 4.2.334);

— Parabola (see 4.2.337);

— Plane (see 4.2.360);

— Point (see 4.2.367);

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— Polyline (see 4.2.377);

— Spherical_surface (see 4.2.475);

— Surface (see 4.2.489);

— Surface_of_linear_extrusion (see 4.2.497);

— Surface_of_revolution (see 4.2.498);

— Toroidal_surface (see 4.2.530);

— Vertex_loop (see 4.2.552);

— Vertex_point (see 4.2.553).

4.1.13 compound_model (G6)

This unit of functionality provides the capability to represent geometry as a topologically connected geometric model consisting of solid, surface, or wireframe data. This geometric model deals with mixed dimensionality (solids, surfaces, and wireframes) and non-manifold topology.

Only shape models with complete topological description, i.e., in boundary representation are supported. Since the topology is not restricted to be manifold, the models can have more than two faces sharing one edge, and faces shared by two adjacent shells. A compound representation collects several geometric items of the same or of different type and joins them into one topologically connected model.

NOTE - This UoF should be used wherever portions of the shape have to be distinguished.

EXAMPLE Examples for distinguishing portions of the shape are material zones with different heat treatment, structures welded together, meshing macros for finite element analysis, and shape representation of varying dimensionality, e.g., surfaces and solids.

This UoF includes all application objects of UoF b_rep_model (G5) and connected_surface_model (G3).

The following application objects are used by the compound_model UoF:

— B_spline_curve (see 4.2.36);

— B_spline_surface (see 4.2.37);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Compound_model (see 4.2.92);

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— Conical_surface (see 4.2.96);

— Curve (see 4.2.108);

— Curve_on_surface (see 4.2.110);

— Cylindrical_surface (see 4.2.114);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Edge_loop (see 4.2.176);

— Edge_transition (see 4.2.178);

— Ellipse (see 4.2.183);

— Face (see 4.2.191);

— Face_bound (see 4.2.192);

— Face_transition (see 4.2.194);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Offset_surface (see 4.2.326);

— Oriented_edge_curve (see 4.2.334);

— Parabola (see 4.2.337);

— Plane (see 4.2.360);

— Point (see 4.2.367);

— Point_on_curve (see 4.2.373);

— Point_on_surface (see 4.2.374);

— Polyline (see 4.2.377);

— Spherical_surface (see 4.2.475);

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— Surface (see 4.2.489);

— Surface_of_linear_extrusion (see 4.2.497);

— Surface_of_revolution (see 4.2.498);

— Topologically_connected_set (see 4.2.529);

— Toroidal_surface (see 4.2.530);

— Vertex_loop (see 4.2.552);

— Vertex_point (see 4.2.553).

4.1.14 csg_model (G7)

This unit of functionality provides the capability to represent geometry as a solid model using Constructive Solid Geometry (CSG).

A CSG shape is the evaluation of a CSG tree which has solid objects at the leaves and Boolean operations at the nodes. This model provides geometric functionality for building solids using Boolean operations on predefined simple parameterized solid shapes, manifold solid B-rep shapes in faceted or exact form, half space solids, or swept face solids.

The following application objects are used by the csg_model UoF:

— B_rep (see 4.2.34);

— B_rep_model (see 4.2.35);

— B_spline_curve (see 4.2.36);

— B_spline_surface (see 4.2.37);

— Block (see 4.2.40);

— Boolean_result (see 4.2.41);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Closed_shell (see 4.2.74);

— Conical_surface (see 4.2.96);

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— Csg_model (see 4.2.106);

— Csg_primitive (see 4.2.107);

— Curve (see 4.2.108);

— Curve_on_surface (see 4.2.110);

— Cylindrical_surface (see 4.2.114);

— Detailed_element (see 4.2.143);

— Detailed_geometric_model_element (see 4.2.144);

— Detailed_model_element (see 4.2.145);

— Edge_loop (see 4.2.176);

— Edge_transition (see 4.2.178);

— Ellipse (see 4.2.183);

— Face (see 4.2.191);

— Face_bound (see 4.2.192);

— Face_transition (see 4.2.194);

— Faceted_b_rep (see 4.2.195);

— Faceted_b_rep_model (see 4.2.196);

— Faceted_closed_shell (see 4.2.197);

— Faceted_face (see 4.2.198);

— Half_space_solid (see 4.2.252);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Oriented_edge_curve (see 4.2.334);

— Parabola (see 4.2.337);

— Plane (see 4.2.360);

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— Point (see 4.2.367);

— Poly_loop (see 4.2.376);

— Polyline (see 4.2.377);

— Right_angular_wedge (see 4.2.436);

— Right_circular_cone (see 4.2.437);

— Right_circular_cylinder (see 4.2.438);

— Solid_of_linear_extrusion (see 4.2.460);

— Solid_of_revolution (see 4.2.461);

— Solid_replica (see 4.2.462);

— Sphere (see 4.2.473);

— Spherical_surface (see 4.2.475);

— Surface (see 4.2.489);

— Surface_of_linear_extrusion (see 4.2.497);

— Surface_of_revolution (see 4.2.498);

— Swept_face_solid (see 4.2.502);

— Toroidal_surface (see 4.2.530);

— Torus (see 4.2.531);

— Vertex_loop (see 4.2.552);

— Vertex_point (see 4.2.553).

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4.1.15 geometrically_bounded_surface_model (G8)

This unit of functionality provides the capability to represent geometry as a surface model that is geometrically bounded.

This UoF provides basic geometric constructs, such as three-dimensional points, curves, and surfaces. It includes elementary and sculptured surfaces as well as composite surfaces. Points and curves can be represented in the parameter space of curves or surfaces, respectively, by objects such as point on curve and parametric curve. The replication of the geometric objects is not included in this UoF.

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The basic geometric constructs are used for the definition of complex geometric objects, i.e., geometrically bounded surfaces without connectivity. They are also used within the connected_surface_model UoF (G3) and b_rep_model UoF (G5) for the definition of topologically bounded surfaces with topological connections.

NOTE - This UoF does not contain any topological information. Therefore, the geometrically bounded surfaces cannot be connected by topology.

The following application objects are used by the geometrically_bounded_surface_model UoF:

— B_spline_curve (see 4.2.36);

— B_spline_surface (see 4.2.37);

— Cartesian_point (see 4.2.47);

— Circle (see 4.2.56);

— Composite_curve (see 4.2.83);

— Conical_surface (see 4.2.96);

— Curve (see 4.2.108);

— Curve_on_surface (see 4.2.110);

— Cylindrical_surface (see 4.2.114);

— Ellipse (see 4.2.183);

— Geometric_set_3d (see 4.2.242);

— Geometrically_bounded_surface_model (see 4.2.248);

— Hyperbola (see 4.2.260);

— Line (see 4.2.296);

— Offset_curve (see 4.2.325);

— Offset_surface (see 4.2.326);

— Parabola (see 4.2.337);

— Plane (see 4.2.360);

— Point (see 4.2.367);

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— Point_on_curve (see 4.2.373);

— Point_on_surface (see 4.2.374);

— Polyline (see 4.2.377);

— Spherical_surface (see 4.2.475);

— Surface (see 4.2.489);

— Surface_of_linear_extrusion (see 4.2.497);

— Surface_of_revolution (see 4.2.498);

— Toroidal_surface (see 4.2.530);

— Trimmed_curve (see 4.2.539);

— Trimmed_surface (see 4.2.540).

4.1.16 kinematics (K1)

This unit of functionality provides the capability to represent kinematic aspects of a mechanical product as required for the communication between CAD systems and kinematic analysis systems, including robotic simulation systems, as well as between dissimilar kinematic analysis systems.

A mechanism as described using this UoF is regarded as being composed of rigid links mating in the following types of joints:

— cylindrical pair;

— gear pair;

— homokinetic pair;

— planar pair;

— point on surface pair;

— prismatic pair;

— rack and pinion pair;

— revolute pair;

— rolling curve pair;

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— rolling surface pair;

— screw pair;

— sliding curve pair;

— sliding surface pair;

— spherical pair;

— universal pair.

The mechanism may contain open or closed kinematic chains. This information is implicitly defined by the topology of the kinematic structure. A mechanism may be connected to another mechanism. Both planar and 3D mechanisms can be defined. The rigid links may be described by a 3D geometric shape description. A link may have additional frames attached to it, to allow application specific kinematic forward analysis to be performed.

The following application objects are used by the kinematics UoF:

— Actuator (see 4.2.7);

— Ground_representation (see 4.2.249);

— Initial_configuration (see 4.2.263);

— Interpolated_configuration_sequence (see 4.2.265);

— Kinematic_configuration_definition (see 4.2.279);

— Kinematic_configuration_interpolation (see 4.2.280);

— Kinematic_control (see 4.2.281);

— Kinematic_element (see 4.2.282);

— Kinematic_joint (see 4.2.283);

— Kinematic_link (see 4.2.284);

— Kinematic_link_representation (see 4.2.285);

— Kinematic_mechanism (see 4.2.286);

— Kinematic_pair (see 4.2.287);

— Kinematic_simulation_information (see 4.2.288);

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— Kinematic_structure (see 4.2.289);

— Kinematic_transformation_result (see 4.2.290);

— Pair_value (see 4.2.335);

— Path_approximation (see 4.2.343);

— Simple_pair_range (see 4.2.453);

— Tool_attachment_point_frame (see 4.2.526);

— Tool_centre_point_frame (see 4.2.527);

— Transformation_to_reference_frame (see 4.2.536).

4.1.17 measured_data (MD1)

This unit of functionality specifies the representation of scanned data resulting from a measurement process of a physical part. These data are represented by a sequence of measured points, potentially with associated vector information for the measured surface normal direction.

NOTE - This data representation may also be used for manufacturing processes, e.g., to represent tool paths for NC programming with vector information indicating the tool direction.

The following application objects are used by the measured_data UoF:

— Point_direction (see 4.2.369);

— Point_direction_model (see 4.2.370);

— Point_direction_sequence (see 4.2.371);

— Point_sequence (see 4.2.375).

4.1.18 item_property (PR1)

This unit of functionality specifies various properties for a part, such as material, recyclability, mass, and general properties.

The information about recyclability is required to describe whether and how material or component parts may be reused. The costs, as planned or calculated for a part, as well as a quality measure property to keep track of the results of some processes, e.g., prototype building, may be specified. The mass is required to express the weight of a part. Shape related properties that are rotation and translation invariant such as the centre of mass and the moments of inertia may also be specified.

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The general properties are required to define property data which are not covered by one of the other UoFs, and, due to their variety, cannot be specified all by explicit application objects.

EXAMPLE Noise development of an engine, maintenance intervals of parts, and heat or noise absorption of insulating parts between the engine and passenger compartment are examples for general properties.

The following application objects are used by the item_property UoF:

— Centre_of_mass (see 4.2.49);

— Change (see 4.2.55);

— Cost_property (see 4.2.105);

— Data_environment (see 4.2.116);

— Duration_property (see 4.2.175);

— General_property (see 4.2.230);

— General_shape_dependent_property (see 4.2.231);

— Item_property_association (see 4.2.273);

— Mass_property (see 4.2.306);

— Material (see 4.2.309);

— Material_property (see 4.2.310);

— Material_property_association (see 4.2.311);

— Material_property_value_representation (see 4.2.312);

— Model_property_association (see 4.2.317);

— Model_property_value (see 4.2.318);

— Moments_of_inertia (see 4.2.319);

— Process_property_association (see 4.2.390);

— Property (see 4.2.409);

— Property_change (see 4.2.410);

— Property_relationship (see 4.2.411);

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— Property_value_association (see 4.2.413);

— Property_value_representation (see 4.2.414);

— Property_value_representation_relationship (see 4.2.415);

— Quality_property (see 4.2.416);

— Recyclability_property (see 4.2.428);

— Shape_dependent_property (see 4.2.447).

4.1.19 geometric_presentation (P1)

This unit of functionality specifies the presentation of point, vector, curve, and surface geometry with attributes, such as colour, line thickness, or line font. The association of these attributes to geometric elements is defined either directly or through a context.

EXAMPLE The following are examples for a context: drawing sheet, layer, group, model view, template, view, or view area.

The curve appearance is restricted to unscaled curve fonts only. A viewing mechanism for the presentation of a geometric model in one or more views is also provided.

The following application objects are used by the geometric_presentation UoF:

— Appearance_assignment (see 4.2.20);

— Context_dependent_appearance_assignment (see 4.2.103);

— Curve_appearance (see 4.2.109);

— Hidden_element_handling (see 4.2.256);

— Model_image (see 4.2.316);

— Point_appearance (see 4.2.368);

— Point_marker_symbol (see 4.2.372);

— Styled_element (see 4.2.482);

— Styled_geometric_model (see 4.2.483);

— Styled_model (see 4.2.484);

— Styled_model_element (see 4.2.485);

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— Styled_model_relationship (see 4.2.486);

— Styled_model_version (see 4.2.487);

— Surface_appearance (see 4.2.490);

— Surface_appearance_element (see 4.2.491);

— Terminator_symbol (see 4.2.513);

— Vector_appearance (see 4.2.550);

— View (see 4.2.554);

— View_area (see 4.2.555);

— View_area_assignment (see 4.2.556).

4.1.20 annotated_presentation (P2)

This unit of functionality specifies the presentation of annotations and a view layout with multiple views, including annotations. The curve appearance is unrestricted in this UoF.

EXAMPLE Sketches can be represented with this UoF.

The organizational definition of technical drawings is not included in this UoF but in the Explicit_draughting UoF.

The following application objects are used by the annotated_presentation UoF:

— Annotation_curve (see 4.2.16);

— Annotation_element (see 4.2.17);

— Annotation_subfigure (see 4.2.18);

— Annotation_symbol (see 4.2.19);

— Area_placed_annotation (see 4.2.25);

— Detailed_element (see 4.2.143);

— Dimension_symbol (see 4.2.153);

— Draughting_callout (see 4.2.169);

— Fill_area (see 4.2.204);

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— General_symbol (see 4.2.233);

— Geometric_tolerance_symbol (see 4.2.246);

— Hatching (see 4.2.255);

— Leader (see 4.2.293);

— Point_marker_symbol (see 4.2.372);

— Solid_fill_area (see 4.2.459);

— Styled_annotation_model (see 4.2.481);

— Surface_condition_symbol (see 4.2.495);

— Terminator_symbol (see 4.2.513);

— Text (see 4.2.514);

— Text_appearance (see 4.2.515);

— Tiling (see 4.2.521);

— View_area_relationship (see 4.2.557);

— View_placed_annotation (see 4.2.558);

— View_relationship (see 4.2.559).

4.1.21 shaded_presentation (P3)

This unit of functionality specifies advanced presentation capabilities for three-dimensional geometry. This includes hidden line and hidden surface presentation. It also includes definitions which enable the creation of shaded images, such as light source definitions. Enhanced surface appearance definitions are also included.

EXAMPLE Examples of enhanced surface appearance definitions are transparency and reflection rates of surfaces.

The following application objects are used by the shaded_presentation UoF:

— Hidden_element_handling (see 4.2.256);

— Light_source (see 4.2.294).

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4.1.22 product_management_data (S1)

This unit of functionality provides the capability to represent product management information. It includes information about items that are either raw materials, parts, or tools, about versions and views of items, about persons and dates, and about information resulting from release and approval processes.

Additionally, this unit of functionality provides the capability to represent descriptive information about objects in different languages and to assign alias identifiers to objects.

The following application objects are used by the product_management_data UoF:

— Alias_identification (see 4.2.8);

— Application_context (see 4.2.21);

— Approval (see 4.2.22);

— Approval_relationship (see 4.2.23);

— Approval_status (see 4.2.24);

— Certification (see 4.2.50);

— Contract (see 4.2.104);

— Date_and_person_assignment (see 4.2.117);

— Date_and_person_organization (see 4.2.118);

— Date_time (see 4.2.119);

— Date_time_assignment (see 4.2.120);

— Date_time_interval_assignment (see 4.2.121);

— Design_discipline_item_definition (see 4.2.142);

— Feature_parameter (see 4.2.201);

— General_parameter (see 4.2.226);

— Interval_of_time (see 4.2.266);

— Item (see 4.2.267);

— Item_version (see 4.2.275);

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— Item_version_relationship (see 4.2.276);

— Language (see 4.2.291);

— Multi_language_string (see 4.2.320);

— Numerical_value (see 4.2.324);

— Organization (see 4.2.331);

— Organization_in_contract (see 4.2.332);

— Person (see 4.2.346);

— Person_in_organization (see 4.2.347);

— Person_in_organization_relationship (see 4.2.348);

— Person_organization_assignment (see 4.2.349);

— Property_value (see 4.2.412);

— Security_classification (see 4.2.443);

— Security_level (see 4.2.444);

— Specific_item_classification (see 4.2.465);

— Specific_item_classification_hierarchy (see 4.2.466);

— String_value (see 4.2.478);

— String_with_language (see 4.2.479);

— Unit (see 4.2.541);

— Value_limit (see 4.2.544);

— Value_list (see 4.2.546);

— Value_range (see 4.2.547);

— Value_with_unit (see 4.2.549).

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4.1.23 element_structure (S2)

This unit of functionality provides the capability to associate items with shape or to identify aspects of the shape.

Additionally, this UoF contains elements that are needed to build up structures of data elements. The data elements that can be structured, are geometric elements, annotation elements, and kinematic elements. The supported structures are groups, layers, and templates for multiple instances of the same definition.

This UoF allows also to distinguish between geometric elements used as auxiliary elements and geometric elements that describe product data.

Additionally this UoF contains the capability of an empty geometric model with only a geometric element for placement purposes and an unconstrained three-dimensional geometric model that may contain any geometric data elements of other geometric UoFs in the same conformance class.

NOTE - This UoF is always available if other geometric UoFs are participating in a given conformance class, see Figure 5

The following application objects are used by the element_structure UoF:

— Accuracy (see 4.2.1);

— Axis_placement (see 4.2.33);

— Cartesian_coordinate_space (see 4.2.44);

— Cartesian_coordinate_space_2d (see 4.2.45);

— Cartesian_coordinate_space_3d (see 4.2.46);

— Change (see 4.2.55);

— Constructive_geometric_element (see 4.2.99);

— Constructive_geometry (see 4.2.100);

— Constructive_geometry_association (see 4.2.101);

— Full_model_change (see 4.2.213);

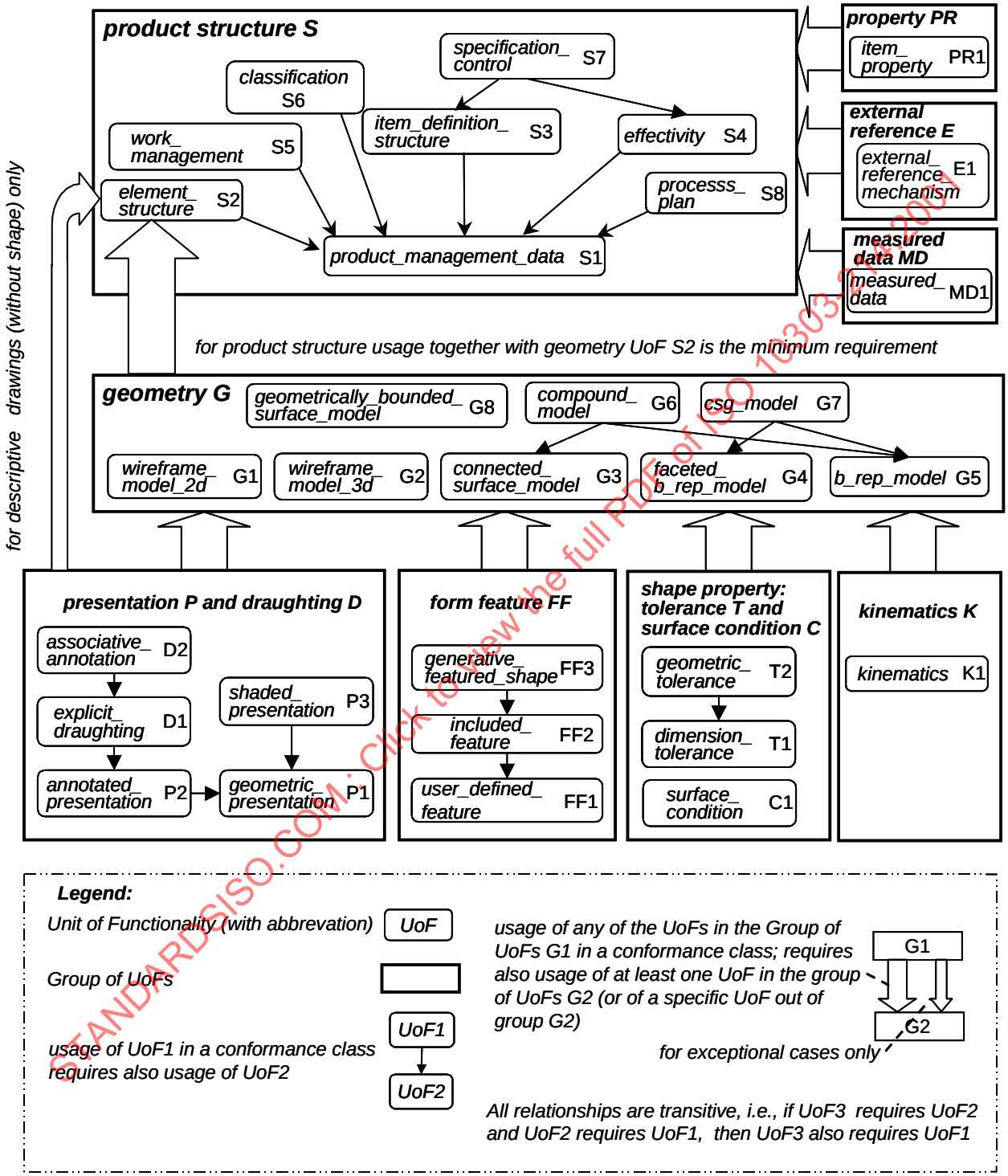
— General_shape_dependent_property (see 4.2.231);

— Geometric_model (see 4.2.238);

— Geometric_model_relationship (see 4.2.239);

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Figure 5 – Interdependencies among UoFs

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— Geometric_model_relationship_with_transformation (see 4.2.240);

— Geometric_model_version (see 4.2.241);

— Group (see 4.2.250);

— Group_relationship (see 4.2.251);

— Hybrid_geometric_model_3d (see 4.2.259);

— Incremental_model_change (see 4.2.262);

— Item_shape (see 4.2.274);

— Layer (see 4.2.292);

— Model_change (see 4.2.315);

— Shape_dependent_property (see 4.2.447);

— Shape_description_association (see 4.2.448);

— Shape_element (see 4.2.449);

— Shape_element_relationship (see 4.2.450);

— Structuring_method_hierarchy (see 4.2.480);

— Template_instance (see 4.2.512);

— Transformation (see 4.2.533);

— Transformation_2d (see 4.2.534);

— Transformation_3d (see 4.2.535).

4.1.24 item_definition_structure (S3)

This unit of functionality provides the capability to represent relationships between items to build up various kinds of structures.

The structures are defined for item definitions, for item instances that are particular occurrences of item definitions or between item definitions and item instances.

Among these structures is a hierarchical assembly structure to represent the relationships between constituents and the assembly.

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The following application objects are used by the item_definition_structure UoF:

— Alternate_item_relationship (see 4.2.9);

— Assembly_component_relationship (see 4.2.26);

— Assembly_definition (see 4.2.27);

— Assembly_substitute_relationship (see 4.2.28);

— General_item_definition_relationship (see 4.2.223);

— Geometrical_relationship (see 4.2.247);

— Item_definition_instance_relationship (see 4.2.268);

— Item_definition_relationship (see 4.2.269);

— Item_instance (see 4.2.271);

— Make_from_relationship (see 4.2.304);

— Next_higher_assembly (see 4.2.322);

— Product_constituent (see 4.2.395);

— Promissory_usage (see 4.2.408);

— Quantified_instance (see 4.2.417);

— Replaced_definition_relationship (see 4.2.430);

— Selected_instance (see 4.2.445);

— Single_instance (see 4.2.455);

— Specified_instance (see 4.2.472).

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4.1.25 effectivity (S4)

This unit of functionality provides the capability to represent information concerning the validity of data. Implicit propagation of data specifying validity is not available.

The validity of data can be expressed by effectivities that specify time ranges within which data may be used and by retention periods that specify how long data have to be kept and when they may or have to be deleted.

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Both concepts can make use of explicit dates or of dates expressed by events in order to represent the relevant points in time.

The following application objects are used by the effectivity UoF:

— Dated_configuration (see 4.2.122);

— Duration (see 4.2.174);

— Effectivity (see 4.2.179);

— Effectivity_assignment (see 4.2.180);

— Effectivity_relationship (see 4.2.181);

— Event_reference (see 4.2.184);

— Lot_configuration (see 4.2.303);

— Manufacturing_configuration (see 4.2.305);

— Product_class (see 4.2.392);

— Product_design (see 4.2.396);

— Product_identification (see 4.2.398);

— Retention_period (see 4.2.434);

— Serial_configuration (see 4.2.446).

4.1.26 work_management (S5)

This unit of functionality provides the capability to represent activity, project, and contract related information.

Activities may be initiated by work requests and may be authorized by work orders. Activities may result in changes of models or of properties; such changes can also be represented in this UoF.

The following application objects are used by the work_management UoF:

— Activity (see 4.2.2);

— Activity_element (see 4.2.3);

— Activity_method (see 4.2.4);

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— Activity_method_assignment (see 4.2.5);

— Activity_relationship (see 4.2.6);

— Change (see 4.2.55);

— Element_delivery (see 4.2.182);

— Organization_relationship (see 4.2.333);

— Project (see 4.2.404);

— Project_relationship (see 4.2.405);

— Work_order (see 4.2.564);

— Work_request (see 4.2.565).

4.1.27 classification (S6)

This unit of functionality provides the capability to classify items into specific categories.

EXAMPLE 1 Examples are the classification as raw materials, parts, or tools, or as safety or in-process items.

Additionally items may be classified by their attributes.

EXAMPLE 2 Examples for categories of attribute based classification are screws, bolts, nuts, shafts, or brackets.

The following application objects are used by the classification UoF:

— Classification_association (see 4.2.69);

— Classification_attribute (see 4.2.70);

— Classification_system (see 4.2.71);

— External_library_reference (see 4.2.188);

— General_classification (see 4.2.216);

— General_classification_hierarchy (see 4.2.217);

— Plib_class_reference (see 4.2.361);

— Plib_property_reference (see 4.2.362);

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— Specific_item_classification (see 4.2.465);

— Specific_item_classification_hierarchy (see 4.2.466).

4.1.28 specification_control (S7)

This unit of functionality provides the capability to describe products with a large number of variants.

EXAMPLE Examples for automotive products are passenger cars, trucks, busses, or engines or components of these products.

Because of the large number of variants there is no unique identification for each of the variants that could be produced. The main concepts that are used to handle this large number of variants are the following:

— product classes are used to identify sets of similar products to be offered to the market;

— specifications are used to describe characteristics of the products;

— specification categories are used to group similar characteristics of the products;

— specification expressions are used to control the usage of a part within a product and to represent conditions for product classes;

— product functions are used to describe the functional requirements for products and components of products;

— product components are used to describe the common decomposition structure of all products of a product class or of various alternative solutions;

— alternative solutions are used to describe the variants for a product component or for a product function;

— item instances are used to identify an occurrence of a component in an assembly structure, e.g., to identify the elements of an alternative solution;

— configurations are used to link the parts (item instances), alternative solutions, product components, or product functions with their usage cases, i.e., the conditions under which they are used;

— product specifications are used to identify a manufacturable product out of a product class by its specific characteristics (specifications), e.g., a customer order for a car;

— physical instances are used to identify actually manufactured physical parts or products by their lot id or serial number.

Figure 6 illustrates the relationships among these concepts.

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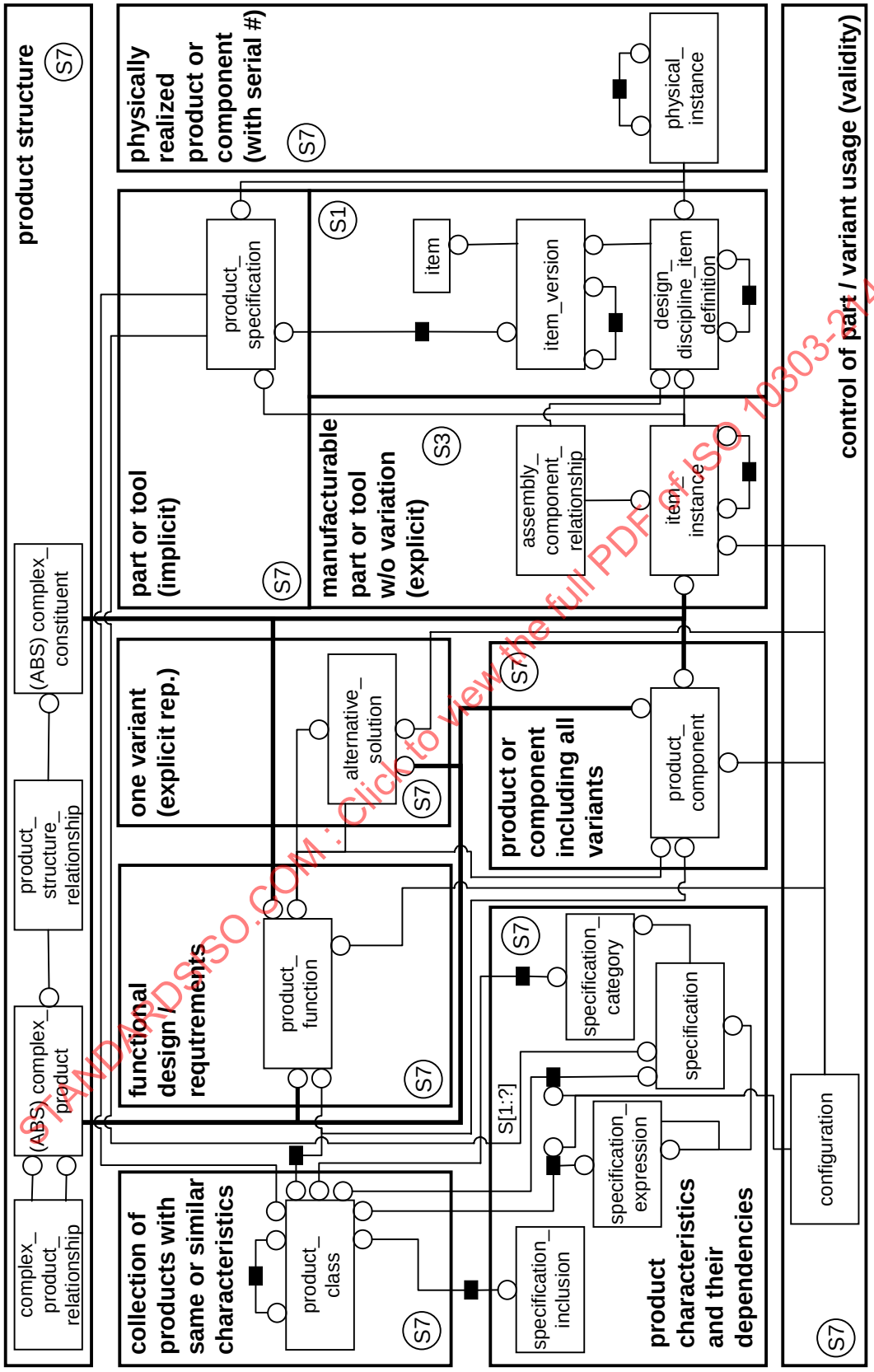


Figure 6 – UoF S7: ARM structure

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The following application objects are used by the specification_control UoF:

— Alternative_solution (see 4.2.10);

— Class_category_association (see 4.2.64);

— Class_condition_association (see 4.2.65);

— Class_inclusion_association (see 4.2.66);

— Class_specification_association (see 4.2.67);

— Class_structure_relationship (see 4.2.68);

— Collected_item_association (see 4.2.77);

— Collection_definition (see 4.2.78);

— Complex_product (see 4.2.80);

— Complex_product_relationship (see 4.2.81);

— Component_placement (see 4.2.82);

— Configuration (see 4.2.94);

— Descriptive_specification (see 4.2.137);

— Design_constraint (see 4.2.138);

— Design_constraint_association (see 4.2.139);

— Design_constraint_relationship (see 4.2.140);

— Design_constraint_version (see 4.2.141);

— Final_solution (see 4.2.206);

— General_item_definition_instance_relationship (see 4.2.222);

— General_item_instance_relationship (see 4.2.224);

— Instance_placement (see 4.2.264);

— Item_function_association (see 4.2.270);

— Item_instance_relationship (see 4.2.272);

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— Physical_assembly_relationship (see 4.2.350);

— Physical_instance (see 4.2.352);

— Physical_instance_test_result (see 4.2.353);

— Product_class (see 4.2.392);

— Product_class_relationship (see 4.2.393);

— Product_component (see 4.2.394);

— Product_function (see 4.2.397);

— Product_identification (see 4.2.398);

— Product_specification (see 4.2.399);

— Product_structure_relationship (see 4.2.400);

— Replaced_usage_relationship (see 4.2.431);

— Specification (see 4.2.467);

— Specification_category (see 4.2.468);

— Specification_category_hierarchy (see 4.2.469);

— Specification_expression (see 4.2.470);

— Specification_inclusion (see 4.2.471);

— Supplier_solution (see 4.2.488);

— Technical_solution (see 4.2.510).

4.1.29 process_plan (S8)

This unit of functionality provides the capability to represent process related data. This includes process plans, versions of process plans with version tracking, process operations and properties of processes.

A process plan is decomposed into one or more occurrences of process operations. Process plans and process operations establish relationships among raw materials, in-process items, and final items, as well as the relationship between the items and the tools used to manufacture them.

Additionally, the representation of the connection of parts in various kinds of mating is part of this UoF.

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The following application objects are used by the process_plan UoF:

— Descriptive_specification (see 4.2.137);

— Make_from_relationship (see 4.2.304);

— Mated_item_association (see 4.2.307);

— Mated_item_relationship (see 4.2.308);

— Mating_definition (see 4.2.313);

— Process_operation_definition (see 4.2.381);

— Process_operation_definition_relationship (see 4.2.382);

— Process_operation_input_or_output (see 4.2.383);

— Process_operation_occurrence (see 4.2.384);

— Process_operation_occurrence_relationship (see 4.2.385);

— Process_operation_resource_assignment (see 4.2.386);

— Process_plan (see 4.2.387);

— Process_plan_relationship (see 4.2.388);

— Process_plan_version (see 4.2.389);

— Process_state (see 4.2.391);

— Same_time_machining_relationship (see 4.2.442);

— Tool_part_relationship (see 4.2.528).

4.1.30 dimension_tolerance (T1)

This unit of functionality specifies the representation of geometric dimensions and of tolerances limiting geometric dimensions. Tolerances for geometric dimensions are characterized by plus-minus-tolerances, limits and fits, dimension ranges, or dimension limits and describe the allowable deviation range.

The definition of the presentation of the Tolerance information is dealt with in the associative_annotation UoF (D2).

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The following application objects are used by the dimension_tolerance UoF:

— Angular_location_dimension (see 4.2.13);

— Angular_size_dimension (see 4.2.14);

— Curved_distance_dimension (see 4.2.113);

— Default_setting_association (see 4.2.132);

— Default_thickness (see 4.2.134);

— Derived_geometry (see 4.2.136);

— General_size_dimension (see 4.2.232);

— General_tolerance_table (see 4.2.234);

— General_tolerances (see 4.2.235);

— Geometric_dimension (see 4.2.237);

— Limits_and_fits (see 4.2.295);

— Linear_distance_dimension (see 4.2.299);

— Location_dimension (see 4.2.301);

— Measurement_path (see 4.2.314);

— Plus_minus_bounds (see 4.2.363);

— Plus_minus_toleranced_datum (see 4.2.364);

— Significant_number_of_digits (see 4.2.452);

— Size_dimension (see 4.2.456);

— Thickness_dimension (see 4.2.516);

— Tolerance_table_cell (see 4.2.523);

— Upper_lower_limit (see 4.2.542);

— Upper_lower_toleranced_datum (see 4.2.543);

— Value_limitation (see 4.2.545).

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4.1.31 geometric_tolerance (T2)

This unit of functionality specifies the representation of geometric tolerances with a datum reference, such as parallelism or perpendicularity, and also geometric tolerances without a datum reference, such as straightness or flatness.

The tolerances are defined relative to the ideal shape of the toleranced object.

This UoF allows the definition of up to three datum references that are either single datum references, compound datum references, or datum targets and additionally the specification of tolerance zones.

The definition of the presentation of the Tolerance information is dealt with in the associative_annotation UoF (D2).

The following application objects are used by the geometric_tolerance UoF:

— Angularity_tolerance (see 4.2.15);

— Circular_runout_tolerance (see 4.2.63);

— Coaxiality_tolerance (see 4.2.76);

— Compound_datum (see 4.2.84);

— Concentricity_tolerance (see 4.2.93);

— Cylindricity_tolerance (see 4.2.115);

— Datum (see 4.2.123);

— Datum_target (see 4.2.125);

— Datum_target_set (see 4.2.127);

— Derived_geometry (see 4.2.136);

— Flatness_tolerance (see 4.2.211);

— Geometric_tolerance (see 4.2.243);

— Geometric_tolerance_relationship (see 4.2.245);

— Line_profile_tolerance (see 4.2.297);

— Parallelism_tolerance (see 4.2.338);

— Perpendicularity_tolerance (see 4.2.345);

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— Placed_target (see 4.2.357);

— Position_tolerance (see 4.2.378);

— Projection (see 4.2.406);

— Reference_plane (see 4.2.429);

— Roundness_tolerance (see 4.2.441);

— Single_datum (see 4.2.454);

— Straightness_tolerance (see 4.2.477);

— Surface_profile_tolerance (see 4.2.499);

— Symmetry_tolerance (see 4.2.503);

— Target_area (see 4.2.505);

— Target_circle (see 4.2.506);

— Target_line (see 4.2.507);

— Target_point (see 4.2.508);

— Target_rectangle (see 4.2.509);

— Tolerance_condition (see 4.2.522);

— Tolerance_zone (see 4.2.524);

— Tolerance_zone_definition (see 4.2.525);

— Total_runout_tolerance (see 4.2.532).

4.2 Application objects

This subclause specifies the application objects for the Core data for automotive mechanical design processes application protocol. Each application object is an atomic element that embodies a unique application concept and contains attributes specifying the data elements of the object. The application objects and their definitions are given below.

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NOTE 1 - The following conventions apply for the definition text:

— lower case terms refer to the concept known in the application environment, e.g., 'circle' refers to the concept of a round planar figure whose circumference is everywhere equidistant from its centre;

— terms with a first upper case character refer to the application objects as defined in this part of ISO 10303, e.g., 'Circle' refers to the application object as defined in the geometric UoFs.

The attribute names 'id', 'name', and 'description' imply the following meanings:

— id: a computer interpretable identifier;

— name: human readable information;

— description: descriptive text.

NOTE 2 - The id is not a system generated identifier used by an implementation to distinguish between the various objects but it is an identifier that has a certain meaning in an application and that may be meaningful to a human being as well.

NOTE 3 - In cases where unique identifiers are required, identifiers with a format according to ISO 6523 [17] may be used.

In this clause, a permissive list approach for attributes with suffix '_type' or with name 'role' is used consistently, i.e., there is a list of standardized values with the specific semantics defined. However, the usage of other non-standardized values is also allowed.

NOTE 4 - Especially many relationship objects are defined in a general way where the attribute 'relation_-type' defines the standardized usages with a definition of the meaning of the other attributes, like 'relating' and 'related'.

4.2.1 Accuracy

An Accuracy is the information about the geometrical accuracy of the product data contained in a model.

The data associated with an Accuracy are the following:

— accuracy_type;

— accuracy_value;

— description;

— is_defined_for.

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4.2.1.1 accuracy_type

The accuracy_type specifies the kind of accuracy that is applied. Where applicable, the following values shall be used:

— 'angular accuracy': A kind of accuracy that specifies the maximum value for the absolute angle between two curve tangents or two surface normals for which the creating system assumes curve tangents or surface normals being identical;

NOTE 1 - The angular accuracy value can be used to determine the accuracy range for tangent continuous curve or surface connections.

— 'curvature accuracy': A kind of accuracy that specifies the value for the term

$$\frac{2 \parallel R_1 - R_2 \parallel}{\parallel R_1 \parallel + \parallel R_2 \parallel}$$

under which a system can assume that the two radii of curvature R_1 and R_2 are identical. The curvature accuracy value is used to determine the accuracy range for curvature continuous curve or surface connections;

NOTE 2 - Terms surrounded by the $\parallel$ symbols represent the absolute values of these terms.

— 'distance accuracy': A kind of accuracy that specifies the distance under which two points can be considered as having the same location. The distance accuracy value defined for a Geometric_model (see 4.2.238) is valid for all geometric elements of the Geometric_model.

4.2.1.2 accuracy_value

The accuracy_value specifies a numerical value defining the Accuracy.

4.2.1.3 description

The description specifies additional information about the Accuracy.

See 4.3.4 for the application assertion.

The description need not be specified for a particular Accuracy (see 4.2.1).

If present, there shall be exactly one object that defines the description for an Accuracy.

4.2.1.4 is_defined_for

The is_defined_for specifies the geometry to which the Accuracy is assigned.

See 4.3.1, 4.3.2, 4.3.3, 4.3.5, and 4.3.6 for the application assertions.

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There shall be at least one object that the Accuracy (see 4.2.1) is_defined_for.

4.2.2 Activity

An Activity is the fact of achieving or accomplishing an action.

The data associated with an Activity are the following:

— activity_type;

— actual_end_date;

— actual_start_date;

— chosen_method;

— concerned_organization;

— description;

— id;

— internal;

— planned_end_date;

— planned_start_date;

— requestor;

— resolved_request;

— status;

— supplying_organization.

4.2.2.1 activity_type

The activity_type specifies the purpose of the Activity. Where applicable, the following values shall be used:

— 'amendment': An Activity to add information to product data;

— 'analysis': An Activity to determine the behaviour of an element under certain physical circumstances;

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— ’cancellation’: An Activity to delete an element from the bill of material or to cancel the whole bill of material;

— ’delivery change’: An Activity to change the delivery schedule of an element;

— ’design change’: An Activity to change the design of an item or an assembly; this might include changes to the geometry or to properties of the object;

— ’design’: An Activity concerning the development of a design of an item;

— ’mock-up creation’: An Activity to create an experimental model or replica of an item;

— ’prototype building’: An Activity to manufacture a preliminary version of an item;

— ’rectification’: An Activity to correct the data, documentation or structure associated with an item;

— ’restructuring’: An Activity to create a new structure or position within a bill of material without changing the data associated with the items in the bill of material;

— ’spare part creation’: An Activity to design a spare part or to classify an item as a spare part;

— ’stop notice’: An Activity to stop the manufacturing process of an item;

— ’testing’: An Activity to test an item;

— ’work definition’: An Activity to manage several sub-activities related to this Activity by an Activity_relationship (see 4.2.6) with a ’relation_type’ of value ’decomposition’.

4.2.2.2 actual_end_date

The actual_end_date specifies the date when the Activity actually finished.

See 4.3.9 for the application assertion.

The actual_end_date need not be specified for a particular Activity (see 4.2.2).

4.2.2.3 actual_start_date

The actual_start_date specifies the date when the Activity actually started.

See 4.3.9 for the application assertion.

The actual_start_date need not be specified for a particular Activity (see 4.2.2).

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4.2.2.4 chosen_method

The chosen_method specifies the Activity_method (see 4.2.4) used to carry out the Activity.

See 4.3.7 for the application assertion.

The chosen_method need not be specified for a particular Activity (see 4.2.2).

4.2.2.5 concerned_organization

The concerned_organization specifies the set of Organization (see 4.2.331) objects that are affected by the result of the Activity.

EXAMPLE The production site that has to change a manufacturing process due to a design change activity is an example for concerned_organization.

See 4.3.13 for the application assertion.

4.2.2.6 description

The description specifies additional information about the Activity.

See 4.3.12 for the application assertion.

The description need not be specified for a particular Activity (see 4.2.2).

If present, there shall be exactly one object that defines the description for an Activity.

4.2.2.7 id

The id specifies the identifier of the Activity.

4.2.2.8 internal

The internal specifies whether the activity is carried out within the organization that initiated the activity. A value of 'true' indicates that the activity is carried out within this particular organization.

The internal need not be specified for a particular Activity (see 4.2.2).

4.2.2.9 planned_end_date

The planned_end_date specifies the date when the Activity is or was supposed to be finished.

See 4.3.9, 4.3.10, and 4.3.11 for the application assertions.

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The planned_end_date need not be specified for a particular Activity (see 4.2.2).

If present, there shall be exactly one object that defines the planned_end_date for an Activity.

4.2.2.10 planned_start_date

The planned_start_date specifies the date when the Activity is or was supposed to be started.

See 4.3.9 and 4.3.11 for the application assertions.

The planned_start_date need not be specified for a particular Activity (see 4.2.2).

If present, there shall be exactly one object that defines the planned_start_date for an Activity.

4.2.2.11 requestor

The requestor specifies the Person (see 4.2.346) or Organization (see 4.2.331) that requested the Activity and the date the request was submitted.

See 4.3.8 for the application assertion.

The requestor need not be specified for a particular Activity (see 4.2.2).

4.2.2.12 resolved_request

The resolved_request specifies the set of Work_request (see 4.2.565) objects that are resolved by the Activity.

See 4.3.14 for the application assertion.

4.2.2.13 status

The status specifies the level of completion of the Activity.

EXAMPLE The value 'open' is an example for status.

NOTE - The values and sequence of status are company specific.

The status need not be specified for a particular Activity (see 4.2.2).

4.2.2.14 supplying_organization

The supplying_organization specifies the set of Organization (see 4.2.331) objects that carry out the work.

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See 4.3.13 for the application assertion.

4.2.3 Activity_element

An Activity_element is an item of work that is part of an Activity (see 4.2.2).

The data associated with an Activity_element are the following:

— associated_activity;

— element;

— role.

4.2.3.1 associated_activity

The associated_activity specifies the Activity (see 4.2.2) the Activity_element belongs to.

See 4.3.15 for the application assertion.

4.2.3.2 element

The element specifies the piece of product data that is under work.

See 4.3.16, 4.3.17, 4.3.18, 4.3.19, 4.3.20, 4.3.21, 4.3.22, 4.3.23, 4.3.24, 4.3.25, 4.3.26, 4.3.27, 4.3.28, 4.3.29, 4.3.30, 4.3.31, 4.3.32, 4.3.33, 4.3.34, 4.3.35, 4.3.36, 4.3.37, 4.3.38, 4.3.39, 4.3.40, 4.3.41, 4.3.42, 4.3.43, 4.3.44, 4.3.45, 4.3.46, 4.3.47, 4.3.48, 4.3.49, 4.3.50, 4.3.51, 4.3.52, 4.3.53, 4.3.54, 4.3.55, 4.3.56, 4.3.57, 4.3.58, and 4.3.59 for the application assertions.

There shall be exactly one object that defines the element for an Activity_element (see 4.2.3).

4.2.3.3 role

The role specifies the function that is performed by the Activity_element in the context of the concerned Activity (see 4.2.2). Where applicable, the following values shall be used:

— 'control': The referenced element is an object that has immediate influence on the Activity performed;

> EXAMPLE Design lots used in the design of a component that fulfils a given product function may be identified as Activity_element objects that refer to this Product_function (see 4.2.397) in the role of 'control'.

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— ’input’: The referenced element serves as initial data for the Activity;

— ’output’: The referenced element is a result of the Activity.

4.2.4 Activity_method

An Activity_method is a procedure that may be used to solve a request.

The data associated with an Activity_method are the following:

— consequence;

— description;

— name.

4.2.4.1 consequence

The consequence specifies the expected positive or negative effects of the application of a particular Activity_method.

The consequence need not be specified for a particular Activity_method (see 4.2.4).

4.2.4.2 description

The description specifies additional information that defines the Activity_method in terms of either the nature of the Activity_method or in terms of the specific procedure steps required to implement it.

See 4.3.60 for the application assertion.

There shall be exactly one object that defines the description for an Activity_method (see 4.2.4).

4.2.4.3 name

The name specifies the word or group of words by which the Activity_method is referred to.

See 4.3.60 for the application assertion.

There shall be exactly one object that defines the name for an Activity_method (see 4.2.4).

4.2.5 Activity_method_assignment

An Activity_method_assignment is an object that associates an Activity_method (see 4.2.4) with a Work_request (see 4.2.565). The associated Activity_method serves as a recommended or non-recommended method to resolve the tasks specified in the Work_request.

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The data associated with an Activity_method_assignment are the following:

— assigned_method;

— associated_request;

— relation_type.

4.2.5.1 assigned_method

The assigned_method identifies the Activity_method (see 4.2.4) that is recommended or that shall not be chosen.

See 4.3.61 for the application assertion.

4.2.5.2 associated_request

The associated_request identifies the Work_request (see 4.2.565) that the recommended or non – recommended method applies to.

See 4.3.62 for the application assertion.

4.2.5.3 relation_type

The relation_type specifies whether the specified Activity_method (see 4.2.4) may be used or not. Where applicable, the following values shall be used:

— 'non recommended method': The specified Activity_method shall not be used in order to accomplish the specified Work_request (see 4.2.565);

— 'recommended method': The specified Activity_method may be used in order to accomplish the specified Work_request.

NOTE – Several alternative recommended methods may exist.

4.2.6 Activity_relationship

An Activity_relationship is a relationship between two Activity (see 4.2.2) objects.

The data associated with an Activity_relationship are the following:

— description;

— related;

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— relating;

— relation_type.

4.2.6.1 description

The description specifies additional information about the Activity_relationship.

See 4.3.64 for the application assertion.

The description need not be specified for a particular Activity_relationship (see 4.2.6).

If present, there shall be exactly one object that defines the description for an Activity_relationship.

4.2.6.2 related

The related specifies the second of the two Activity (see 4.2.2) objects related by an Activity_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.63 for the application assertion.

4.2.6.3 relating

The relating specifies the first of the two Activity (see 4.2.2) objects related by an Activity_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.63 for the application assertion.

4.2.6.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'alternative': The application object defines a relationship where the related Activity (see 4.2.2) may be used alternatively instead of the relating Activity;

— 'decomposition': The application object defines a relationship where the related Activity is one of potentially more sub-activities into which the relating Activity is broken down;

— 'derivation': The application object defines a relationship where the related Activity is derived from the relating Activity;

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EXAMPLE An Activity that is controlled by a Work_order (see 4.2.564) with work order type 'manufacturing release' may be derived from (is based on) another Activity controlled by another Work_order with 'work_order_type' 'design release'.

— 'exclusiveness': The application object defines a relationship where the relating and the related Activity shall not have any overlap in time of execution;

— 'precedence': The application object defines a relationship where the related Activity has higher priority than the relating Activity;

— 'sequence': The application object defines a relationship where the relating Activity shall be completed before the related Activity starts;

— 'simultaneity': The application object defines a relationship that establishes that both the relating and related Activity are considered as occurring during the same time period or shall be performed together in order to ensure consistency and enhance efficiency.

NOTE - The criteria for 'simultaneity' and in particular the allowed delay between two Activity objects declared simultaneous, are user-dependent.

4.2.7 Actuator

An Actuator is a mechanism that applies forces or moments to a Kinematic_pair (see 4.2.287) in such a way that a defined motion results.

The data associated with an Actuator are the following:

— is_applied_to;

— name.

4.2.7.1 is_applied_to

The is_applied_to specifies the Kinematic_pair (see 4.2.287) that the Actuator is actuating.

See 4.3.65 for the application assertion.

4.2.7.2 name

The name specifies the word or group of words by which the Actuator is referred to.

EXAMPLE 'cylinder' is an example for a name.

See 4.3.66 for the application assertion.

There shall be exactly one object that defines the name for an Actuator (see 4.2.7).

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4.2.8 Alias_identification

An Alias_identification is a mechanism to associate an object with an additional identifier that is used to identify the object of interest in a different context, either in another Organization (see 4.2.331), or in some other context. The scope of the Alias_identification shall be specified either by the attribute 'alias_scope' or by the attribute 'description'.

EXAMPLE A document (e.g., a book) may have a unique document id (ISBN) and an Alias_identification as inventory number in the context of the inventory of a company.

The data associated with an Alias_identification are the following:

— alias_id;

— alias_scope;

— alias_version_id;

— description;

— is_applied_to.

4.2.8.1 alias_id

The alias_id specifies the identifier used in the context specified by the alias_scope, or by the description.

4.2.8.2 alias_scope

The alias_scope specifies the Organization (see 4.2.331) in which the Alias_identification is valid.

See 4.3.82 for the application assertion.

The alias_scope need not be specified for a particular Alias_identification (see 4.2.8).

4.2.8.3 alias_version_id

The alias_version_id specifies the version of the object as known in the context of the Alias_identification.

NOTE - An alias_version_id may be applied even if the object of interest does not have versions.

The alias_version_id need not be specified for a particular Alias_identification (see 4.2.8).

4.2.8.4 description

The description specifies the type of the Alias_identification.

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EXAMPLE The description may be, e.g., 'inventory number'.

See 4.3.81 for the application assertion.

The description need not be specified for a particular Alias_identification (see 4.2.8).

If present, there shall be exactly one object that defines the description for an Alias_identification.

4.2.8.5 is_applied_to

The is_applied_to specifies the object that has an Alias_identification.

NOTE - If applied to an Approval_status (see 4.2.24), a Document_type_property (see 4.2.166), or a Security_level (see 4.2.444), it is not the id but the name that is being aliased.

See 4.3.67, 4.3.68, 4.3.69, 4.3.70, 4.3.71, 4.3.72, 4.3.73, 4.3.74, 4.3.75, 4.3.76, 4.3.77, 4.3.78, 4.3.79, 4.3.80, 4.3.82, 4.3.83, 4.3.84, 4.3.85, 4.3.86, 4.3.87, 4.3.88, and 4.3.89 for the application assertions.

There shall be exactly one object that the Alias_identification (see 4.2.8) is_applied_to.

4.2.9 Alternate_item_relationship

An Alternate_item_relationship is the relationship between two Item (see 4.2.267) objects specifying that all versions of the alternate Item may be used in place of the base Item, regardless of its usages and of its versions.

NOTE - This concept usually refers to form, fit, function, and quality. Additional properties such as performance, noise, endurance, or reliability may also be considered as a prerequisite for the replacement.

The data associated with an Alternate_item_relationship are the following:

— alternate;

— base;

— fulfilled_requirements.

4.2.9.1 alternate

The alternate specifies the Item (see 4.2.267) that may be used in place of the base Item.

See 4.3.90 for the application assertion.

4.2.9.2 base

The base specifies the Item (see 4.2.267) for which another Item may be used as a replacement.

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See 4.3.90 for the application assertion.

4.2.9.3 fulfilled_requirements

The fulfilled_requirements specifies the word or group of words describing the requirements that are covered by both the base and the alternate and therefore are the basis for the statement regarding the capability of replacement.

See 4.3.91 for the application assertion.

There shall be exactly one object that defines the fulfilled_requirements for an Alternate_item_relationship (see 4.2.9).

4.2.10 Alternative_solution

An Alternative_solution is the identification of one of potentially many mutually exclusive implementations of a Product_function (see 4.2.397) or of a Product_component (see 4.2.394).

An Alternative_solution may refer directly to the object to be implemented or to another Alternative_solution object. In the latter case it serves as a refinement of the referenced Alternative_solution.

An Alternative_solution shall be instantiated only, if it is decomposed further into Product_component or Product_function objects.

NOTE 1 - An Alternative_solution may specify (through Product_structure_relationship (see 4.2.400) with 'relation_type' 'functionality' or 'realization') a set of objects that jointly form this implementation.

NOTE 2 - Each Alternative_solution may be any combination of Final_solution (see 4.2.206), Supplier_solution (see 4.2.488), and Technical_solution (see 4.2.510).

An Alternative_solution is a type of Complex_product (see 4.2.80).

Each Alternative_solution may be a Technical_solution (see 4.2.510), a Supplier_solution (see 4.2.488), or a Final_solution (see 4.2.206).

The data associated with an Alternative_solution are the following:

— base_element

The base_element specifies the object, for which the Alternative_solution provides a design alternative. All Alternative_solution objects for the same base_element are mutually exclusive.

See 4.3.92, 4.3.93, and 4.3.94 for the application assertions.

There shall be exactly one object that defines the base_element for an Alternative_solution.

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4.2.11 Angle_specification

An Angle_specification is an angle value and the specification of the element from which the angle is measured.

EXAMPLE Figure **??** shows two examples of the use of an Angle_specification for the definition of a Form_feature_in_panel (see 4.2.212).

The data associated with an Angle_specification are the following:

— angle;

— angle_reference.

4.2.11.1 angle

The angle specifies the Feature_parameter (see 4.2.201) that represents the angle.

NOTE - Depending on the direction of the vector that serves as the reference for the angle measurement positive or negative values may be used.

See 4.3.95 for the application assertion.

4.2.11.2 angle_reference

The angle_reference specifies the element the angle is measured from. The following values shall be used:

— 'profile normal': The angle is measured from a direction normal to the profile plane;

— 'punch direction': The angle is measured from the punch direction that is specified for the Process_-feature_in_panel (see 4.2.379);

— 'surface normal': The angle is measured from the actual surface normal.

4.2.12 Angle_taper

An Angle_taper is an angular deviation from a linear path. The Angle_taper is measured from the Linear_path (see 4.2.300) that is the sweep path of the feature to which the Angle_taper is applied. The start of the Linear_path is the start of the taper.

Tapers shall be applied after general end conditions are applied.

EXAMPLE Figure 8 illustrates the application of an Angle_taper.

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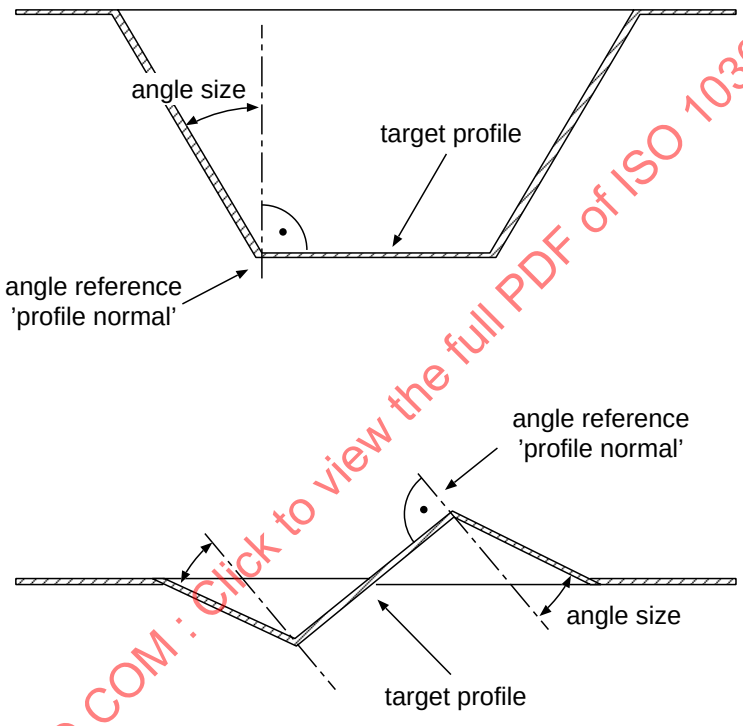


Figure 7 – Form features in panel defined by target boundaries and wall angles

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The data associated with an Angle_taper are the following:

— angle

The angle specifies the amount of angular deviation. An angle between 0 and 90 degrees or between -90 and -180 degrees indicates that the profile grows larger along the sweep path. An angle between 0 and -90 degrees or between 90 and 180 degrees indicates that the profile grows smaller along the sweep path.

See 4.3.96 for the application assertion.

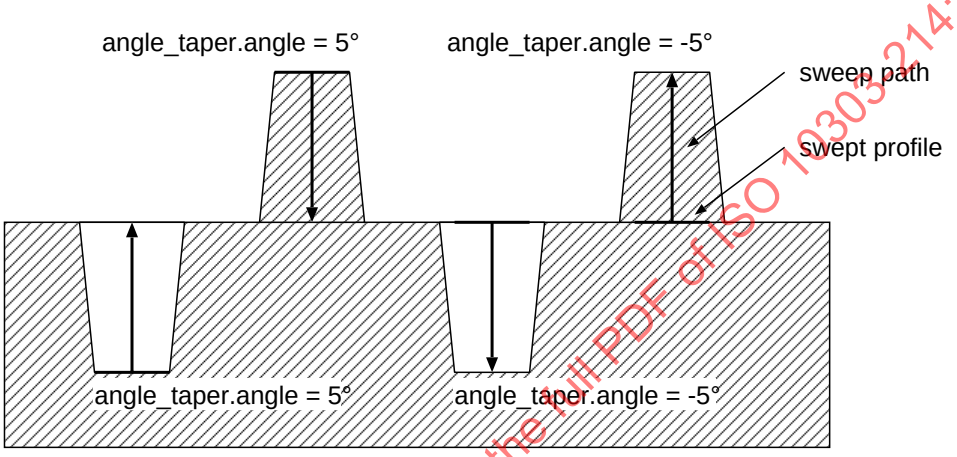


Figure 8 – Parameters defining an Angle_taper

4.2.13 Angular_location_dimension

An Angular_location_dimension is the representation of a geometrical angular constraint concerning the position of two elements.

NOTE - In the following, the first referenced element (plane or line) of the angular constraint is called origin and the second referenced element (plane or line) is called target.

EXAMPLE Figure 9 illustrates the application of the attributes of an Angular_location_dimension.

An Angular_location_dimension is a type of Location_dimension (see 4.2.301).

The data associated with an Angular_location_dimension are the following:

— major_angle;

— mirror_target;

— origin_determination.

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4.2.13.1 major_angle

The major_angle specifies a Boolean value that indicates the way the dimension is defined. A value of 'true' specifies the angle to be the larger of the two angles formed by the two elements that are referred to by the Angular_location_dimension.

NOTE - This attribute is used in combination with the other attributes to determine the angle that is constrained.

4.2.13.2 mirror_target

The mirror_target specifies a Boolean value that indicates whether the element that defines the target of the limitation is to be mirrored in order to define the angle whose dimension is specified. A value of 'true' indicates that the target object is mirrored about a plane orthogonal to it through the intersection point of the origin and the target.

4.2.13.3 origin_determination

The origin_determination specifies the method used to identify the first of the two elements that form the angle. The following values shall be used:

— 'unchanged': The Angular_location_dimension is measured from the origin as identified;

— 'mirror': The Angular_location_dimension is measured from the origin that is mirrored about a plane orthogonal to it through the intersection point of the origin and the target;

— 'positive normal': The Angular_location_dimension is measured from a line or plane that is positive normal to the identified origin through the intersection point of the origin and the target. Positive normal means into that half space where the target is located;

— 'negative normal': The Angular_location_dimension is measured from a line or plane that is negative normal to the identified origin through the intersection point of the origin and the target. Negative normal means into that half space where the target is not located.

4.2.14 Angular_size_dimension

An Angular_size_dimension is a dimension representing an angular size of an aspect of a part.

EXAMPLE Figure 10 shows the difference between an Angular_size_dimension and an Angular_location_dimension (see 4.2.13).

NOTE - For each combination of values of the attribute 'full' and 'major_angle' the value of the Angular_size_dimension remains positive.

An Angular_size_dimension is a type of Size_dimension (see 4.2.456).

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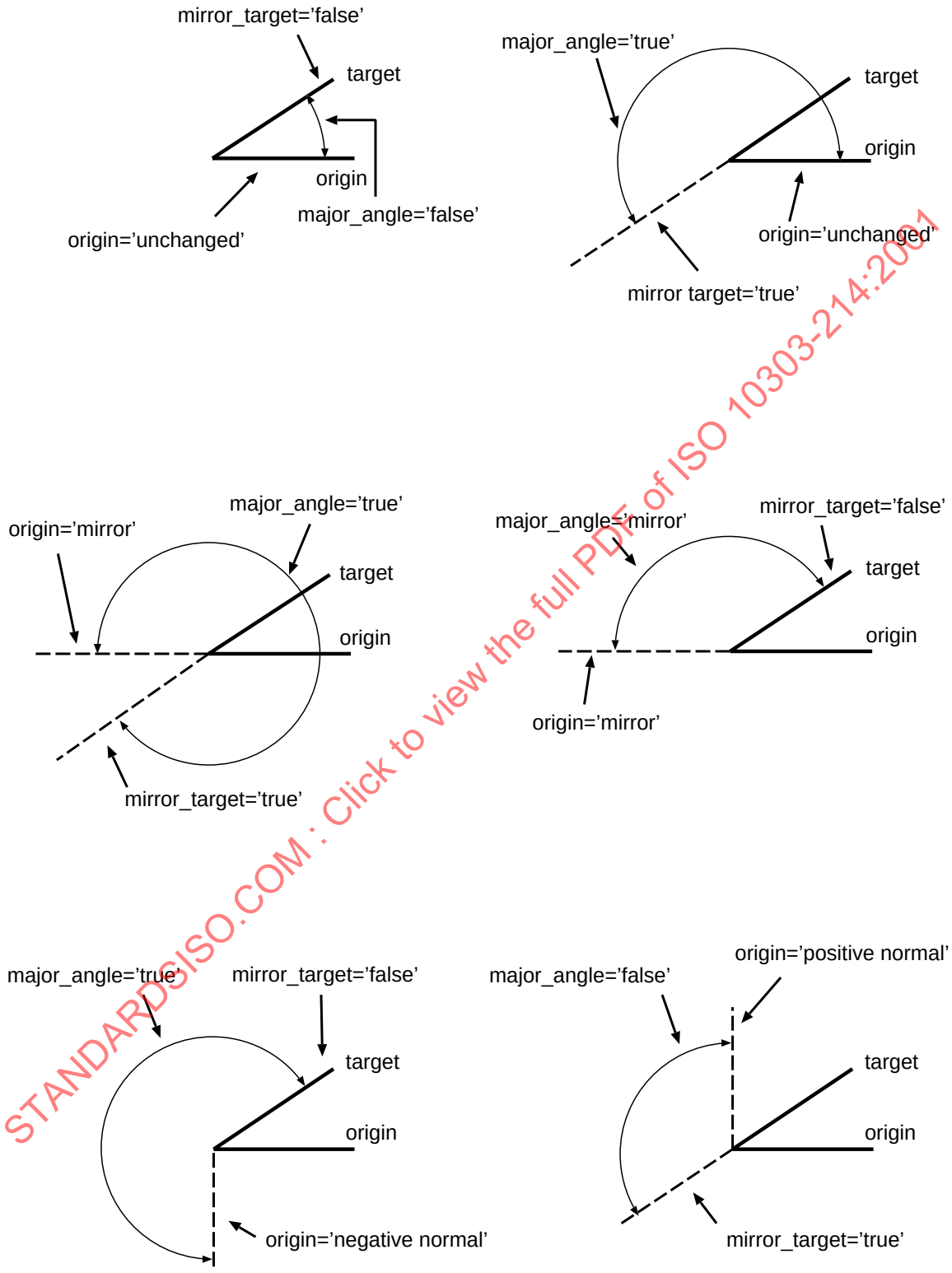


Figure 9 – Parameters defining an Angular_location_dimension

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The data associated with an Angular_size_dimension are the following:

— full;

— major_angle.

4.2.14.1 full

The full specifies the method used to establish the Angular_size_dimension. A value of 'true' specifies the angle is established between the two sides of the angular element. A value of 'false' specifies the angle is established between the bisector line and the angular element.

4.2.14.2 major_angle

The major_angle specifies which one of the two possible angles is meant. A value of 'true' specifies the angle to be the larger of the two angles formed by the angular element.

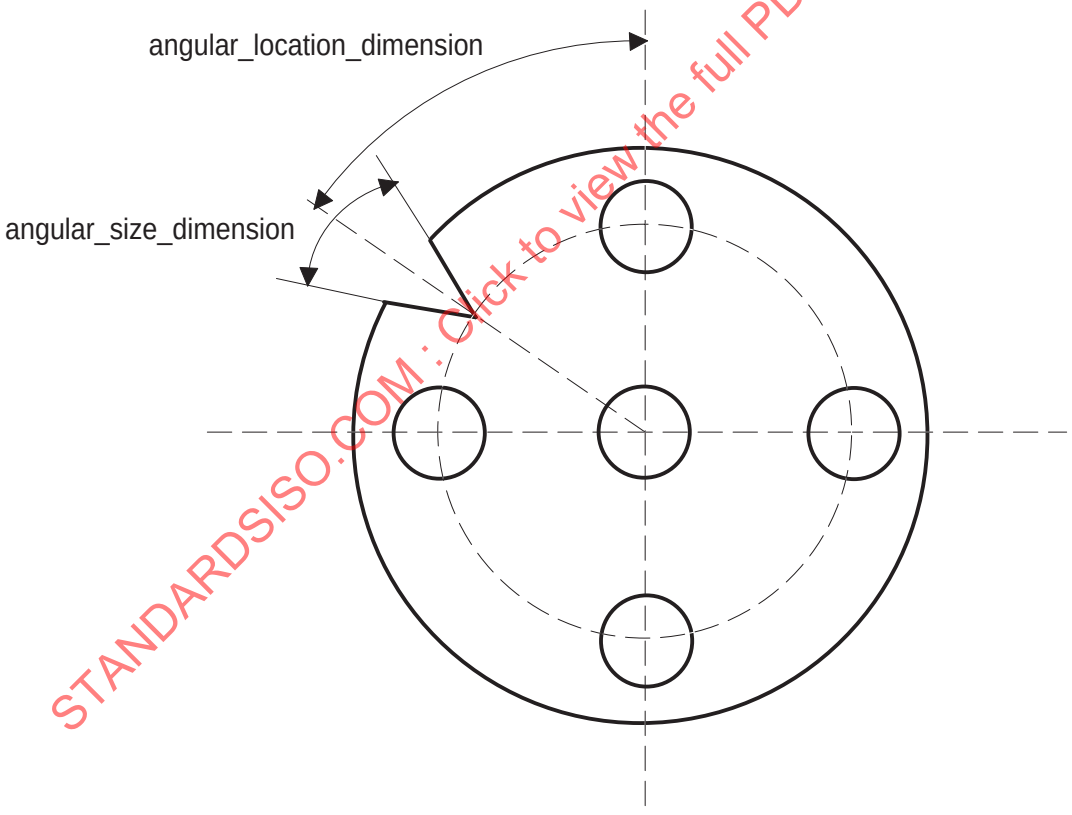


Figure 10 – Angular_location_dimension versus Angular_size_dimension

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4.2.15 Angularity_tolerance

An Angularity_tolerance is a constraint on the location of a surface, of a centre plane, of an edge, or of an axis that lies theoretically at a specified angle (other than 90 degrees) from a datum plane or from a datum axis. An Angularity_tolerance specifies one of the following:

— a tolerance zone defined by two parallel planes at the specified basic angle from a datum plane or axis within which the considered element must lie;

— a tolerance zone defined by a cylinder at the specified basic angle from a datum plane or axis within which the considered element must lie.

An Angularity_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with an Angularity_tolerance are the following:

— reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.97 for the application assertion.

4.2.16 Annotation_curve

An Annotation_curve is a two-dimensional trimmed curve that is used to annotate a drawing or a geometric model.

An Annotation_curve is a type of Annotation_element (see 4.2.17).

Each Annotation_curve may be a Projection_curve (see 4.2.407), a Dimension_curve (see 4.2.151), or a Leader (see 4.2.293).

The data associated with an Annotation_curve are the following:

— annotation_curve_type

The annotation_curve_type specifies the kind of annotation curve. This information is provided with respect to the intended usage of the annotated object.

EXAMPLE 'centre line' is an example for annotation_curve_type.

The annotation_curve_type need not be specified for a particular Annotation_curve.

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4.2.17 Annotation_element

An Annotation_element is a representation of an annotation.

An Annotation_element is a type of Styled_element (see 4.2.482).

Each Annotation_element is a Text (see 4.2.514), an Annotation_subfigure (see 4.2.18), an Annotation_curve (see 4.2.16), an Annotation_symbol (see 4.2.19), or a Fill_area (see 4.2.204).

4.2.18 Annotation_subfigure

An Annotation_subfigure is the occurrence of a template that contains annotation elements. An Annotation_subfigure is located within the coordinate system of a Drawing_sheet (see 4.2.173), a Styled_model (see 4.2.484), or a View (see 4.2.554).

EXAMPLE Figure 11 depicts an Annotation_subfigure.

An Annotation_subfigure is a type of Annotation_element (see 4.2.17).

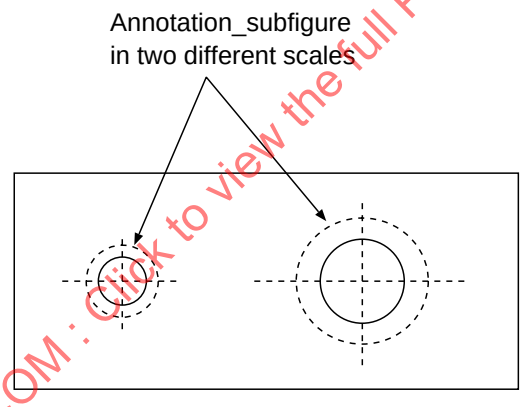


Figure 11 – Annotation_subfigure for a hole on a technical drawing

4.2.19 Annotation_symbol

An Annotation_symbol is an annotation presenting a symbol.

An Annotation_symbol is either user-defined, externally defined, or pre-defined. The set of pre-defined symbols comprises the following:

— Geometrical tolerance symbols;

— Surface condition symbols;

— Dimension symbols;

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— Terminator symbols;

— Point marker symbols.

An Annotation_symbol is a type of Annotation_element (see 4.2.17).

The data associated with an Annotation_symbol are the following:

— symbol_definition

The symbol_definition specifies the symbol that defines this annotation.

See 4.3.98, 4.3.99, 4.3.100, 4.3.101, 4.3.102, and 4.3.103 for the application assertions.

There shall be exactly one object that defines the symbol_definition for an Annotation_symbol.

4.2.20 Appearance_assignment

An Appearance_assignment is the assignment of visual appearance characteristics to geometric elements and to annotation.

The appearance can be defined explicitly for each represented element or for a context in which the elements are represented. Several appearance components for the representation of the different kinds of elements can be associated with the Appearance_assignment.

Each Appearance_assignment may be a Context_dependent_appearance_assignment (see 4.2.103).

The data associated with an Appearance_assignment are the following:

— component

The component specifies the various appearance objects that define the appearance of geometric and annotation objects.

See 4.3.104, 4.3.105, 4.3.106, 4.3.107, 4.3.108, 4.3.109, and 4.3.110 for the application assertions.

There shall be at least one object that defines the component for an Appearance_assignment.

4.2.21 Application_context

An Application_context is a shared universe of discourse.

The data associated with an Application_context are the following:

— application_domain;

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— description;

— life_cycle_stage.

4.2.21.1 application_domain

The application_domain is the identification of the applications for which an object may be relevant. Where applicable, the following values shall be used:

— 'assembly study': The object may be relevant for an assembly study;

— 'digital mock-up': The object may be relevant for digital mock-up;

— 'electrical design': The object may be relevant for the electrical design;

— 'mechanical design': The object may be relevant for the mechanical design;

— 'preliminary design': The object may be relevant for the preliminary design;

— 'process planning': The object may be relevant for the process planning.

4.2.21.2 description

The description specifies additional information about the Application_context.

See 4.3.111 for the application assertion.

The description need not be specified for a particular Application_context (see 4.2.21).

If present, there shall be exactly one object that defines the description for an Application_context.

4.2.21.3 life_cycle_stage

The life_cycle_stage is the specification of the general stage in the product life cycle to which the concerned items belong. Where applicable, the following values shall be used:

— 'design': The concerned item belongs to the design phase of the life cycle;

— 'manufacturing': The concerned item belongs to the manufacturing phase of the life cycle;

— 'recycling': The concerned item belongs to the recycling phase of the life cycle.

4.2.22 Approval

An Approval is a judgement concerning the quality of those product data that are subject of the Approval. An Approval represents a statement made by technical personnel or management personnel whether

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certain requirements are met. The absence of approval information does not imply any approval status by default.

The data associated with an Approval are the following:

— actual_date;

— is_applied_to;

— is_approved_by;

— level;

— planned_date;

— scope;

— status.

4.2.22.1 actual_date

The actual_date specifies the date when the Approval actually became valid. If this attribute is absent, the approval has not yet occurred, i.e., it is pending.

See 4.3.130 for the application assertion.

The actual_date need not be specified for a particular Approval (see 4.2.22).

4.2.22.2 is_applied_to

The is_applied_to specifies the objects to which the Approval is assigned.

See 4.3.112, 4.3.113, 4.3.114, 4.3.115, 4.3.117, 4.3.118, 4.3.119, 4.3.120, 4.3.121, 4.3.122, 4.3.123, 4.3.124, 4.3.125, 4.3.126, 4.3.127, 4.3.128, 4.3.131, 4.3.132, 4.3.133, 4.3.134, 4.3.135, 4.3.136, 4.3.137, 4.3.138, 4.3.139, 4.3.140, 4.3.141, 4.3.142, 4.3.143, 4.3.144, 4.3.145, 4.3.146, 4.3.147, 4.3.148, 4.3.150, 4.3.151, 4.3.152, 4.3.153, 4.3.154, 4.3.155, 4.3.156, 4.3.157, 4.3.158, 4.3.159, 4.3.160, 4.3.161, 4.3.162, 4.3.163, 4.3.164, 4.3.165, and 4.3.166 for the application assertions.

There shall be at least one object that the Approval (see 4.2.22) is_applied_to.

4.2.22.3 is_approved_by

The is_approved_by specifies personnel responsible for the Approval and the dates of the Approval.

NOTE - In cases, where more than one person or organization has to sign off on the Approval, usually the last sign-off date corresponds to the date specified as the 'actual date'.

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See 4.3.129 for the application assertion.

4.2.22.4 level

The level represents the aspect for which the object subject to approval, by reference as 'is_applied_to', is endorsed. Where applicable, the following values shall be used:

— 'disposition': The referenced object is approved for series production;

— 'equipment order': The referenced object has reached a status in which changes are subject to a defined change process and tools and other equipment required for production may be ordered;

— 'planning': The referenced object is technically complete and has reached a status sufficiently stable so that other designs may be based on it.

The level need not be specified for a particular Approval (see 4.2.22).

4.2.22.5 planned_date

The planned_date specifies the date when the Approval is or was supposed to be performed.

See 4.3.130 for the application assertion.

The planned_date need not be specified for a particular Approval (see 4.2.22).

4.2.22.6 scope

The scope specifies the set of Organization (see 4.2.331) objects for which the Approval is valid.

See 4.3.149 for the application assertion.

4.2.22.7 status

The status indicates the level of acceptance of the object, the Approval is applied to, for the specified 'level'.

NOTE - The approval levels are defined within a given life cycle stage view and are typically dependent upon the approval cycles within an individual business process. For each defined level, generally there is a defined sequence of values for the status, usually leading towards the status 'approved' indicating achievement of the particular level.

See 4.3.116 for the application assertion.

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4.2.23 Approval_relationship

An Approval_relationship is a relationship between two Approval (see 4.2.22) objects.

The data associated with an Approval_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.23.1 description

The description specifies additional information about the Approval_relationship.

See 4.3.168 for the application assertion.

The description need not be specified for a particular Approval_relationship (see 4.2.23).

If present, there shall be exactly one object that defines the description for an Approval_relationship.

4.2.23.2 related

The related specifies the second of the two Approval (see 4.2.22) objects related by the Approval_-relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.167 for the application assertion.

4.2.23.3 relating

The relating specifies the first of the two Approval (see 4.2.22) objects related by the Approval_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.167 for the application assertion.

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4.2.23.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The Approval_relationship defines a relationship where the related Approval (see 4.2.22) is one of the components into which the relating Approval is broken down with no implication of 'sequence' or 'dependency';

— 'dependency': The Approval_relationship defines a relationship where the issuing of the related Approval is dependent on the issuing of the relating Approval;

NOTE - The value 'dependency does not imply the semantics of the the values 'decomposition' or 'sequence'.

EXAMPLE 1 The Approval of an assembly is dependent on the Approval of all of the constituents of the assembly.

EXAMPLE 2 In two parallel sequences of approvals for two assemblies a certain approval of one assembly may be dependent on a certain approval of the second assembly.

— 'precedence': the Approval_relationship defines a relationship where the related Approval has higher priority than the relating Approval;

— 'sequence': The Approval_relationship defines a relationship where the relating Approval shall be completed before the related Approval is given.

4.2.24 Approval_status

An Approval_status is the state of acceptance of some product data.

The data associated with an Approval_status are the following:

— status_name;

— used_classification_system.

4.2.24.1 status_name

The status_name specifies the terms characterizing the Approval_status. Where applicable, the following values shall be used:

— 'approved': The required authorizations have been obtained for a particular role of approval for a piece of product data;

— 'disapproved': The required authorizations have been denied for a particular role of approval for a piece of product data;

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— 'withdrawn': The required authorizations have been revoked for a particular role of approval for a piece of product data.

4.2.24.2 used_classification_system

The used_classification_system specifies the Classification_system (see 4.2.71) that contains the information about how to interpret the Approval_status.

See 4.3.169 for the application assertion.

The used_classification_system need not be specified for a particular Approval_status (see 4.2.24).

4.2.25 Area_placed_annotation

An Area_placed_annotation is a two-dimensional annotation element that is defined in the two-dimensional coordinate space of a View_area (see 4.2.555) or of a Drawing_sheet (see 4.2.173).

EXAMPLE The drawing title box and drawing frame are examples for Area_placed_annotation objects on a drawing sheet.

The data associated with an Area_placed_annotation are the following:

— element;

— reference_area.

4.2.25.1 element

The element specifies the presented Annotation_element (see 4.2.17).

See 4.3.170 and 4.3.171 for the application assertions.

There shall be exactly one object that defines the element for an Area_placed_annotation (see 4.2.25).

4.2.25.2 reference_area

The reference_area specifies the View_area (see 4.2.555) or Drawing_sheet (see 4.2.173) where the Annotation_element (see 4.2.17) is located.

See 4.3.172 and 4.3.173 for the application assertions.

There shall be exactly one object that defines the reference_area for an Area_placed_annotation (see 4.2.25).

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4.2.26 Assembly_component_relationship

An Assembly_component_relationship is the relation between an Assembly_definition (see 4.2.27) and an Item_instance (see 4.2.271) representing a constituent of the assembly. The Assembly_definition and the Design_discipline_item_definition (see 4.2.142) that serves as 'definition' of the Item_instance shall share at least one Application_context (see 4.2.21).

NOTE - The constituent may also be an assembly.

An Assembly_component_relationship is a type of Item_definition_instance_relationship (see 4.2.268).

Each Assembly_component_relationship may be a Next_higher_assembly (see 4.2.322) or a Promissory_usage (see 4.2.408).

The data associated with an Assembly_component_relationship are the following:

— placement;

— relating.

4.2.26.1 placement

The placement specifies the Geometric_model_relationship_with_transformation (see 4.2.240) or the Template_instance (see 4.2.512) that specify the transformation information which is used to locate and orient the constituent in the coordinate space of the Assembly_definition (see 4.2.27). In the case of a Template_instance, the scale factor shall be omitted or set to 1.0.

See 4.3.175 and 4.3.176 for the application assertions.

The placement need not be specified for a particular Assembly_component_relationship (see 4.2.26).

If present, there shall be exactly one object that defines the placement for an Assembly_component_relationship.

4.2.26.2 relating

The relating specifies the Assembly_definition (see 4.2.27) that has subordinate constituents.

See 4.3.174 for the application assertion.

4.2.27 Assembly_definition

An Assembly_definition is a definition of an Item_version (see 4.2.275) that contains other subordinate objects.

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An Assembly_definition is a type of Design_discipline_item_definition (see 4.2.142).

The data associated with an Assembly_definition are the following:

— assembly_type

The assembly_type specifies the kind of the Assembly_definition.

EXAMPLE 'functional assembly', 'manufacturing assembly', and 'design assembly' are examples of an assembly_type.

The assembly_type need not be specified for a particular Assembly_definition.

4.2.28 Assembly_substitute_relationship

An Assembly_substitute_relationship is a relationship that indicates that one Assembly_component_relationship (see 4.2.26) may be substituted for another Assembly_component_relationship. The subjects of the substitution are the related Item_instance (see 4.2.271) objects of both Assembly_component_relationship objects. The relating Assembly_definition (see 4.2.27) shall be the same in both Assembly_component_relationship objects.

The data associated with an Assembly_substitute_relationship are the following:

— base;

— description;

— substitute.

4.2.28.1 base

The base specifies the Assembly_component_relationship (see 4.2.26) that is replaceable.

See 4.3.177 for the application assertion.

4.2.28.2 description

The description specifies additional information about the Assembly_substitute_relationship.

See 4.3.178 for the application assertion.

The description need not be specified for a particular Assembly_substitute_relationship (see 4.2.28).

If present, there shall be exactly one object that defines the description for an Assembly_substitute_relationship.

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4.2.28.3 substitute

The substitute specifies the Assembly_component_relationship (see 4.2.26) that may be used instead of the base Assembly_component_relationship.

See 4.3.177 for the application assertion.

4.2.29 Associated_draughting_callout

An Associated_draughting_callout is a combination of annotation elements that represents a recognized annotation concept and that is associated with other pieces of geometry or annotation.

An Associated_draughting_callout is a type of Draughting_callout (see 4.2.169).

The data associated with an Associated_draughting_callout are the following:

— is_associated_to

The is_associated_to specifies the piece of annotation or geometry with which the Associated_draughting_callout is associated.

See 4.3.179 and 4.3.180 for the application assertions.

There shall be at least one object that the Associated_draughting_callout is_associated_to.

4.2.30 Associated_fill_area

An Associated_fill_area is a bounded area containing colouring, hatching, or tiling. The boundary of the Associated_fill_area is defined by closed annotation curves. The annotation curves defining the boundary of the Associated_fill_area are derived from geometric elements of the shape model or from other annotation curves.

An Associated_fill_area is a type of Fill_area (see 4.2.204).

The data associated with an Associated_fill_area are the following:

— is_derived_from

The is_derived_from specifies the geometric elements or the annotation curves from which the boundary curves of the Associated_fill_area are derived.

See 4.3.181 and 4.3.182 for the application assertions.

There shall be at least one object that the Associated_fill_area is_derived_from.

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4.2.31 Associated_leader

An Associated_leader is a leader that is associated with the referenced object.

This association implies that a change in the definition of the 'target' affects the Associated_leader in a way the Associated_leader may also need to be changed in order to keep up consistency.

> EXAMPLE If the 'target' is a 3D curve and if the location of the curve changes, then the leader will have to move in a way consistent with the movement of the curve.

An Associated_leader is a type of Leader (see 4.2.293).

The data associated with an Associated_leader are the following:

— target

The target specifies the associated element.

See 4.3.183 and 4.3.184 for the application assertions.

There shall be exactly one object that defines the target for an Associated_leader.

4.2.32 Associated_projection_curve

An Associated_projection_curve is a projection curve that is associated with a Detailed_geometric_model_element (see 4.2.144) or with another Annotation_element (see 4.2.17).

An Associated_projection_curve is a type of Projection_curve (see 4.2.407).

The data associated with an Associated_projection_curve are the following:

— is_projected_to

The is_projected_to specifies the associated element.

See 4.3.185 and 4.3.186 for the application assertions.

There shall be exactly one object that the Associated_projection_curve is_projected_to.

4.2.33 Axis_placement

An Axis_placement is the representation of three orthogonal axes defined in a three-dimensional reference coordinate system, which intersect at a unique point. This point defines the origin of the Axis_placement.

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4.2.34 B_rep

A B_rep is a geometric element that is defined by exactly one outer Closed_shell (see 4.2.74) and by zero or more inner Closed_shell objects.

A B_rep is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a B_rep are the following:

— outer;

— void.

4.2.34.1 outer

The outer specifies a Closed_shell (see 4.2.74) defining the exterior boundary of the B_rep.

NOTE - This shell has a normal pointing into the empty outside space.

See 4.3.187 for the application assertion.

4.2.34.2 void

The void specifies a Closed_shell (see 4.2.74) that represents an internal cavity of the B_rep.

NOTE - This shell has a normal pointing into the empty inside space.

See 4.3.187 for the application assertion.

4.2.35 B_rep_model

A B_rep_model is a collection of B_rep (see 4.2.34) objects.

A B_rep_model is a type of Geometric_model (see 4.2.238).

The data associated with a B_rep_model are the following:

— element

The element specifies a set of B_rep objects that form the B_rep_model.

See 4.3.188 for the application assertion.

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4.2.36 B_spline_curve

A B_spline_curve is a general polynomial or a rational parametric sculptured curve of various degrees and segments, defined in terms of control points, associated basic functions, weights, and knots.

NOTE - A polynomial uniform B_spline_curve is defined by a list of control points and by the associated basis functions. The knot values can be derived and the weights are equal. A rational non-uniform B_spline_-curve is defined by a list of control points, by the associated basis functions, by weights and by multiplicities of knots.

EXAMPLE A circular arc can be represented by a rational parametric curve.

A B_spline_curve is a type of Curve (see 4.2.108).

4.2.37 B_spline_surface

A B_spline_surface is a bounded surface that is used to represent a wide variety of sculptured surfaces. With appropriate attribute values it enables to represent single span or spline surfaces of explicit polynomial, rational Bézier, or B-spline types, such as NURBS. A B_spline_surface is defined in terms of control points, associated basis functions, weights, and knots.

A B_spline_surface is a type of Surface (see 4.2.489).

4.2.38 Bead_end_type

A Bead_end_type is the definition of a kind of end that characterizes a Bead_feature (see 4.2.39).

Each Bead_end_type is a Linear_bead_end_type (see 4.2.298), an Open_bead_end_type (see 4.2.327), or a Radiused_bead_end_type (see 4.2.418).

The data associated with a Bead_end_type are the following:

— is_applied_to

The is_applied_to specifies to which extremity of the path the Bead_end_type applies. The following values shall be used:

— 'end': The Bead_end_type is applied to the extremity of the Bead_feature that corresponds to the end of the defining Path (see 4.2.342);

— 'start': The Bead_end_type is applied to the extremity of the Bead_feature that corresponds to the start of the defining Path.

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4.2.39 Bead_feature

A Bead_feature is a feature that is applied to panel parts to increase the stiffness of the part and for forming to control metal flow.

EXAMPLE Figure 12 shows a Bead_feature and illustrates the results of the application of various Bead_-end_type (see 4.2.38) conditions.

A Bead_feature is a type of Process_feature_in_panel (see 4.2.379).

The data associated with a Bead_feature are the following:

— base_radius;

— bead_profile;

— end_condition;

— sweep_path.

4.2.39.1 base_radius

The base_radius specifies the blend radius where the Bead_feature meets the panel surface.

See 4.3.190 for the application assertion.

The base_radius need not be specified for a particular Bead_feature (see 4.2.39).

4.2.39.2 bead_profile

The bead_profile specifies the usage of a profile that determines the cross section of the Bead_feature.

See 4.3.191 for the application assertion.

4.2.39.3 end_condition

The end_condition specifies the Bead_end_type (see 4.2.38) objects that define the types of the bead's ends.

See 4.3.189 for the application assertion.

4.2.39.4 sweep_path

The sweep_path specifies the course along which the bead_profile is swept.

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See 4.3.192 for the application assertion.

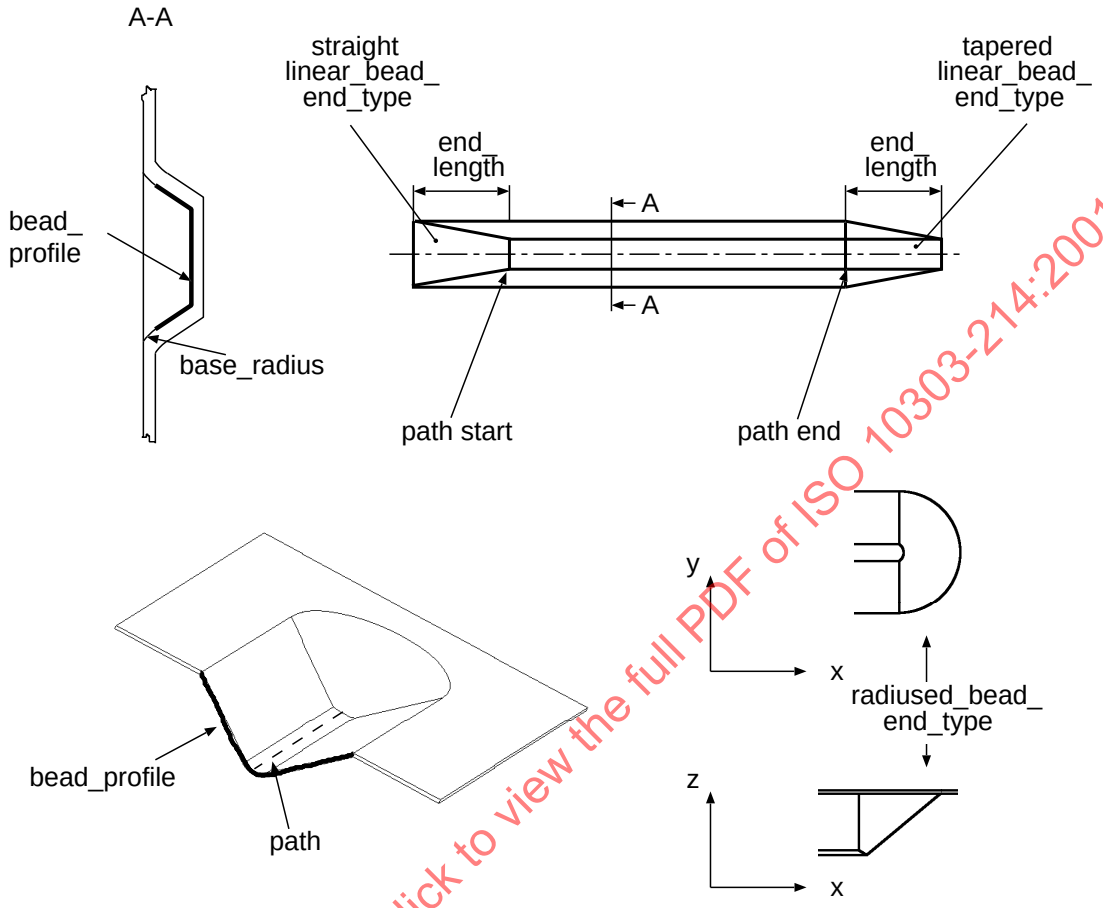


Figure 12 – Parameters defining a Bead_feature

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4.2.40 Block

A Block is a solid rectangular parallelepiped defined by a location and placement coordinate system. The Block is specified by the positive lengths x, y, and z along the axes of the placement coordinate system, and has one vertex at the origin of the placement coordinate system.

A Block is a type of Csg_primitive (see 4.2.107).

4.2.41 Boolean_result

A Boolean_result is the result of a regularised operation on two solids to create a new shape.

NOTE - A Boolean_result may create a new solid with more than one solid bodies.

A Boolean_result is a type of Detailed_geometric_model_element (see 4.2.144).

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The data associated with a Boolean_result are the following:

— boolean_operation;

— first_operand;

— second_operand.

4.2.41.1 boolean_operation

The boolean_operation specifies the type of operation that is applied on the two solids. The following values shall be used:

— 'difference': creates a new solid that is the regularisation of the set of all points, which are in the first operand but not in the second operand;

— 'intersection': creates a new solid that is the regularisation of the set of all points that are in both the first operand and the second operand;

— 'union': creates a new solid that contains all the points that are either in the first operand or in the second operand or both.

4.2.41.2 first_operand

The first_operand specifies the first solid for the Boolean operation.

See 4.3.193, 4.3.194, 4.3.195, 4.3.196, 4.3.197, 4.3.198, and 4.3.199 for the application assertions.

There shall be exactly one object that defines the first_operand for a Boolean_result (see 4.2.41).

4.2.41.3 second_operand

The second_operand specifies the second solid for the Boolean operation.

See 4.3.193, 4.3.194, 4.3.195, 4.3.196, 4.3.197, 4.3.198, and 4.3.199 for the application assertions.

There shall be exactly one object that defines the second_operand for a Boolean_result (see 4.2.41).

4.2.42 Boss_feature

A Boss_feature is an enclosed shape that protrudes from a surface in the direction of the sweep path. The intersection of the Boss_feature and the surface may, but need not, have radius shaped blend between them.

A Boss_feature is a type of Process_feature_in_solid (see 4.2.380).

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Each Boss_feature is a Circular_boss (see 4.2.57), a Rectangular_boss (see 4.2.420), or a General_boss (see 4.2.214).

The data associated with a Boss_feature are the following:

— base_radius;

— boss_height;

— boundary;

— taper;

— top_condition.

4.2.42.1 base_radius

The base_radius specifies a radius shape blend between a Boss_feature and the surrounding surface at its base. The fillet is applied after the placement of the Boss_feature (see 4.2.42) on the part and after a potential application of a taper.

For the creation of a fillet, the following rules apply:

If R_f is the fillet radius to be created at the bottom of the boss and C the path along which the centre of a sphere S defining the fillet is moving then

— the fillet is created by rolling the sphere S with radius R_f along the boss with a constant contact on the surface on which the boss is placed;

— C shall be such that in any point of C the area of contact between S and the boss is either a point or an arc wise connected set of points.

See 4.3.205 for the application assertion.

The base_radius need not be specified for a particular Boss_feature.

4.2.42.2 boss_height

The boss_height specifies the Linear_path (see 4.2.300) that is used to sweep the Closed_profile (see 4.2.72).

See 4.3.206 for the application assertion.

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4.2.42.3 boundary

The boundary specifies the Closed_profile_usage (see 4.2.73) that references the Closed_profile (see 4.2.72), which defines the cross section of the Boss_feature.

NOTE - The different types of Boss_feature constrain the usage of the boundary further.

See 4.3.202 for the application assertion.

4.2.42.4 taper

The taper specifies a variation of the size of the Boss_feature. If present, the variation shall be specified either by an Angle_taper (see 4.2.12) or by a Directed_taper (see 4.2.154) or, in the case of a Circular_-boss (see 4.2.57), by a Diameter_taper (see 4.2.146), or an Angle_taper. If no taper is specified, the cross section at the start of the sweep path and at the end of the sweep path shall be of identical shape.

See 4.3.200, 4.3.203, and 4.3.204 for the application assertions.

The taper need not be specified for a particular Boss_feature (see 4.2.42).

If present, there shall be exactly one object that defines the taper for a Boss_feature.

4.2.42.5 top_condition

The top_condition specifies the shape at the top of the Boss_feature (see 4.2.42).

See 4.3.201 for the application assertion.

4.2.43 Boss_top_condition

A Boss_top_condition is the definition of a kind of top that characterizes a Boss_feature (see 4.2.42).

Each Boss_top_condition is a Planar_top_condition (see 4.2.359) or a General_top_condition (see 4.2.236).

The data associated with a Boss_top_condition are the following:

— is_applied_to;

— top_radius.

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4.2.43.1 is_applied_to

The is_applied_to specifies to which end of the path the Boss_top_condition applies. The following values shall be used:

— 'end': The Boss_top_condition is applied to that extremity of the Boss_feature (see 4.2.42) that corresponds to the end of the defining Linear_path (see 4.2.300);

— 'start': The Boss_top_condition is applied to that extremity of the Boss_feature that corresponds to the start of the defining Linear_path.

4.2.43.2 top_radius

The top_radius specifies a radius shape blend between the wall of a Boss_feature (see 4.2.42) object and its top surface.

See 4.3.207 for the application assertion.

The top_radius need not be specified for a particular Boss_top_condition (see 4.2.43).

4.2.44 Cartesian_coordinate_space

A Cartesian_coordinate_space is a coordinate space in which geometric and annotation elements may be defined. It is either two-dimensional or three-dimensional. An origin for coordinate values is implicitly defined. The units applicable to the coordinate values of elements defined in the Cartesian_coordinate_space are specified.

NOTE 1 - Cartesian Transformation (see 4.2.533) objects are used to specify the relationships between coordinate spaces.

Each Cartesian_coordinate_space is a Cartesian_coordinate_space_3d (see 4.2.46) or a Cartesian_coordinate_space_2d (see 4.2.45).

The data associated with a Cartesian_coordinate_space are the following:

— unit_of_values

The unit_of_values specifies the various units in which any values are expressed. In the case where geometric elements are defined in the Cartesian_coordinate_space, there shall be at least two units specified, the length unit and the plane angle unit. The same length unit is applied to each coordinate direction. Only one unit of a kind shall be specified.

The unit_of_values need not be specified only if the Cartesian_coordinate_space belongs to an External_model (see 4.2.189).

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NOTE 2 - If elements with different units are required, they have to be separated into different models with their own Cartesian_coordinate_space.

EXAMPLE A length measure unit measured in inches and an angle measure unit measured in degrees are examples for two members of the attribute unit_of_values assigned to the same Cartesian_coordinate_space.

See 4.3.208 for the application assertion.

The unit_of_values need not be specified for a particular Cartesian_coordinate_space.

4.2.45 Cartesian_coordinate_space_2d

A Cartesian_coordinate_space_2d is a two-dimensional coordinate space. Any two-dimensional geometric and annotation element shall be defined in a Cartesian_coordinate_space_2d.

EXAMPLE The annotation elements associated in a View_area (see 4.2.555) are defined in a Cartesian_coordinate_space_2d.

A Cartesian_coordinate_space_2d is a type of Cartesian_coordinate_space (see 4.2.44).

4.2.46 Cartesian_coordinate_space_3d

A Cartesian_coordinate_space_3d is a three-dimensional coordinate space. Any three-dimensional geometric data shall be defined in a Cartesian_coordinate_space_3d.

A Cartesian_coordinate_space_3d is a type of Cartesian_coordinate_space (see 4.2.44).

4.2.47 Cartesian_point

A Cartesian_point is a point that is defined by its coordinates in a rectangular Cartesian coordinate system.

A Cartesian_point is a type of Point (see 4.2.367).

4.2.48 Catalogue_thread

A Catalogue_thread is a thread that is specified by a document or by a library containing the specification of the thread. Each Catalogue_thread shall be referenced by either a Document_assignment (see 4.2.156) or a Classification_association (see 4.2.69).

A Catalogue_thread is a type of Thread_specification (see 4.2.518).

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4.2.49 Centre_of_mass

A Centre_of_mass is the centre of the mass of a body. The relative position of the Centre_of_mass within the body is an invariant datum relative to rotation and translation. The Centre_of_mass is a characteristic of an item, not its shape.

NOTE 1 - If a shape representation is present, the Centre_of_mass is usually derivable from the shape representation. However, as a characteristic of an item, it may be pre-defined in order to reflect a requirement.

NOTE 2 - In order to convey the information about the actual centre of mass of a geometric model, the use of General_shape_dependent_property (see 4.2.231) with value 'centroid' for its attribute 'property_type' is appropriate.

A Centre_of_mass is a type of Shape_dependent_property (see 4.2.447).

The data associated with a Centre_of_mass are the following:

— centre_point;

— is_defined_in.

4.2.49.1 centre_point

The centre_point specifies a point in three-dimensional space that defines the location of a Centre_of_-mass in the Cartesian_coordinate_space (see 4.2.44).

4.2.49.2 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the property is applicable.

NOTE - The values of geometry related properties are specified relative to a Cartesian_coordinate_space.

EXAMPLE A Centre_of_mass (see 4.2.49) may be specified in different coordinate spaces for different dimensioning applications.

See 4.3.209 for the application assertion.

4.2.50 Certification

A Certification is a certificate for an object.

The data associated with a Certification are the following:

— certification_type;

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— is_applied_to;

— name;

— purpose.

4.2.50.1 certification_type

The certification_type specifies the kind of certification.

EXAMPLE ’supplier certificate’ is an example for the certification_type.

4.2.50.2 is_applied_to

The is_applied_to specifies the set of objects that the certificate is applied to.

See 4.3.210, 4.3.211, 4.3.212, and 4.3.214 for the application assertions.

There shall be at least one object that the Certification (see 4.2.50) is_applied_to.

4.2.50.3 name

The name specifies the word or group of words by which the Certification is referred to.

See 4.3.213 for the application assertion.

There shall be exactly one object that defines the name for a Certification (see 4.2.50).

4.2.50.4 purpose

The purpose specifies the objective of the Certification.

See 4.3.213 for the application assertion.

The purpose need not be specified for a particular Certification (see 4.2.50).

If present, there shall be exactly one object that defines the purpose for a Certification.

4.2.51 Chamfer

A Chamfer is a transition between two joining non-coplanar faces, having a linear cross section perpendicular to the intersection of the two faces or, if this intersection does not exist, the intersection of the surfaces obtained by extrapolating linearly the faces until an intersection exists.

EXAMPLE Figure 13 illustrates a Chamfer.

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A Chamfer is a type of Transition_feature (see 4.2.537).

The data associated with a Chamfer are the following:

— chamfer_face;

— is_defined_by.

4.2.51.1 chamfer_face

The chamfer_face specifies the Face (see 4.2.191) that results from the chamfering operation.

See 4.3.216 for the application assertion.

4.2.51.2 is_defined_by

The is_defined_by specifies the Chamfer_definition (see 4.2.53) that has the information defining the Chamfer.

See 4.3.215 for the application assertion.

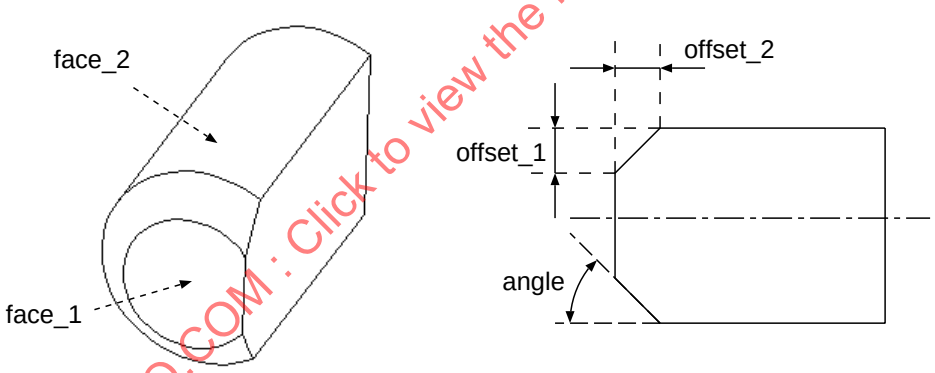


Figure 13 – Parameters defining a Chamfer

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4.2.52 Chamfer_angle

A Chamfer_angle is the definition of an angle used to specify a Chamfer (see 4.2.51).

The data associated with a Chamfer_angle are the following:

— angle

The angle specifies the value of the angle between the resulting face and the base shape. It is measured between a tangent of the concerned surface and the face resulting from the application of the chamfer as shown in figure 13.

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See 4.3.217 for the application assertion.

4.2.53 Chamfer_definition

A Chamfer_definition is the set of parameters specifying a Chamfer (see 4.2.51).

The data associated with a Chamfer_definition are the following:

— offset_1;

— value_2.

4.2.53.1 offset_1

The offset_1 specifies the amount of offset measured from the intersection of the two faces along the first face. In the case where there is no intersection between the faces, the offset is measured from the intersection curve obtained by extrapolating the faces until they intersect.

See 4.3.219 for the application assertion.

4.2.53.2 value_2

The value_2 specifies the second value that is necessary to define a Chamfer (see 4.2.51). In the case where the value_2 is a Chamfer_angle (see 4.2.52) the angle is measured from the second face. In the case where the value_2 is a Chamfer_offset (see 4.2.54), the offset is measured from the intersection of the two faces along the second face as shown in figure 13.

See 4.3.218 and 4.3.219 for the application assertions.

There shall be exactly one object that defines the value_2 for a Chamfer_definition (see 4.2.53).

4.2.54 Chamfer_offset

A Chamfer_offset is the definition of an offset used to specify a Chamfer (see 4.2.51). The offset is measured as an arc length perpendicularly from the intersection curve of the two faces on the concerned face. The curve along which the arc length is measured is the intersection of a plane that is the cross-section of the concerned face along the intersection curve.

The data associated with a Chamfer_offset are the following:

— offset

The offset specifies the value of the Chamfer_offset.

See 4.3.220 for the application assertion.

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4.2.55 Change

A Change is a mechanism to collect the Model_change (see 4.2.315) objects and the Property_change (see 4.2.410) objects that describe the differences between the two objects referenced by the specified relationship object.

The data associated with a Change are the following:

— described_change;

— description.

4.2.55.1 described_change

The described_change specifies the relationship object that references a modified object and the corresponding original object.

See 4.3.221, 4.3.222, 4.3.223, 4.3.225, 4.3.226, 4.3.227, 4.3.228, and 4.3.229 for the application assertions.

There shall be exactly one object that defines the described_change for a Change (see 4.2.55).

4.2.55.2 description

The description specifies additional information about the Change.

See 4.3.224 for the application assertion.

The description need not be specified for a particular Change (see 4.2.55).

If present, there shall be exactly one object that defines the description for a Change.

4.2.56 Circle

A Circle is a planar unbounded curve where all points are equidistant from one point.

A Circle is a type of Curve (see 4.2.108).

4.2.57 Circular_boss

A Circular_boss is a protrusion feature that is made up by an enclosed volume bounded by a cylinder. The boundary shall be defined using a Circular_closed_profile (see 4.2.58).

EXAMPLE Figure 14 illustrates a Circular_boss.

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A Circular_boss is a type of Boss_feature (see 4.2.42).

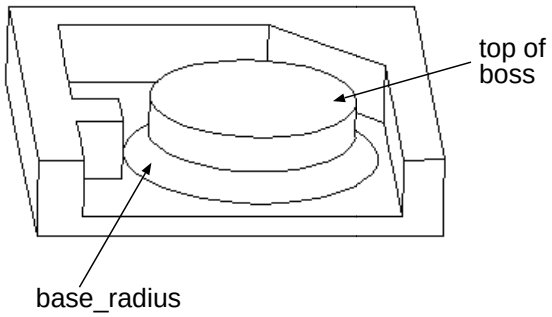


Figure 14 – Parameters defining a Circular_boss

4.2.58 Circular_closed_profile

A Circular_closed_profile is made up by a circle that bounds an enclosed area.

EXAMPLE Figure 15 illustrates a Circular_closed_profile.

The x-y-plane of the inherited Axis_placement (see 4.2.33) lies in the plane of the circle that outlines the profile. It is located in the centre of that circle.

A Circular_closed_profile is a type of Closed_profile (see 4.2.72).

The data associated with a Circular_closed_profile are the following:

— diameter

The diameter specifies the diameter of the circle that defines the Circular_closed_profile.

See 4.3.230 for the application assertion.

4.2.59 Circular_offset_pattern

A Circular_offset_pattern is a modification of the placement of a particular occurrence of the base feature in a Circular_pattern (see 4.2.62) relative to the expected placement of the occurrence.

EXAMPLE Figure 16 depicts a Circular_offset_pattern.

The data associated with a Circular_offset_pattern are the following:

— angular_offset;

— index.

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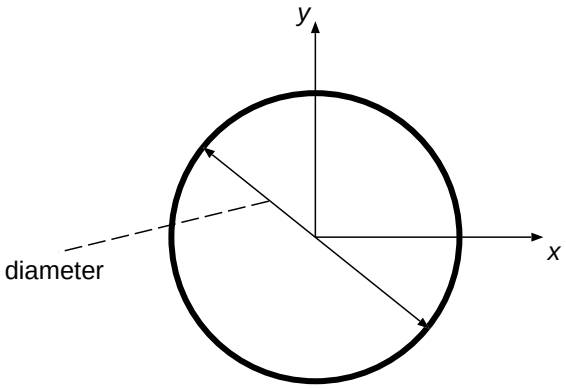


Figure 15 – Definition of a Circular_closed_profile

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4.2.59.1 angular_offset

The angular_offset specifies the amount of rotation from the expected feature location to the actual feature location of the Circular_pattern (see 4.2.62) as an angular measurement.

4.2.59.2 index

The index specifies the number of the feature that has an offset.

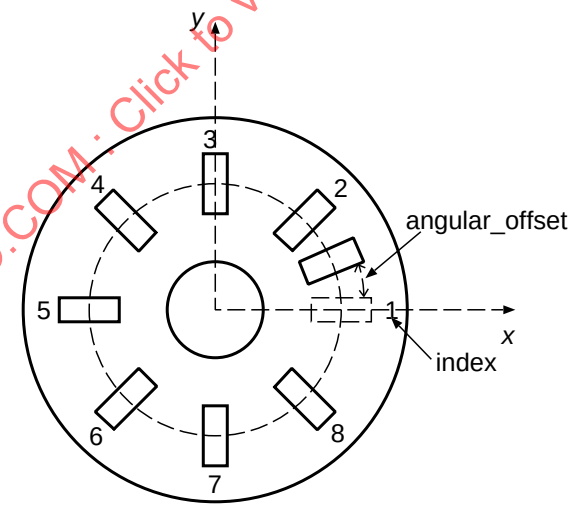


Figure 16 – Parameters defining an offset in a circular pattern

4.2.60 Circular_omit_pattern

A Circular_omit_pattern is an omission of a particular occurrence of the base feature in a Circular_-pattern (see 4.2.62).

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EXAMPLE Figure 17 depicts a Circular_omit_pattern.

The data associated with a Circular_omit_pattern are the following:

— index

The index specifies the number of the feature that is omitted.

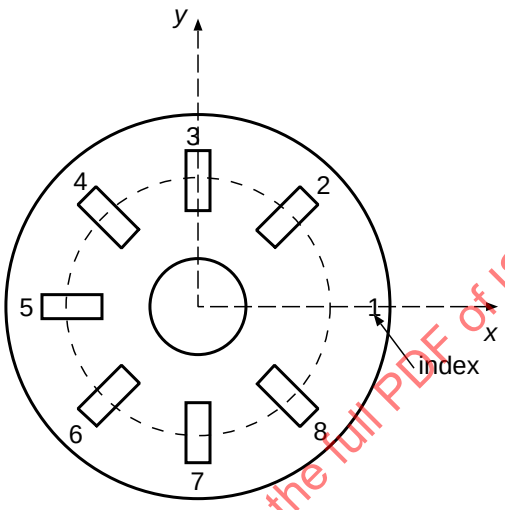


Figure 17 – Parameters defining an omission in a circular pattern

4.2.61 Circular_path

A Circular_path is specified by a direction of travel along an arc of constant radius around an axis.

A Circular_path is a type of Path (see 4.2.342).

Each Circular_path is a Complete_circular_path (see 4.2.79) or a Partial_circular_path (see 4.2.339).

The data associated with a Circular_path are the following:

— radius

The radius specifies the radius of the Circular_path.

See 4.3.231 for the application assertion.

4.2.62 Circular_pattern

A Circular_pattern is the replication of a base feature about a rotation axis.

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The inherited attribute 'location_and_orientation' shall be located in the centre point of the pattern. The z-axis of this attribute shall specify the rotation axis, and the base feature shall be located at a y co-ordinate of zero.

The origin of the base feature or of the transformed base feature is located at a distance from the local z-axis that equals half the diameter of the Circular_pattern.

NOTE - The base feature or the transformed base feature is the first instance of the Circular_pattern.

A Circular_pattern is a type of Replicate_feature (see 4.2.433).

The data associated with a Circular_pattern are the following:

— angular_spacing;

— diameter;

— missing_feature;

— number_of_features;

— relocated_feature;

— rotation.

4.2.62.1 angular_spacing

The angular_spacing specifies the angle between two instances in the Circular_pattern.

See 4.3.234 for the application assertion.

4.2.62.2 diameter

The diameter specifies twice the distance between the centre of the Circular_pattern and the location of the base feature.

NOTE - Usually, the diameter can be determined from the location of the Circular_pattern and the location of the base feature. The attribute diameter may be instantiated to support process planning which may require the diameter value explicitly.

See 4.3.234 for the application assertion.

The diameter need not be specified for a particular Circular_pattern (see 4.2.62).

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4.2.62.3 missing_feature

The missing_feature specifies those instances that are omitted in the Circular_pattern.

See 4.3.233 for the application assertion.

4.2.62.4 number_of_features

The number_of_features specifies the number of features used in the Circular_pattern.

NOTE - The number_of_features includes any constituents that are in a later step subject to omission.

4.2.62.5 relocated_feature

The relocated_feature specifies those instances that are relocated in the Circular_pattern.

See 4.3.232 for the application assertion.

4.2.62.6 rotation

The rotation specifies the angle of the rotation that shall be applied to each replicate, after its positioning along the circle, with respect to the position of the previous replicate in the Circular_pattern. The default value is zero.

EXAMPLE Figure 18 depicts a Circular_pattern with a rotation specified that equals the negative angular_-spacing of the Circular_pattern.

See 4.3.234 for the application assertion.

The rotation need not be specified for a particular Circular_pattern (see 4.2.62).

4.2.63 Circular_runout_tolerance

A Circular_runout_tolerance is a geometric constraint on the circularity of curves pertaining to a surface described by the rotation of a part about an axis.

The tolerance is applied independently at any circular measuring position as the part is rotated 360 degrees.

NOTE - Where applied to surfaces constructed around a datum axis, Circular_runout_tolerance may be used to control the cumulative variations of circularity and coaxiality. Where applied to surfaces constructed at right angles to the datum axis, Circular_runout_tolerance controls circular elements of a plane surface.

A Circular_runout_tolerance is a type of Geometric_tolerance (see 4.2.243).

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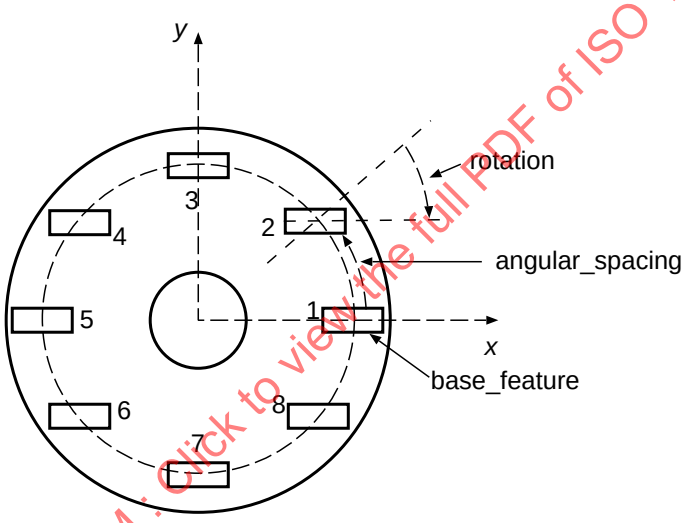


Figure 18 – Circular_pattern with rotation of base feature

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The data associated with a Circular_runout_tolerance are the following:

— angle;

— reference_datum.

4.2.63.1 angle

The angle specifies the direction in which the runout tolerance is controlled.

If the angle is specified, the runout tolerance applies in this angle which is fixed with respect to the datum axis. If the angle is not specified, the runout tolerance applies normal to the surface generated by the rotation.

The angle need not be specified for a particular Circular_runout_tolerance (see 4.2.63).

4.2.63.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that defines the reference for this type of geometric tolerance. The reference_datum shall contain an axis.

See 4.3.235 for the application assertion.

4.2.64 Class_category_association

A Class_category_association is the association of a Specification_category (see 4.2.468) with a Product_class (see 4.2.392). Additionally, this assignment specifies if the usage of one or more Specification (see 4.2.467) objects belonging to this Specification_category, is mandatory or optional for all products of that Product_class.

NOTE - The assignment of a Specification_category to a Product_class does not replace the association of single members of the Specification_category to the Product_class.

The data associated with a Class_category_association are the following:

— associated_category;

— associated_product_class;

— mandatory.

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4.2.64.1 associated_category

The associated_category specifies the Specification_category (see 4.2.468) that is associated with the Product_class (see 4.2.392).

See 4.3.237 for the application assertion.

4.2.64.2 associated_product_class

The associated_product_class specifies the Product_class (see 4.2.392) for which the Specification_-category (see 4.2.468) is valid.

See 4.3.236 for the application assertion.

4.2.64.3 mandatory

The mandatory specifies whether the Specification (see 4.2.467) objects referring to the associated Specification_category (see 4.2.468) have to be used or may be used (optional) for products within the referenced Product_class (see 4.2.392). A value of 'true' indicates that the usage is mandatory.

EXAMPLE The specification category 'radio' may be associated 'optional' to the product class of a car; the specification category 'engine' is an example for a 'mandatory' association.

4.2.65 Class_condition_association

A Class_condition_association is the association of a Specification_expression (see 4.2.470) with a Product_class (see 4.2.392).

The meaning of this association is specified further by the attribute condition_type.

The data associated with a Class_condition_association are the following:

— associated_condition;

— associated_product_class;

— condition_type;

— description.

4.2.65.1 associated_condition

The associated_condition specifies the Specification_expression (see 4.2.470) that is assigned to the Product_class (see 4.2.392).

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See 4.3.240 for the application assertion.

4.2.65.2 associated_product_class

The associated_product_class specifies the Product_class (see 4.2.392) for which the Specification_-expression (see 4.2.470) is valid.

See 4.3.239 for the application assertion.

4.2.65.3 condition_type

The condition_type specifies the meaning of the association. Where applicable, the following values shall be used:

— 'design case': The Specification_expression (see 4.2.470) specifies a condition when a given object has to be designed and verified. This value of the condition_type is for information only and shall not be interpreted when querying design cases or usage cases. For such a query, the value of the attribute 'configuration_type' of Configuration (see 4.2.94) shall be evaluated;

> NOTE - This value may be used to precise when a given Product_function (see 4.2.397) or a given Product_component (see 4.2.394) has to be studied by the design department so that it provides solutions appropriate for the case specified by 'associated_condition' and 'associated_product_class'.

— 'identification': The Specification_expression specifies a condition that enables to distinguish the associated Product_class (see 4.2.392) from other Product_class objects. This value is not applicable for a top level node in a hierarchy of Product_class objects. This identification is part of the identification of all sub classes of this Product_class;

— 'part usage': The Specification_expression specifies a condition for the usage of the components of an Alternative_solution (see 4.2.10), the usage of an Item_instance (see 4.2.271) or for the application of a Process_plan (see 4.2.387) or a Process_operation_occurrence (see 4.2.384) in the products of the associated Product_class. In this case, the Class_condition_association shall be referenced by at least one Configuration object;

— 'validity': The Specification_expression specifies a condition that is used to verify a Product_-specification (see 4.2.399) for the associated Product_class. That means that the Specification_-expression evaluates to 'true' if the set of Specification (see 4.2.467) objects is valid; otherwise it evaluates to 'false' with the meaning that the specified object is invalid for the Product_class.

It is valid for all products belonging to the 'associated_product_class' in case of the condition types 'identification' and 'validity'.

4.2.65.4 description

The description specifies additional information about the Class_condition_association.

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See 4.3.238 for the application assertion.

The description need not be specified for a particular Class_condition_association (see 4.2.65).

If present, there shall be exactly one object that defines the description for a Class_condition_association.

4.2.66 Class_inclusion_association

A Class_inclusion_association is the assignment of a Specification_inclusion (see 4.2.471) to a Product_-class (see 4.2.392). This assignment contains the information that a particular Specification_inclusion applies for all products of that Product_class.

The data associated with a Class_inclusion_association are the following:

— associated_inclusion;

— associated_product_class;

— description.

4.2.66.1 associated_inclusion

The associated_inclusion specifies the Specification_inclusion (see 4.2.471) that is associated with the Product_class (see 4.2.392).

See 4.3.243 for the application assertion.

4.2.66.2 associated_product_class

The associated_product_class specifies the Product_class (see 4.2.392) for which the Specification_-inclusion (see 4.2.471) is valid.

See 4.3.242 for the application assertion.

4.2.66.3 description

The description specifies additional information about the Class_inclusion_association.

See 4.3.241 for the application assertion.

The description need not be specified for a particular Class_inclusion_association (see 4.2.66).

If present, there shall be exactly one object that defines the description for a Class_inclusion_association.

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4.2.67 Class_specification_association

A Class_specification_association is an association of a Specification (see 4.2.467) with a Product_class (see 4.2.392). This Specification serves as a potential characteristic of all products belonging to the Product_class.

The meaning of this association is specified further by the attribute association_type.

The data associated with a Class_specification_association are the following:

— associated_product_class;

— associated_specification;

— association_type.

4.2.67.1 associated_product_class

The associated_product_class specifies the Product_class (see 4.2.392) for which the Specification (see 4.2.467) is valid.

See 4.3.244 for the application assertion.

4.2.67.2 associated_specification

The associated_specification specifies the Specification (see 4.2.467) that is associated with the Product_class (see 4.2.392).

See 4.3.245 for the application assertion.

4.2.67.3 association_type

The association_type specifies the kind of availability of a particular Specification (see 4.2.467) in a Product_class (see 4.2.392). Where applicable, the following values shall be used:

— 'availability': The Specification is a potential characteristic of any product belonging to a high level Product_class. It is not specified if this is an option or a standard;

EXAMPLE 1 'front wheel drive' or 'four wheel drive' are available for a product class 'Voyager'.

— 'identification': The Specification is a characteristic that enables to distinguish the associated Product_class from other Product_class objects. This is a kind of 'non replaceable standard'. This value is not applicable for a top level node in a hierarchy of Product_class objects. This identification is part of the identification of all sub classes of this Product_class;

EXAMPLE 2 The car body type 'limousine' is identifying for product class 'S40'.

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— ’non replaceable standard’: The Specification is a characteristic of all products belonging to the Product_class;

EXAMPLE 3 ’South East Asia climate zone’ is a ’non replaceable standard’ for a car that is produced for use in that particular geographic area.

— ’option’: The Specification is a characteristic of a product if explicitly chosen. The Specification replaces another Specification of the same specification category if the replaced Specification is associated with the Product_class as ’replaceable standard’;

EXAMPLE 4 ’sun roof’ or ’radio with CD’ are common options proposed to the customer.

— ’part usage’: The Specification is a characteristic for the usage of the components of an Alternative_solution (see 4.2.10), the usage of an Item_instance (see 4.2.271), or for the application of a Process_plan (see 4.2.387) or a Process_operation_occurrence (see 4.2.384) in the products of the associated Product_class;

— ’replaceable standard’: The Specification is a default characteristic of the products belonging to the Product_class as long as no other specification of the same Specification_category (see 4.2.468) is chosen.

EXAMPLE 5 ’power brake’ is a ’replaceable standard’ for product class ’Golf’; it can be replaced by ’ABS’ which is another specification of the same specification category ’brake system’.

4.2.68 Class_structure_relationship

A Class_structure_relationship is an association between a Product_class (see 4.2.392) object and either a Product_component (see 4.2.394) or a Product_function (see 4.2.397) object.

The data associated with a Class_structure_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.68.1 description

The description specifies additional information about the Class_structure_relationship.

See 4.3.246 for the application assertion.

The description need not be specified for a particular Class_structure_relationship (see 4.2.68).

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If present, there shall be exactly one object that defines the description for a Class_structure_relationship.

4.2.68.2 related

The related specifies the Product_component (see 4.2.394) or Product_function (see 4.2.397) object related by the Class_structure_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.248 and 4.3.249 for the application assertions.

There shall be exactly one object that the Class_structure_relationship (see 4.2.68) is related to.

4.2.68.3 relating

The relating specifies the Product_class (see 4.2.392) object related by the Class_structure_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.247 for the application assertion.

4.2.68.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'functionality': The related Product_function (see 4.2.397) is an element of the functional structure of the relating Product_class (see 4.2.392). This relation type shall only be used if the related object is a Product_function;

— 'realization': The related Product_component (see 4.2.394) fulfils, partially or fully, the requirements identified with the relating Product_class. This relation type shall only be used if the related object is a Product_component.

4.2.69 Classification_association

A Classification_association associates a General_classification (see 4.2.216) with an object.

The data associated with a Classification_association are the following:

— associated_classification;

— classified_element;

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— definitional;

— role.

4.2.69.1 associated_classification

The associated_classification specifies the General_classification (see 4.2.216) object that provides classification information.

See 4.3.263 for the application assertion.

4.2.69.2 classified_element

The classified_element specifies the object that is classified.

See 4.3.250, 4.3.251, 4.3.252, 4.3.253, 4.3.254, 4.3.255, 4.3.256, 4.3.257, 4.3.258, 4.3.259, 4.3.260, 4.3.261, 4.3.262, 4.3.264, 4.3.265, 4.3.266, 4.3.267, 4.3.268, 4.3.269, 4.3.270, 4.3.271, 4.3.272, 4.3.273, 4.3.274, 4.3.275, 4.3.276, 4.3.277, 4.3.278, 4.3.279, 4.3.280, 4.3.281, 4.3.282, and 4.3.283 for the application assertions.

There shall be exactly one object that defines the classified_element for a Classification_association (see 4.2.69).

4.2.69.3 definitional

The definitional specifies whether a General_classification (see 4.2.216) serves as definition. A value of 'true' indicates that the General_classification is definitional. The 'associated_classification' does not take precedence over the descriptions of the 'classified_element' made using Property_value (see 4.2.412) or Geometric_model (see 4.2.238) objects.

The attribute definitional shall only be used, if the classified_element is of one of the types Material (see 4.2.309), Item (see 4.2.267), Item_version (see 4.2.275), Design_discipline_item_definition (see 4.2.142), or Catalogue_thread (see 4.2.48).

The definitional need not be specified for a particular Classification_association (see 4.2.69).

4.2.69.4 role

The role specifies the relationship between the General_classification (see 4.2.216) and the associated object. Where applicable, the following values shall be used:

— 'electromagnetic compatibility': The associated object is the classification that categorizes the classified element in respect of its ability to comply with requirements concerning electromagnetic interference;

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— ’environmental conditions’: The associated object is the classification that categorizes the classified element with respect to its ability to comply with environmental impact requirements.

The role need not be specified for a particular Classification_association (see 4.2.69).

4.2.70 Classification_attribute

A Classification_attribute is a characteristic used to classify an object associated with the corresponding General_classification (see 4.2.216). The definition attribute of each ’allowed_value’ shall refer to the property identified within ’attribute_definition’.

The data associated with a Classification_attribute are the following:

— allowed_value;

— associated_classification;

— attribute_definition;

— description;

— id;

— name.

4.2.70.1 allowed_value

The allowed_value specifies the set of Property_value_representation (see 4.2.414) objects that represent characteristic values of the Classification_attribute.

See 4.3.287 for the application assertion.

4.2.70.2 associated_classification

The associated_classification specifies the General_classification (see 4.2.216) the Classification_attribute is a characteristic of.

See 4.3.284 for the application assertion.

4.2.70.3 attribute_definition

The attribute_definition specifies the Property (see 4.2.409) that characterizes the allowed values.

NOTE - The specification of compound characteristics can be realized by using Property_relationship (see 4.2.411) with ’relation_type ’peer’ or ’decomposition’.

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See 4.3.286 for the application assertion.

4.2.70.4 description

The description specifies additional information about the Classification_attribute.

See 4.3.285 for the application assertion.

The description need not be specified for a particular Classification_attribute (see 4.2.70).

If present, there shall be exactly one object that defines the description for a Classification_attribute.

4.2.70.5 id

The id specifies the identifier of the Classification_attribute that shall be unique within the scope of the associated General_classification (see 4.2.216).

EXAMPLE 'a' or 'b' for length or width attributes or 'r' for radius attributes are examples for identifiers of Classification_attribute objects. The meaning of such ids is usually specified in external sources.

4.2.70.6 name

The name specifies the word or group of words by which the Classification_attribute is referred to.

EXAMPLE 'length', 'width', or 'radius' are examples for the name of a Classification_attribute.

See 4.3.285 for the application assertion.

The name need not be specified for a particular Classification_attribute (see 4.2.70).

If present, there shall be exactly one object that defines the name for a Classification_attribute.

4.2.71 Classification_system

A Classification_system is the scheme used to define the categorization of an item.

EXAMPLE A dictionary collecting the conventional definitions of technical properties is an example of Classification_system.

The data associated with a Classification_system are the following:

— description;

— id.

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4.2.71.1 description

The description specifies additional information about the Classification_system.

See 4.3.288 for the application assertion.

The description need not be specified for a particular Classification_system (see 4.2.71).

If present, there shall be exactly one object that defines the description for a Classification_system.

4.2.71.2 id

The id specifies the identifier of the Classification_system.

4.2.72 Closed_profile

A Closed_profile is specified by an outline that bounds an enclosed area with no opening.

A Closed_profile is a type of Profile (see 4.2.401).

Each Closed_profile is a Ngon_profile (see 4.2.323), a Rectangular_closed_profile (see 4.2.422), a General_closed_profile (see 4.2.218), or a Circular_closed_profile (see 4.2.58).

4.2.73 Closed_profile_usage

A Closed_profile_usage is the identification of a Closed_profile (see 4.2.72) and possibly of a geometric Transformation (see 4.2.533) used to place the Closed_profile in a reference coordinate space.

A Closed_profile_usage is a type of Profile_usage (see 4.2.403).

The data associated with a Closed_profile_usage are the following:

— used_profile

The used_profile specifies the Closed_profile that is used.

See 4.3.289 for the application assertion.

4.2.74 Closed_shell

A Closed_shell is a collection of at least one Face (see 4.2.191) object that bounds a region in a three-dimensional space. The topological normal of the shell is defined as being directed from the finite to the infinite region. A Closed_shell shall not self-intersect.

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The data associated with a Closed_shell are the following:

— shell_boundary

The shell_boundary specifies the Face that represents the boundary of a Closed_shell.

See 4.3.290 for the application assertion.

4.2.75 Coating_layer

A Coating_layer is one layer of covering applied to a surface. For a Coating_layer the inherited attribute 'element_name' is not available.

NOTE 1 - Each Coating_layer is one particular aspect of a part's shape.

NOTE 2 - Sequences of Coating_layer objects can be defined using Shape_element_relationship (see 4.2.450) with relation_type 'coating layer sequence'.

EXAMPLE A layer of paint, applied to a part, is an example of Coating_layer.

A Coating_layer is a type of Shape_element (see 4.2.449).

The data associated with a Coating_layer are the following:

— thickness;

— used_material.

4.2.75.1 thickness

The thickness specifies the thickness of the Coating_layer.

NOTE - This reference to Thickness_dimension (see 4.2.516) is identical with the reference from Thickness_dimension to Shape_element (see 4.2.449) as Shape_element is a supertype of Coating_layer.

See 4.3.292 for the application assertion.

The thickness need not be specified for a particular Coating_layer (see 4.2.75).

4.2.75.2 used_material

The used_material specifies the material that is used for the Coating_layer.

NOTE - This reference to Material (see 4.2.309) is identical with the reference from Material to Shape_element (see 4.2.449) as Shape_element is a supertype of Coating_layer.

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See 4.3.291 for the application assertion.

4.2.76 Coaxiality_tolerance

A Coaxiality_tolerance is a constraint where the tolerance zone is limited by a cylinder, the diameter of which is the tolerance value. The cylinder axis is defined by the datums that are referenced.

A Coaxiality_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Coaxiality_tolerance are the following:

— reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.293 for the application assertion.

4.2.77 Collected_item_association

A Collected_item_association is a mechanism to associate Item_instance (see 4.2.271) objects with a Collection_definition (see 4.2.78).

A Collected_item_association is a type of Item_definition_instance_relationship (see 4.2.268).

The data associated with a Collected_item_association are the following:

— relating

The relating specifies the Collection_definition that collects the Item_instance objects.

See 4.3.294 for the application assertion.

4.2.78 Collection_definition

A Collection_definition is the definition of an Item_version (see 4.2.275) that serves as a collector for Item_instance (see 4.2.271) objects that are mounted in the same vehicle but may not be assembled together.

> EXAMPLE Brake pads on the left and right front brake from same supplier, locks and keys of the car all from one supplier, wooden panels in the interior from the same supplier (to ensure common structure of the wood) are examples for collections.

A Collection_definition is a type of Design_discipline_item_definition (see 4.2.142).

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The data associated with a Collection_definition are the following:

— purpose

The purpose specifies the rationale behind the Collection_definition.

See 4.3.295 for the application assertion.

The purpose need not be specified for a particular Collection_definition.

If present, there shall be exactly one object that defines the purpose for a Collection_definition.

4.2.79 Complete_circular_path

A Complete_circular_path is a path that defines a revolution of 360 degrees along a circle. The x-axis of the inherited Axis_placement (see 4.2.33) is coaxial to the rotation axis, and the z-axis is tangent to the curve n its start point. The y-axis is oriented such that the actual rotation axis has a y co-ordinate equal to the value of the 'radius' inherited from Circular_path (see 4.2.61). The Axis_placement lies on the curve described by the path.

EXAMPLE Figure 19 illustrates a Complete_circular_path.

A Complete_circular_path is a type of Circular_path (see 4.2.61).

4.2.80 Complex_product

A Complex_product is an object with the capability that it can be realized by, decomposed into or specialized as Product_constituent (see 4.2.395) objects in a functional, logical, or physical way.

Each Complex_product is a Product_function (see 4.2.397), a Product_component (see 4.2.394), or an Alternative_solution (see 4.2.10).

The data associated with a Complex_product are the following:

— id;

— version_id.

4.2.80.1 id

The id specifies the identifier of the Complex_product.

4.2.80.2 version_id

The version_id identifies a version of the concept represented by a Complex_product.

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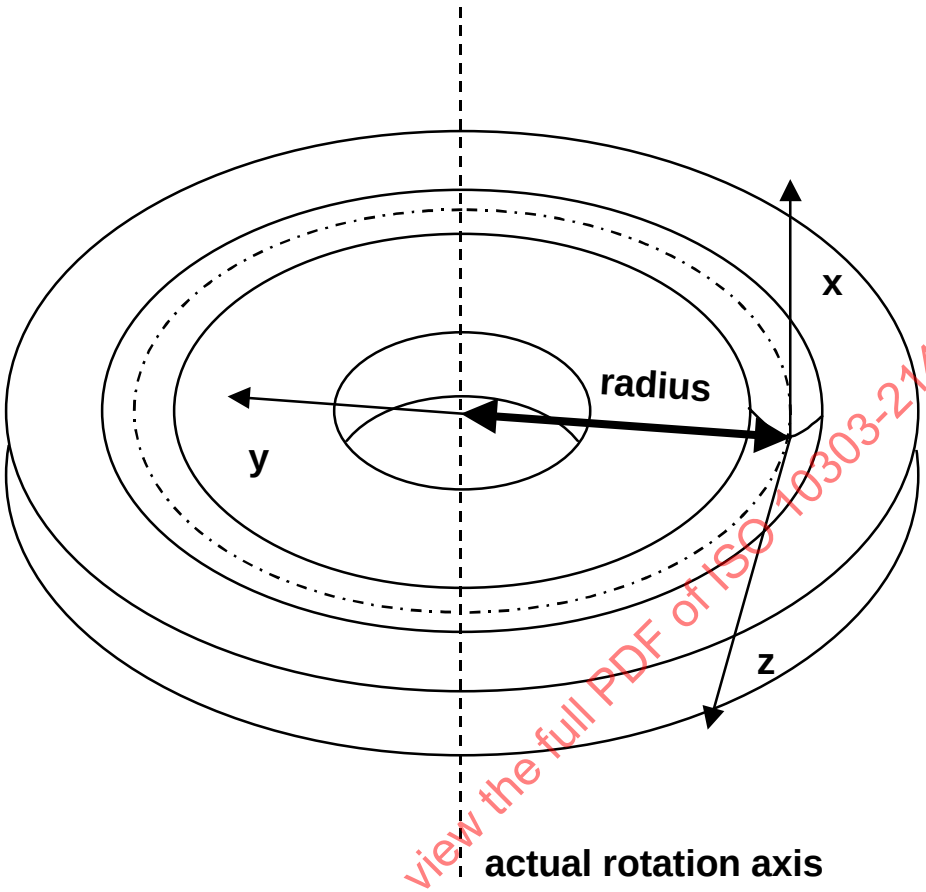


Figure 19 – Definition of a Complete_circular_path

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NOTE - The version_id does not identify a version of its characterization in one or more application contexts.

The version_id need not be specified for a particular Complex_product (see 4.2.80).

4.2.81 Complex_product_relationship

A Complex_product_relationship is a relationship between two Complex_product (see 4.2.80) objects.

The Complex_product_relationship shall only be used to relate Complex_product objects that are of the same kind.

The data associated with a Complex_product_relationship are the following:

— description;

— related;

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— relating;

— relation_type.

4.2.81.1 description

The description specifies additional information about the Complex_product_relationship.

See 4.3.297 for the application assertion.

The description need not be specified for a particular Complex_product_relationship (see 4.2.81).

If present, there shall be exactly one object that defines the description for a Complex_product_relationship.

4.2.81.2 related

The related specifies the second of the two objects related by the Complex_product_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.296 for the application assertion.

4.2.81.3 relating

The relating specifies the first of the two objects related by the Complex_product_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.296 for the application assertion.

4.2.81.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'derivation': the Complex_product_relationship defines a relationship where the related Complex_product (see 4.2.80) is derived from the relating Complex_product;

NOTE 1 - The relationship does not imply inheritance of any kind between the application objects that are related.

— 'replacement': The Complex_product_relationship defines a relationship where the related Complex_product is used in place of the relating Complex_product;

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— 'version hierarchy': the Complex_product_relationship defines a relationship where the related Complex_product is a sub version of the relating Complex_product;

EXAMPLE 1 'version hierarchy' is used, whenever a revision of one particular version is prepared, e.g., 'version 1.1'.

— 'version sequence': the Complex_product_relationship defines a relationship where the relating Complex_product is the preceding version and the related Complex_product is the following version.

NOTE 2 - The relationship does not imply inheritance of any kind between the application objects that are related.

EXAMPLE 2 'version sequence' is used, whenever a new version is prepared, e.g., 'version 1.0' is the preceding version for the following 'version 2.0'.

4.2.82 Component_placement

A Component_placement is the information pertaining to the placement of a Product_component (see 4.2.394), which is defined in its own Cartesian_coordinate_space (see 4.2.44), in the coordinate space of a reference Product_component.

EXAMPLE An example for the use of of a Component_placement is the placement of the Product_component 'steering wheel' dependent on left hand versus right hand steering in different countries.

The data associated with a Component_placement are the following:

— placed_component;

— placement;

— reference_product_component.

4.2.82.1 placed_component

The placed_component specifies the Product_component (see 4.2.394) that is positioned with respect to the 'reference_product_component'.

NOTE 1 - The Component_placement does not define a placement for all variants of the placed_component in the context of 'reference_product_component'.

The coordinate system that serves as a reference for the placement shall be specified by a Model_property_association (see 4.2.317). the 'definition' of the Model_property_value (see 4.2.318) shall be a General_property (see 4.2.230) with a 'property_type' of 'positioning'. The placement is only applicable for the placed_component and Product_component or Item_instance (see 4.2.271) objects that are explicitly placed in its coordinate space by Component_placement or Instance_placement (see 4.2.264).

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NOTE 2 - The placement does not apply to variants of the placed_component, i.e., Alternative_solution (see 4.2.10) objects that refer to the placed_component as 'base_element'.

See 4.3.299 for the application assertion.

4.2.82.2 placement

The placement specifies the Geometric_model_relationship_with_transformation (see 4.2.240) or the Template_instance (see 4.2.512) that defines the position of the 'placed_component' relatively to the 'reference_product_component'. In the case of Template_instance, the scale shall be omitted or set to 1.0.

See 4.3.298 and 4.3.300 for the application assertions.

There shall be exactly one object that defines the placement for a Component_placement (see 4.2.82).

4.2.82.3 reference_product_component

The reference_product_component specifies the high level Product_component (see 4.2.394) that is defined in the reference coordinate space. A Model_property_association (see 4.2.317) shall be assigned to the reference_product_component to define this reference coordinate space.

See 4.3.299 for the application assertion.

4.2.83 Composite_curve

A Composite_curve is a curve that is composed of a number of curves which join end to end.

NOTE - A Composite_curve may be closed and self-intersecting.

A Composite_curve is a type of Curve (see 4.2.108).

4.2.84 Compound_datum

A Compound_datum is a set of two Single_datum (see 4.2.454) objects of equal importance which are used to establish a single datum plane or axis.

EXAMPLE Figure 20 shows the usage of compound datum objects for tolerancing.

A Compound_datum is a type of Datum (see 4.2.123).

The data associated with a Compound_datum are the following:

— is_made_up_by

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The is_made_up_by specifies the set of Single_datum objects that form the Compound_datum.

See 4.3.301 for the application assertion.

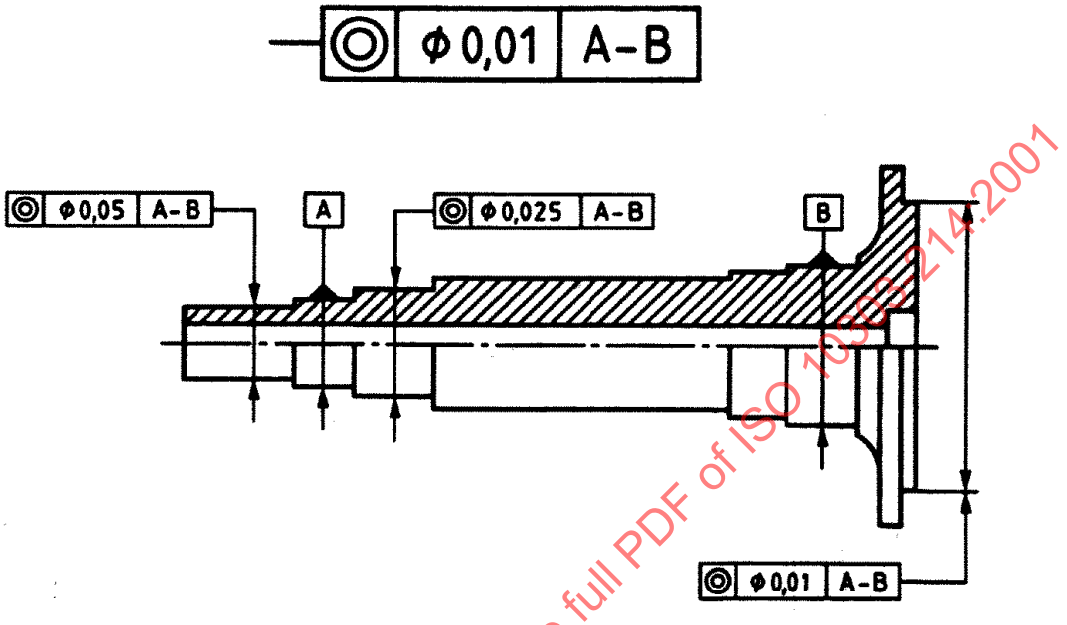


Figure 20 – Usage of compound datums

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4.2.85 Compound_feature_in_panel

A Compound_feature_in_panel is a union of Process_feature_in_panel (see 4.2.379) objects.

In the case where the Compound_feature_in_panel is applied as a Placed_feature (see 4.2.356), all of its elements, except for Transition_feature (see 4.2.537) objects, shall be defined in their own local coordinate spaces, and then transformed into the coordinate space of the Compound_feature_in_panel. In the case where the Compound_feature_in_panel is applied as an Included_feature (see 4.2.261), the Compound_feature_in_panel as well as all of its elements shall be defined in the coordinate space of the shape where it is applied.

NOTE - A Compound_feature_in_panel enables the definition of complex features based on existing Process_feature_in_panel definitions.

A Compound_feature_in_panel is a type of Process_feature_in_panel (see 4.2.379).

The data associated with a Compound_feature_in_panel are the following:

— feature_type

The feature_type specifies the kind of Compound_feature_in_panel.

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4.2.86 Compound_feature_in_panel_element

A Compound_feature_in_panel_element is the identification and, if necessary, the positioning of an element of a Compound_feature_in_panel (see 4.2.85).

The data associated with a Compound_feature_in_panel_element are the following:

— element_placement;

— feature;

— is_element_for.

4.2.86.1 element_placement

The element_placement specifies the geometric Transformation (see 4.2.533) that defines the position and the orientation of the Compound_feature_in_panel_element in the coordinate space of the Compound_feature_in_panel (see 4.2.85) in the case where the Compound_feature_in_panel is applied as a Placed_feature (see 4.2.356). In the case where the Compound_feature_in_panel is applied as an Included_feature (see 4.2.261) the element_placement shall not be instantiated.

See 4.3.304 for the application assertion.

The element_placement need not be specified for a particular Compound_feature_in_panel_element (see 4.2.86).

4.2.86.2 feature

The feature specifies the Process_feature_in_panel (see 4.2.379) or Transition_feature (see 4.2.537) that is the feature definition of the Compound_feature_in_panel_element.

See 4.3.303 and 4.3.305 for the application assertions.

There shall be exactly one object that defines the feature for a Compound_feature_in_panel_element (see 4.2.86).

4.2.86.3 is_element_for

The is_element_for specifies the Compound_feature_in_panel (see 4.2.85) of which the Compound_feature_in_panel_element is a component.

See 4.3.302 for the application assertion.

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4.2.87 Compound_feature_in_panel_element_relationship

A Compound_feature_in_panel_element_relationship is a relationship between two Compound_feature_-in_panel_element (see 4.2.86) objects that shall be applied consecutively when forming a Compound_-feature_in_panel (see 4.2.85).

The data associated with a Compound_feature_in_panel_element_relationship are the following:

— predecessor;

— successor.

4.2.87.1 predecessor

The predecessor specifies the Compound_feature_in_panel_element (see 4.2.86) that is preceding the other feature in the Compound_feature_in_panel_element_relationship.

See 4.3.306 for the application assertion.

4.2.87.2 successor

The successor specifies the Compound_feature_in_panel_element (see 4.2.86) that is succeeding the other feature in the Compound_feature_in_panel_element_relationship.

See 4.3.306 for the application assertion.

4.2.88 Compound_feature_in_solid

A Compound_feature_in_solid is a union of Process_feature_in_solid (see 4.2.380) objects.

In the case where the Compound_feature_in_solid is applied as a Placed_feature (see 4.2.356), all of its elements, Transition_feature (see 4.2.537) or Thread_feature (see 4.2.517) objects excepted, shall be defined in their own local coordinate spaces and then transformed into the coordinate space of the Compound_feature_in_solid. In the case where the Compound_feature_in_solid is applied as an Included_-feature (see 4.2.261), the Compound_feature_in_solid as well as all of its elements shall be defined in the coordinate space of the shape where the Compound_feature_in_solid is applied.

NOTE - A Compound_feature_in_solid allows the definition of complex features based on existing Process_feature_in_solid definitions.

A Compound_feature_in_solid is a type of Process_feature_in_solid (see 4.2.380).

Each Compound_feature_in_solid is a Compound_hole (see 4.2.91) or a General_compound_feature_-in_solid (see 4.2.220).

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The data associated with a Compound_feature_in_solid are the following:

— feature_type

The feature_type specifies a user defined name for the kind of Compound_feature_in_solid.

The feature_type need not be specified for a particular Compound_feature_in_solid.

4.2.89 Compound_feature_in_solid_element

A Compound_feature_in_solid_element is the identification and, if necessary, the positioning of an element of a Compound_feature_in_solid (see 4.2.88).

If the Compound_feature_in_solid_element is a Thread_feature (see 4.2.517), there shall be a Compound_feature_in_solid_element_relationship (see 4.2.90) that references the Compound_feature_in_solid_element representing the Thread_feature as successor and a Compound_feature_in_solid_element referring to either a Circular_boss (see 4.2.57) or a Round_hole (see 4.2.439) as predecessor.

The data associated with a Compound_feature_in_solid_element are the following:

— element_placement;

— feature;

— is_element_for.

4.2.89.1 element_placement

The element_placement specifies the geometric Transformation (see 4.2.533) that defines the position and the orientation of the Compound_feature_in_solid_element in the coordinate space of the Compound_feature_in_solid (see 4.2.88), in the case where the Compound_feature_in_solid is applied as a Placed_feature (see 4.2.356). The element_placement shall not be used if the Compound_feature_in_solid_element is a Thread_feature (see 4.2.517) or a Transition_feature (see 4.2.537). In the case where the Compound_feature_in_solid is applied as an Included_feature (see 4.2.261), the element_placement shall not be instantiated.

See 4.3.310 for the application assertion.

The element_placement need not be specified for a particular Compound_feature_in_solid_element (see 4.2.89).

4.2.89.2 feature

The feature specifies the Process_feature_in_solid (see 4.2.380) that is the feature definition of the Compound_feature_in_solid_element.

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See 4.3.308, 4.3.309, and 4.3.311 for the application assertions.

There shall be exactly one object that defines the feature for a Compound_feature_in_solid_element (see 4.2.89).

4.2.89.3 is_element_for

The is_element_for specifies the Compound_feature_in_solid_element (see 4.2.89) of which the Compound_feature_in_solid_element is a component.

See 4.3.307 for the application assertion.

4.2.90 Compound_feature_in_solid_element_relationship

A Compound_feature_in_solid_element_relationship is a relationship between two Compound_feature_in_solid_element (see 4.2.89) objects that shall be applied consecutively when forming a Compound_feature_in_solid (see 4.2.88).

NOTE - The sequence defined by the Compound_feature_in_solid_element_relationship need not be the same as the manufacturing sequence of the Compound_feature_in_solid.

The data associated with a Compound_feature_in_solid_element_relationship are the following:

— predecessor;

— successor.

4.2.90.1 predecessor

The predecessor specifies the Compound_feature_in_solid_element (see 4.2.89) that is preceding the other feature in the Compound_feature_in_solid_element_relationship.

See 4.3.312 for the application assertion.

4.2.90.2 successor

The successor specifies the Compound_feature_in_solid_element (see 4.2.89) that is succeeding the other feature in the Compound_feature_in_solid_element_relationship.

See 4.3.312 for the application assertion.

4.2.91 Compound_hole

A Compound_hole made of two Round_hole (see 4.2.439) objects. The top of the first Round_hole shall mate with the bottom of the second Round_hole. The Compound_hole orientation shall be the

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same as the orientation of the first Round_hole. Both Round_hole objects shall be co-axial. The Axis_placement (see 4.2.33) referenced by the inherited attribute 'location_and_orientation' shall coincide with the Axis_placement referenced by the first Round_hole.

A Compound_hole is a type of Compound_feature_in_solid (see 4.2.88).

The data associated with a Compound_hole are the following:

— compound_hole_type

The compound_hole_type specifies the type of combination of the two Round_hole objects. The following values shall be used:

— 'counterbore': The first Round_hole shall have any kind of Hole_bottom_condition (see 4.2.257), the second shall not have a Through_pocket_bottom_condition (see 4.2.520), and a larger diameter than the first Round_hole;

— 'countersunk': The first Round_hole shall have any kind of Hole_bottom_condition, the second shall not have a Through_pocket_bottom_condition, and shall have a taper.

4.2.92 Compound_model

A Compound_model is a geometry model where elements of different dimensionality, such as wireframe models or surface models, are topologically connected. The topology of a Compound_model may be non-manifold.

NOTE - A Compound_model may include non-manifold surface models as well as topologically bounded three-dimensional wireframe models.

A Compound_model is a type of Geometric_model (see 4.2.238).

The data associated with a Compound_model are the following:

— element

The element specifies the topologically connected elements that form the Compound_model.

See 4.3.313 for the application assertion.

4.2.93 Concentricity_tolerance

A Concentricity_tolerance is a constraint defining one of the following two conditions:

— a condition where the axes of all cross-sectional elements of a surface of revolution perpendicular to the axis of a datum feature are common to this axis. In this case, it implies a cylindrical tolerance

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zone whose axis coincides with the datum axis and within which all cross-sectional axes of the feature being controlled must lie;

— a condition where the centre point of one sphere is common to the centre point of another sphere. In this case, it implies a spherical tolerance zone within which the centre point of the first sphere must lie.

A Concentricity_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Concentricity_tolerance are the following:

— reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) that defines the reference for this type of geometric tolerance.

See 4.3.314 for the application assertion.

4.2.94 Configuration

A Configuration is the association of a Class_condition_association (see 4.2.65) or a Class_specification_association (see 4.2.67) object with a design or with a process in order to define a valid usage of it in the context of a certain Product_class (see 4.2.392).

NOTE 1 - The validity of the association may be limited by a time period through assigning an Effectivity (see 4.2.179) object to it.

NOTE 2 - The semantics of the kind of association is defined by the attributes 'configuration_type' and 'inheritance_type'.

The data associated with a Configuration are the following:

— configuration_type;

— configured_element;

— inheritance_type;

— is_solution_for.

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4.2.94.1 configuration_type

The configuration_type specifies the valid usage of a Configuration object that is applied to the application object as configured_element. The following values shall be used:

— 'design': The object referenced as 'configured_element' has to be designed and verified before it can actually be used in a given context. This context is specified by the Class_condition_association (see 4.2.65) and Class_specification_association (see 4.2.67) objects referenced as the 'is_solution_for'.

  This type of Configuration is applicable for Alternative_solution (see 4.2.10), Product_component (see 4.2.394), Product_function (see 4.2.397), Process_plan (see 4.2.387), or Process_operation_occurrence (see 4.2.384) objects;

— 'usage': The object referenced as the 'configured_element' is controlled by a Configuration. The Class_condition_association and Class_specification_association objects specify the usage cases and are referenced as the 'is_solution_for'.

  This type of Configuration is applicable for Alternative_solution, Item_instance (see 4.2.271), Process_plan, Process_operation_occurrence, or Product_component objects.

  EXAMPLE 1 The presence of an optional third rear axle of a truck is controlled by specifications on the level of Product_component.

  EXAMPLE 2 A 'sun-roof' has to be provided, i.e., designed for a class of vehicles that has an optional 'sun-roof' as part of its specification.

4.2.94.2 configured_element

The configured_element specifies the application object that is controlled for its valid usage by the Configuration.

See 4.3.315, 4.3.318, 4.3.319, 4.3.320, 4.3.321, and 4.3.322 for the application assertions.

There shall be exactly one object that defines the configured_element for a Configuration (see 4.2.94).

4.2.94.3 inheritance_type

The inheritance_type specifies whether or not an inheritance scheme for the configuration information in a hierarchical structure is applied to the application object referenced as the configured_element. The levels within such a hierarchy are defined through Product_structure_relationship (see 4.2.400) objects or the attribute 'base_element' of Alternative_solution (see 4.2.10). The following values shall be used:

— 'exception': No inheritance scheme is applicable and all required configuration information must be attached locally at the application object. The value indicates that the configuration information may be inconsistent to the structural levels above it or that it is, on purpose, contradictory to it. Such

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a condition implies that an inheritance scheme shall not continue beyond this point in the product structure tree;

EXAMPLE 1 A situation where the inheritance_type 'exception' is applicable is a technical solution released for an one particular customer without support in higher structure levels.

— 'inherited': A scheme for inheritance of configuration information applies. The complete configuration information shall be collected from the different levels in the structure by evaluation of results. The results shall be evaluated using the logical AND to combine configuration information starting at the referenced configured_element and using the logical OR to combine alternatives. In addition, this evaluation shall consider related effectivity information. 'inherited' only applies for objects for which the same value of 'configuration_type' is defined;

EXAMPLE 2 Figure 21 shows how inheritance is applied along the tree of a product structure: The complete configuration information of an Item_instance (see 4.2.271) can be obtained by adding any such information to Alternative_solution objects which are linked through Product_structure_relationship objects and 'base_element' attributes respectively. Whenever more than one higher level instance is present, the current information available is branched in as many branches as instances are present. For example, the total configuration information for the Item_instance given in Figure 21 could be expressed as follows: (C0.0 AND C1.0 AND C2.0) OR (C0.0 AND C1.1 AND C2.1) OR (C0.0 AND C1.1 AND C2.2).

— 'local': No inheritance scheme is applicable and all required configuration information must be attached locally at the application object. Nevertheless, any potentially inherited configuration information of a higher level shall be consistent, i.e., be a subset of the locally defined configuration information.

4.2.94.4 is_solution_for

The is_solution_for specifies the characteristic or combination of characteristics for which the object referenced as the configured_element provides a solution or which is needed to control a process operation. These characteristics are defined by a Class_specification_association (see 4.2.67) and combinations of characteristics are defined by a Class_condition_association (see 4.2.65) where the attribute 'condition type' is 'part usage'.

See 4.3.316 and 4.3.317 for the application assertions.

There shall be exactly one object that the Configuration (see 4.2.94) is_solution_for.

4.2.95 Conical_bottom

A Conical_bottom is a hole bottom that is shaped like a cone. A Conical_bottom is characterized by a constant decrease in the hole diameter until the diameter is zero or until the surface becomes tangent to a specified tip_radius.

A Conical_bottom is a type of Hole_bottom_condition (see 4.2.257).

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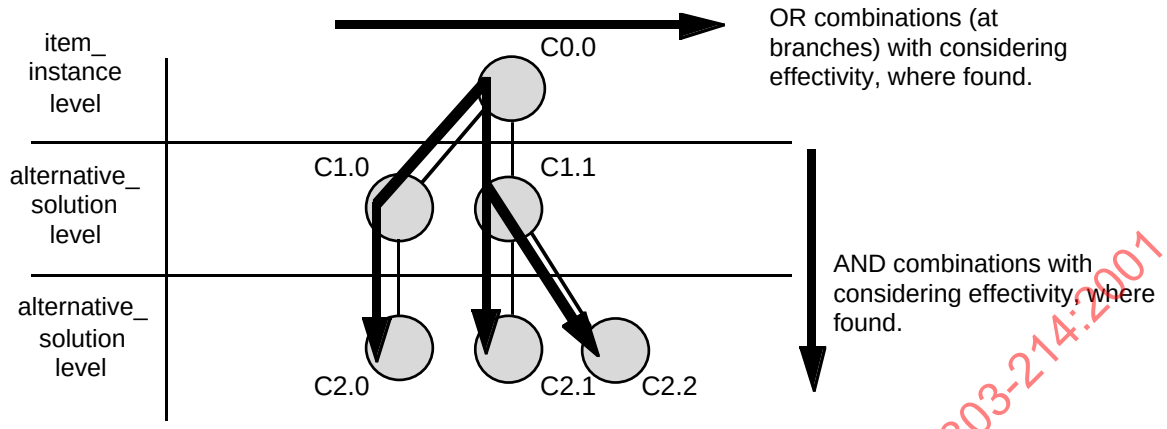


Figure 21 – Configuration inheritance scheme

The data associated with a Conical_bottom are the following:

— tip_angle;

— tip_radius.

4.2.95.1 tip_angle

The tip_angle specifies the opening angle of the cone. The tip_angle shall have a value greater than 0 degrees and smaller than 180 degrees.

See 4.3.323 for the application assertion.

4.2.95.2 tip_radius

The tip_radius specifies the radius at the tip of the cone.

See 4.3.323 for the application assertion.

The tip_radius need not be specified for a particular Conical_bottom (see 4.2.95).

4.2.96 Conical_surface

A Conical_surface is a surface that can be produced by revolving a line in three-dimensional geometric space about any intersecting line as rotation axis. The angle between the axis and the revolved line shall be between and not equal to 0 and 90 degrees. A Conical_surface shall be trimmed to a finite extension if used in a Surface_model (see 4.2.496) or a Geometrically_bounded_surface_model (see 4.2.248).

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A Conical_surface is a type of Surface (see 4.2.489).

4.2.97 Constant_radius_edge_round

A Constant_radius_edge_round is an Edge_round (see 4.2.177) with a constant radius.

A Constant_radius_edge_round is a type of Edge_round (see 4.2.177).

The data associated with a Constant_radius_edge_round are the following:

— first_offset;

— radius;

— second_offset.

4.2.97.1 first_offset

The first_offset specifies the amount of offset from the first Face (see 4.2.191) that defines the location of tangency.

EXAMPLE Figure 22 illustrates the use of offsets with a Constant_radius_edge_round.

NOTE - The use of offsets causes the location of tangency to be 'outside the material' on an imaginary offset surface and not on the part's surface.

See 4.3.324 for the application assertion.

The first_offset need not be specified for a particular Constant_radius_edge_round (see 4.2.97).

4.2.97.2 radius

The radius specifies the amount of curvature for a convex transition representing a Constant_radius_-edge_round.

See 4.3.324 for the application assertion.

4.2.97.3 second_offset

The second_offset specifies the amount of offset from the second Face (see 4.2.191) that defines the location of tangency.

See 4.3.324 for the application assertion.

The second_offset need not be specified for a particular Constant_radius_edge_round (see 4.2.97).

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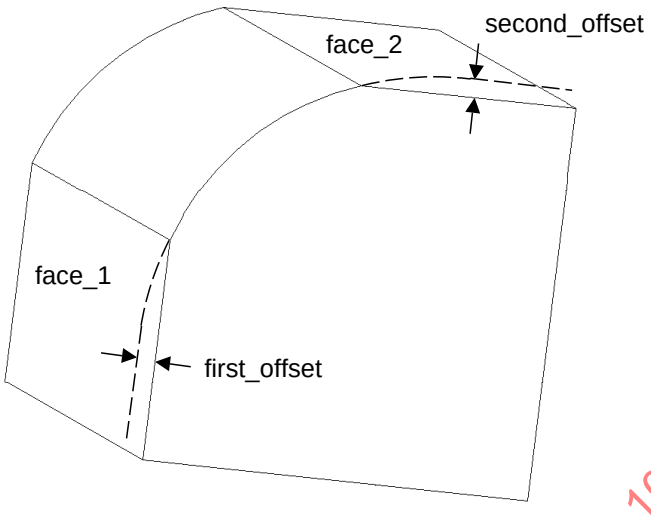


Figure 22 – Parameters defining an edge round with constant radius by offsets

4.2.98 Constant_radius_fillet

A Constant_radius_fillet is a Fillet (see 4.2.205) with a constant radius.

A Constant_radius_fillet is a type of Fillet (see 4.2.205).

The data associated with a Constant_radius_fillet are the following:

— first_offset;

— radius;

— second_offset.

4.2.98.1 first_offset

The first_offset specifies the amount of offset from the first Face (see 4.2.191) that defines the location of tangency.

EXAMPLE Figure 23 illustrates the use of offsets with a Constant_radius_fillet.

NOTE - The use of offsets causes the location of tangency to be 'inside the material' on an imaginary offset surface and not on the part's surface.

See 4.3.325 for the application assertion.

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The first_offset need not be specified for a particular Constant_radius_fillet (see 4.2.98).

4.2.98.2 radius

The radius specifies the amount of curvature for a concave transition representing a Constant_radius_-fillet.

See 4.3.325 for the application assertion.

4.2.98.3 second_offset

The second_offset specifies the amount of offset from the second Face (see 4.2.191) that defines the location of tangency.

See 4.3.325 for the application assertion.

The second_offset need not be specified for a particular Constant_radius_fillet (see 4.2.98).

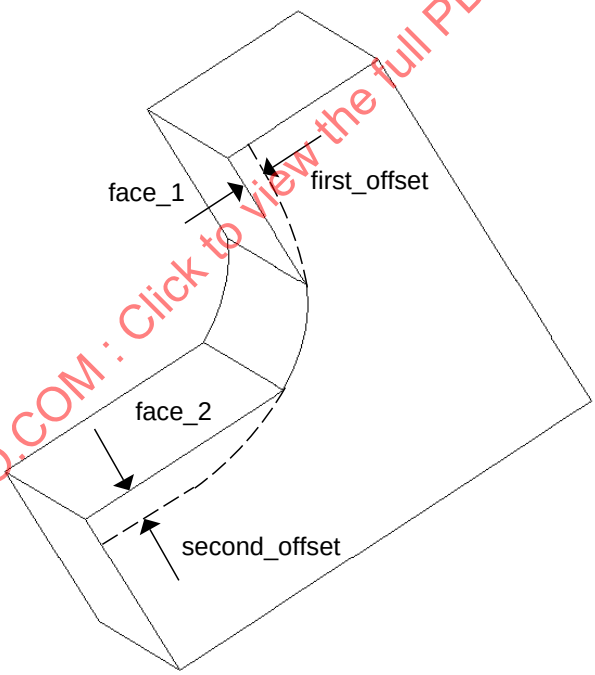


Figure 23 – Parameters defining a fillet with a constant radius by offsets

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4.2.99 Constructive_geometric_element

A Constructive_geometric_element is an element of a Constructive_geometry (see 4.2.100).

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The data associated with a Constructive_geometric_element are the following:

— description;

— element.

4.2.99.1 description

The description specifies the meaning of the Constructive_geometric_element.

EXAMPLE The description may be, e.g., 'rotation axis' or 'mirroring plane'.

See 4.3.329 for the application assertion.

The description need not be specified for a particular Constructive_geometric_element (see 4.2.99).

If present, there shall be exactly one object that defines the description for a Constructive_geometric_-element.

4.2.99.2 element

The element specifies the geometric element that serves as a Constructive_geometric_element.

See 4.3.326, 4.3.327, 4.3.328, 4.3.330, 4.3.331, 4.3.332, and 4.3.333 for the application assertions.

There shall be exactly one object that defines the element for a Constructive_geometric_element (see 4.2.99).

4.2.100 Constructive_geometry

A Constructive_geometry is a collection of non-shape geometry that is used to support the definition of a Geometric_model (see 4.2.238). Each Constructive_geometry shall refer directly or indirectly, via intermediate Constructive_geometry objects, to a Geometric_model through Constructive_geometry_-association (see 4.2.101) objects.

The data associated with a Constructive_geometry are the following:

— element;

— name.

4.2.100.1 element

The element specifies the Constructive_geometric_element (see 4.2.99) objects the Constructive_geom-etry consists of.

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See 4.3.334 for the application assertion.

4.2.100.2 name

The name specifies the word or group of words by which the Constructive_geometry is referred to.

See 4.3.335 for the application assertion.

The name need not be specified for a particular Constructive_geometry (see 4.2.100).

If present, there shall be exactly one object that defines the name for a Constructive_geometry.

4.2.101 Constructive_geometry_association

A Constructive_geometry_association is a the association of an auxiliary Constructive_geometry (see 4.2.100) with a Geometric_model (see 4.2.238) or another Constructive_geometry. This association specifies that the auxiliary Constructive_geometry contains elements that have been used to build the elements of the Geometric_model or of the Constructive_geometry.

The data associated with a Constructive_geometry_association are the following:

— auxiliary_geometry;

— base_geometry;

— description.

4.2.101.1 auxiliary_geometry

The auxiliary_geometry specifies the Constructive_geometry (see 4.2.100) that supports the definition of the 'base_geometry'.

See 4.3.336 for the application assertion.

4.2.101.2 base_geometry

The base_geometry specifies the Geometric_model (see 4.2.238) in which the 'auxiliary geometry' is used.

See 4.3.336 and 4.3.337 for the application assertions.

There shall be exactly one object that defines the base_geometry for a Constructive_geometry_association (see 4.2.101).

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4.2.101.3 description

The description specifies additional information about the Constructive_geometry_association.

See 4.3.338 for the application assertion.

The description need not be specified for a particular Constructive_geometry_association (see 4.2.101).

If present, there shall be exactly one object that defines the description for a Constructive_geometry_association.

4.2.102 Contact_ratio

A Contact_ratio is the measure of the quality of contact of a shape on a reference surface. It is expressed as the ratio between the measure of the area of contact and the measure of the area of the reference surface.

A Contact_ratio is a type of Surface_condition (see 4.2.492).

The data associated with a Contact_ratio are the following:

— measuring_gauge;

— ratio_value.

4.2.102.1 measuring_gauge

The measuring_gauge specifies a Physical_model (see 4.2.354) that serves as the reference for the determination of a Contact_ratio.

See 4.3.339 for the application assertion.

4.2.102.2 ratio_value

The ratio_value specifies a value between 0.0 and 1.0 that is the ratio between the measure of the area of contact and the measure of the area of the reference surface.

See 4.3.340 for the application assertion.

4.2.103 Context_dependent_appearance_assignment

A Context_dependent_appearance_assignment is the assignment of appearance characteristics to geometric elements and to annotations which are presented in a particular context. The assignment is made to this context. The Context_dependent_appearance_assignment is overridden by appearances associated with elements by an Appearance_assignment (see 4.2.20).

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A Context_dependent_appearance_assignment is a type of Appearance_assignment (see 4.2.20).

The data associated with a Context_dependent_appearance_assignment are the following:

— appearance_context

The appearance_context specifies the context where the appearance components are valid.

See 4.3.341, 4.3.342, 4.3.343, 4.3.344, 4.3.345, and 4.3.346 for the application assertions.

There shall be exactly one object that defines the appearance_context for a Context_dependent_appearance_assignment.

4.2.104 Contract

A Contract is a binding agreement concerning the design of Item_version (see 4.2.275) objects, the delivery of Drawing (see 4.2.170) objects, or the execution of other Activity (see 4.2.2) objects.

The data associated with a Contract are the following:

— contracted_element;

— description;

— id.

4.2.104.1 contracted_element

The contracted_element specifies the object that is subject of the Contract.

See 4.3.347, 4.3.348, and 4.3.349 for the application assertions.

4.2.104.2 description

The description specifies additional information for an Item_version (see 4.2.275), a Drawing (see 4.2.170), or an Activity (see 4.2.2) object according to the underlying Contract.

EXAMPLE The description of the Contract may be the ordered price.

See 4.3.350 for the application assertion.

The description need not be specified for a particular Contract (see 4.2.104).

If present, there shall be exactly one object that defines the description for a Contract.

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4.2.104.3 id

The id specifies the identifier of the Contract that shall be unique within the scope of an organization.

4.2.105 Cost_property

A Cost_property is a property that specifies costs.

A Cost_property is a type of Property (see 4.2.409).

4.2.106 Csg_model

A Csg_model is a collection of solids combined using regularized Boolean operations according to a tree (directed acyclic graph) with CSG primitives and non primitive solid models at the leaves and Boolean operations (and their associated Boolean results) at the nodes. A Csg_model is the root of the tree.

A Csg_model is a type of Geometric_model (see 4.2.238).

The data associated with a Csg_model are the following:

— tree_root_expression

The tree_root_expression specifies the root of the CSG tree.

See 4.3.351, 4.3.352, 4.3.353, 4.3.354, 4.3.355, and 4.3.356 for the application assertions.

4.2.107 Csg_primitive

A Csg_primitive is a basic solid object that may be combined with other solid objects, using regularized Boolean operations, in order to create more complex solid geometric elements.

A Csg_primitive is a type of Detailed_geometric_model_element (see 4.2.144).

Each Csg_primitive is a Right_circular_cylinder (see 4.2.438), a Right_angular_wedge (see 4.2.436), a Right_circular_cone (see 4.2.437), a Torus (see 4.2.531), a Block (see 4.2.40), or a Sphere (see 4.2.473).

4.2.108 Curve

A Curve is a path of a point moving in a coordinate space.

A Curve is a type of Detailed_geometric_model_element (see 4.2.144).

Each Curve is a Hyperbola (see 4.2.260), a Parabola (see 4.2.337), a Trimmed_curve (see 4.2.539), an Offset_curve (see 4.2.325), an Ellipse (see 4.2.183), a Composite_curve (see 4.2.83), a Circle (see

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4.2.56), a Line (see 4.2.296), a B_spline_curve (see 4.2.36), a Curve_on_surface (see 4.2.110), or a Polyline (see 4.2.377).

4.2.109 Curve_appearance

A Curve_appearance governs the visual appearance of geometric curves and of annotation curves.

Each Curve_appearance may be a Vector_appearance (see 4.2.550).

The data associated with a Curve_appearance are the following:

— colour;

— font;

— width.

4.2.109.1 colour

The colour specifies the colour of the visible segments of a curve. The colour is either user-defined or pre-defined. Figure 24 shows the pre-defined colours.

4.2.109.2 font

The font specifies the line font of a curve. The font determines the visible and invisible segments of a curve. Figure 25 shows the pre-defined curve fonts.

4.2.109.3 width

The width specifies the thickness of the visible segments of a curve measured perpendicular to the direction of the curve. The width is invariant to the scale of a Model_image (see 4.2.316).

Colour name	Red	Green	Blue
Black	0	0	0
Red	1.0	0	0
Green	0	1.0	0
Blue	0	0	1.0
Yellow	1.0	1.0	0
Magenta	1.0	0	1.0
Cyan	0	1.0	1.0
White	1.0	1.0	1.0

Figure 24 – Pre-defined colours

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Curve pattern name	Segment (mm)	Space (mm)	Segment (mm)	Space (mm)	Segment (mm)	Space (mm)	Number of Segments
Continous							0
Dotted	1.0	1.0					2
Dashed	4.0	1.5					2
Chain	7.0	1.0	1.0	1.0			4
Chain double dash	7.0	1.0	1.0	1.0	1.0	1.0	6

Figure 25 – Predefined curve fonts

4.2.110 Curve_on_surface

A Curve_on_surface is a curve that lies on a parametric surface. This includes the cases of a 3D curve representation together with the basis surface, a 2D curve representation within the parameter space of the surface, and a combination of both.

A Curve_on_surface is a type of Curve (see 4.2.108).

4.2.111 Curve_set_2d

A Curve_set_2d is a collection of a two-dimensional Curve (see 4.2.108) or Point (see 4.2.367) objects that establish a Wireframe_model_2d (see 4.2.561).

A Curve_set_2d is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Curve_set_2d are the following:

— element

The element specifies the set of Curve or Point objects that form a Curve_set_2d.

See 4.3.357 and 4.3.358 for the application assertions.

There shall be at least one object that defines the element for a Curve_set_2d.

4.2.112 Curve_set_3d

A Curve_set_3d is a collection of three-dimensional Curve (see 4.2.108) or Point (see 4.2.367) objects that establish a Wireframe_model_3d (see 4.2.562).

A Curve_set_3d is a type of Detailed_geometric_model_element (see 4.2.144).

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The data associated with a Curve_set_3d are the following:

— element

The element specifies the set of Curve or Point objects that form a Curve_set_3d.

See 4.3.359 and 4.3.360 for the application assertions.

There shall be at least one object that defines the element for a Curve_set_3d.

4.2.113 Curved_distance_dimension

A Curved_distance_dimension is the chordal dimension or the arc length along a curve.

A Curved_distance_dimension is a type of Location_dimension (see 4.2.301).

The data associated with a Curved_distance_dimension are the following:

— used_path;

— with_curve_direction.

4.2.113.1 used_path

The used_path specifies the Measurement_path (see 4.2.314) representing the curve.

See 4.3.361 for the application assertion.

4.2.113.2 with_curve_direction

The with_curve_direction specifies a Boolean value that indicates whether the direction along the element is of interest or not. The value 'true' indicates that the dimension is applied from the start point of the curve to the end point of the curve. The value 'false' indicates that the direction does not matter.

4.2.114 Cylindrical_surface

A Cylindrical_surface is a surface at a constant distance from an axis. A Cylindrical_surface shall be trimmed to a finite extension if used in a Surface_model (see 4.2.496) or a Geometrically_bounded_surface_model (see 4.2.248).

A Cylindrical_surface is a type of Surface (see 4.2.489).

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4.2.115 Cylindricity_tolerance

A Cylindricity_tolerance is the limitation of the allowable tolerance a surface may deviate from being nominally cylindrical. The tolerance zone is limited by two coaxial cylinders, with a difference in radii of the tolerance value.

A Cylindricity_tolerance is a type of Geometric_tolerance (see 4.2.243).

4.2.116 Data_environment

A Data_environment is the specification of the conditions under which a Material_property_value_representation (see 4.2.312) is valid.

EXAMPLE A Data_environment may have the name 'standard' and the description '20 degrees Celsius, 75% humidity'.

The data associated with a Data_environment are the following:

— description;

— environment_name.

4.2.116.1 description

The description specifies additional information about the Data_environment.

See 4.3.362 for the application assertion.

The description need not be specified for a particular Data_environment (see 4.2.116).

If present, there shall be exactly one object that defines the description for a Data_environment.

4.2.116.2 environment_name

The environment_name specifies the word or group of words by which the Data_environment is referred to.

4.2.117 Date_and_person_assignment

A Date_and_person_assignment is an object that associates a Date_and_person_organization (see 4.2.118) with product data. This assignment provides additional information for the associated object. The provision of such data through this assignment has an organizational character whereas some objects require the same kind of data mandatorily in order to be semantically complete. This assignment shall not be used to associate the corresponding organizational data with an object whose attributes are referencing the organizational data directly.

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EXAMPLE 1 An example for the requirement stated is that there shall not exist a Date_and_person_-assignment with a role of 'requestor' that refers to a Work_request (see 4.2.565), since this object refers directly to Date_and_person_organization in that role.

NOTE - In the context of the object Date_and_person_assignment, the expression 'referenced object' means 'a concept that is conveyed within one of the instances referred to by the attribute 'is_applied_to' and not one of the instances referred to by this attribute.

EXAMPLE 2 If applied to an instance of Item (see 4.2.267) with role 'creation', the Date_and_person_-assignment specifies the creation date of the part, tool, or raw material as a new object in the activity domain of the organization, and not the creation date of the instance of Item in the product management system of the organization.

The data associated with a Date_and_person_assignment are the following:

— assigned_date_and_person;

— description;

— is_applied_to;

— role.

4.2.117.1 assigned_date_and_person

The assigned_date_and_person specifies the Date_and_person_organization (see 4.2.118).

See 4.3.381 for the application assertion.

4.2.117.2 description

The description specifies additional information about the Date_and_person_assignment.

See 4.3.403 for the application assertion.

The description need not be specified for a particular Date_and_person_assignment (see 4.2.117).

If present, there shall be exactly one object that defines the description for a Date_and_person_assignment.

4.2.117.3 is_applied_to

The is_applied_to specifies the set of objects with which the Date_and_person_assignment is associated.

See 4.3.363, 4.3.364, 4.3.365, 4.3.366, 4.3.367, 4.3.368, 4.3.369, 4.3.370, 4.3.371, 4.3.372, 4.3.373, 4.3.374, 4.3.375, 4.3.376, 4.3.377, 4.3.378, 4.3.379, 4.3.380, 4.3.382, 4.3.383, 4.3.384, 4.3.385, 4.3.386,

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4.3.387, 4.3.388, 4.3.389, 4.3.390, 4.3.391, 4.3.392, 4.3.393, 4.3.394, 4.3.395, 4.3.396, 4.3.397, 4.3.398, 4.3.399, 4.3.400, 4.3.401, 4.3.402, 4.3.404, 4.3.405, 4.3.406, 4.3.407, 4.3.408, 4.3.409, 4.3.410, 4.3.411, 4.3.412, 4.3.413, 4.3.414, 4.3.415, 4.3.416, 4.3.417, 4.3.418, 4.3.419, 4.3.420, 4.3.421, 4.3.422, 4.3.423, 4.3.424, 4.3.425, 4.3.426, 4.3.427, 4.3.428, and 4.3.429 for the application assertions.

There shall be at least one object that the Date_and_person_assignment (see 4.2.117) is_applied_to.

4.2.117.4 role

The role specifies the relationship between the date or time and the person or organization in the Date_-and_person_assignment. Where applicable, the following values shall be used:

— 'creation': The assignment specifies that the referenced object has been created by the given person or organization at the given date and time;

— 'update': The assignment specifies that the referenced object has been altered by the given person or organization at the given date and time.

4.2.118 Date_and_person_organization

A Date_and_person_organization is a Person_in_organization (see 4.2.347) or an Organization (see 4.2.331) associated with a Date_time (see 4.2.119) or an Event_reference (see 4.2.184).

The data associated with a Date_and_person_organization are the following:

— actual_date;

— person_or_organization.

4.2.118.1 actual_date

The actual_date specifies the date and an optional time of day component of a Date_and_person_organization, or alternatively a discrete point in time as an Event_reference (see 4.2.184).

See 4.3.430 for the application assertion.

4.2.118.2 person_or_organization

The person_or_organization specifies the Organization (see 4.2.331) or the Person_in_organization (see 4.2.347) that is part of the Date_and_person_organization.

See 4.3.431 and 4.3.432 for the application assertions.

There shall be exactly one object that defines the person_or_organization for a Date_and_person_organization (see 4.2.118).

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4.2.119 Date_time

A Date_time is the specification of a date and an optional time of day.

The data associated with a Date_time are the following:

— date;

— time.

4.2.119.1 date

The date specifies the calendar time, defined according to the Gregorian calendar, conveying information about the year, the month, and the day in no specific order. The representation of a date shall be complete, i.e., millenium, century, and year-within-century data shall be included.

4.2.119.2 time

The time specifies a moment of occurrence measured by hour, minute, and second.

The time need not be specified for a particular Date_time (see 4.2.119).

4.2.120 Date_time_assignment

A Date_time_assignment is an association of point in time specified as a Date_time (see 4.2.119) or an Event_reference (see 4.2.184) with product data.

This assignment provides additional information for the associated object. The provision of such data through this assignment has an organizational character whereas some objects require the same kind of data mandatorily in order to be semantically complete. This assignment shall not be used to associate the corresponding organizational data with an object whose attributes are referencing the organizational data directly.

EXAMPLE 1 An example for the requirement stated is that there shall not exist a Date_time_assignment with a role of 'actual start date' that refers to an Activity (see 4.2.2), since this object refers directly to Date_time in that role.

NOTE - In the context of the object Date_time_assignment, the expression 'referenced object' means 'a concept that is conveyed within one of the instances referred to by the attribute 'is_applied_to' and not one of the instances referred to by this attribute.

EXAMPLE 2 If applied to an instance of Item (see 4.2.267) with role 'creation', the Date_time_assignment specifies the creation date of the part, tool, or raw material as a new object in the activity domain, and not the creation date of the instance of Item in a product management system.

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The data associated with a Date_time_assignment are the following:

— assigned_date_time;

— description;

— is_applied_to;

— role.

4.2.120.1 assigned_date_time

The assigned_date_time specifies the Date_time (see 4.2.119), or alternatively a discrete point in time as an Event_reference (see 4.2.184) that is associated with the product data.

See 4.3.451 for the application assertion.

4.2.120.2 description

The description specifies additional information about the Date_time_assignment.

See 4.3.473 for the application assertion.

The description need not be specified for a particular Date_time_assignment (see 4.2.120).

If present, there shall be exactly one object that defines the description for a Date_time_assignment.

4.2.120.3 is_applied_to

The is_applied_to specifies the set of objects of product data with which the Date_time_assignment is associated.

See 4.3.433, 4.3.434, 4.3.435, 4.3.436, 4.3.437, 4.3.438, 4.3.439, 4.3.440, 4.3.441, 4.3.442, 4.3.443, 4.3.444, 4.3.445, 4.3.446, 4.3.447, 4.3.448, 4.3.449, 4.3.450, 4.3.452, 4.3.453, 4.3.454, 4.3.455, 4.3.456, 4.3.457, 4.3.458, 4.3.459, 4.3.460, 4.3.461, 4.3.462, 4.3.463, 4.3.464, 4.3.465, 4.3.466, 4.3.467, 4.3.468, 4.3.469, 4.3.470, 4.3.471, 4.3.472, 4.3.474, 4.3.475, 4.3.476, 4.3.477, 4.3.478, 4.3.479, 4.3.480, 4.3.481, 4.3.482, 4.3.483, 4.3.484, 4.3.485, 4.3.486, 4.3.487, 4.3.488, 4.3.489, 4.3.490, 4.3.491, 4.3.492, 4.3.493, 4.3.494, 4.3.495, 4.3.496, 4.3.497, 4.3.498, and 4.3.499 for the application assertions.

There shall be at least one object that the Date_time_assignment (see 4.2.120) is_applied_to.

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4.2.120.4 role

The role specifies the action associated with the Date_time_assignment. Where applicable, the following values shall be used:

— 'classification date': The assignment specifies that the specified object is classified at the given date and time. This value shall only be used, if the Date_time_assignment refers to instances of Classification_association (see 4.2.69) as 'is_applied_to';

— 'creation': The assignment specifies that the referenced object was created at the given date and time;

— 'installation': The assignment specifies that the referenced object was mounted in a product at the given date and time;

EXAMPLE 1 This role is applicable, e.g., when referring to a Physical_instance (see 4.2.352).

— 'production': The assignment specifies that the referenced object was produced at the given date and time;

EXAMPLE 2 This role is applicable, e.g., when referring to a Physical_instance.

— 'registration': The assignment specifies that the referenced object was determined at the given date and time;

EXAMPLE 3 This role is applicable, e.g., when referring to a Property (see 4.2.409).

— 'update': The assignment specifies that the referenced object was altered at the given date and time.

4.2.121 Date_time_interval_assignment

A Date_time_interval_assignment is an association of an Interval_of_time (see 4.2.266) with some product data. The Date_time_interval_assignment shall neither be used to convey effectivity information, i.e., information concerning valid use of product data, nor to convey retention information, nor duration information.

NOTE - Such information is conveyed using Effectivity (see 4.2.179), Retention_period (see 4.2.434), and Duration (see 4.2.174) respectively.

The data associated with a Date_time_interval_assignment are the following:

— assigned_time_interval;

— description;

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— is_applied_to;

— role.

4.2.121.1 assigned_time_interval

The assigned_time_interval specifies the Interval_of_time (see 4.2.266) that is associated with the product data.

See 4.3.528 for the application assertion.

4.2.121.2 description

The description specifies additional information about the Date_time_interval_assignment.

See 4.3.539 for the application assertion.

The description need not be specified for a particular Date_time_interval_assignment (see 4.2.121).

If present, there shall be exactly one object that defines the description for a Date_time_interval_assignment.

4.2.121.3 is_applied_to

The is_applied_to specifies the set of objects of product data with which the Date_time_interval_assignment is associated.

See 4.3.500, 4.3.501, 4.3.502, 4.3.503, 4.3.504, 4.3.505, 4.3.506, 4.3.507, 4.3.508, 4.3.509, 4.3.510, 4.3.511, 4.3.512, 4.3.513, 4.3.514, 4.3.515, 4.3.516, 4.3.517, 4.3.518, 4.3.519, 4.3.520, 4.3.521, 4.3.522, 4.3.523, 4.3.524, 4.3.525, 4.3.526, 4.3.527, 4.3.529, 4.3.530, 4.3.531, 4.3.532, 4.3.533, 4.3.534, 4.3.535, 4.3.536, 4.3.537, 4.3.538, 4.3.540, 4.3.541, 4.3.542, 4.3.543, 4.3.544, 4.3.545, 4.3.546, 4.3.547, 4.3.548, 4.3.549, 4.3.550, 4.3.551, 4.3.552, 4.3.553, 4.3.554, 4.3.555, 4.3.556, 4.3.557, 4.3.558, 4.3.559, 4.3.560, 4.3.561, 4.3.562, 4.3.563, 4.3.564, and 4.3.565 for the application assertions.

There shall be at least one object that the Date_time_interval_assignment (see 4.2.121) is_applied_to.

4.2.121.4 role

The role specifies the action associated with the Date_time_interval_assignment. Where applicable, the following values shall be used:

— 'installation': The assignment specifies that the object referenced as 'is_applied_to' was mounted in a product during the given interval of time

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4.2.122 Dated_configuration

A Dated_configuration is a Manufacturing_configuration (see 4.2.305) that applies onwards from a given date, or between a start and an end date.

A Dated_configuration is a type of Manufacturing_configuration (see 4.2.305).

The data associated with a Dated_configuration are the following:

— end_date;

— start_date.

4.2.122.1 end_date

The end_date specifies the date and time when the validity of the 'configured_element' is not defined any longer.

If the end_date is not specified, the Dated_configuration is considered as valid forever from the start_-date.

The end_date need not be specified for a particular Dated_configuration (see 4.2.122).

4.2.122.2 start_date

The start_date specifies the first date when the Dated_configuration is valid.

4.2.123 Datum

A Datum is a reference point, line, axis, or plane.

NOTE - The concept of datum for tolerancing is defined in ISO 5459 [15].

Each Datum is a Single_datum (see 4.2.454) or a Compound_datum (see 4.2.84).

The data associated with a Datum are the following:

— precedence

The precedence specifies the position of the Datum in a sequence of Datum objects.

4.2.124 Datum_feature_callout

A Datum_feature_callout is a callout that is used to denote a point, line, or plane as a datum and that specifies the designation to be used as identification of that datum.

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EXAMPLE The top view in figure 26 shows some Datum_feature_callout objects for datums labeled 'E' and 'F'.

A Datum_feature_callout is a type of Draughting_callout (see 4.2.169).

4.2.125 Datum_target

A Datum_target is a designated geometric element on the surface of a part used to locate the part in a datum reference frame.

NOTE - The concept of datum for tolerancing is defined in ISO 5459 [15].

EXAMPLE Figure 27 shows how datum targets are presented on a drawing.

Each Datum_target is a Target_area (see 4.2.505) or a Placed_target (see 4.2.357).

The data associated with a Datum_target are the following:

— id

The id specifies the identifier of the Datum_target in a Datum_target_set (see 4.2.127).

4.2.126 Datum_target_callout

A Datum_target_callout is a type of callout that is used to denote points, lines, and surfaces of contact, on a part, which are used in establishing a reference datum. The callout contains an alphanumeric designation and, where applicable, a specification of the diametrical size of the target area.

EXAMPLE The bottom view in figure 26 shows three datum target points and their associated datum target symbols.

A Datum_target_callout is a type of Draughting_callout (see 4.2.169).

4.2.127 Datum_target_set

A Datum_target_set is a set of Datum_target (see 4.2.125) objects used to define a datum reference frame for a part.

The data associated with a Datum_target_set are the following:

— rule_description;

— target.

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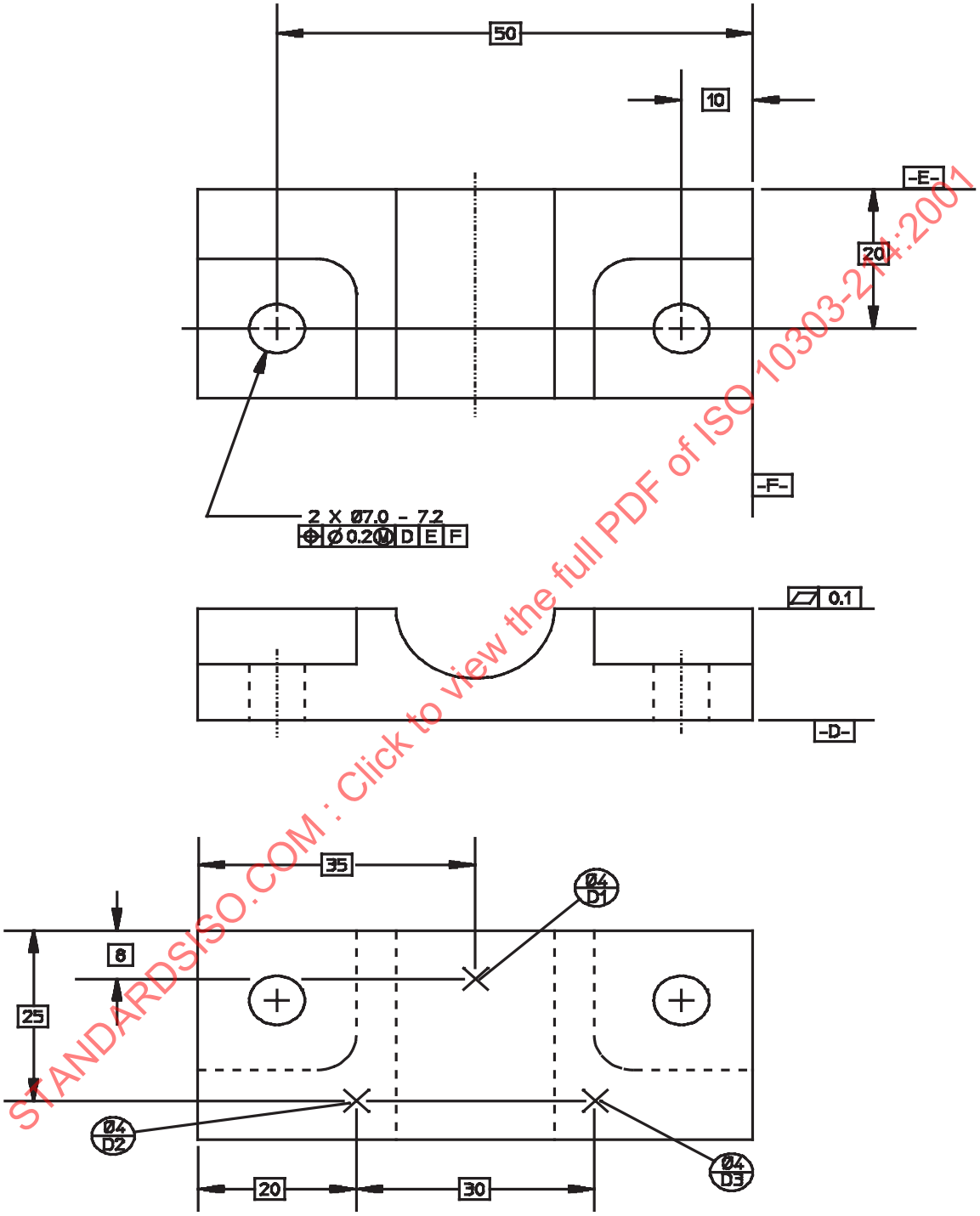


Figure 26 – Draughting callouts on a drawing

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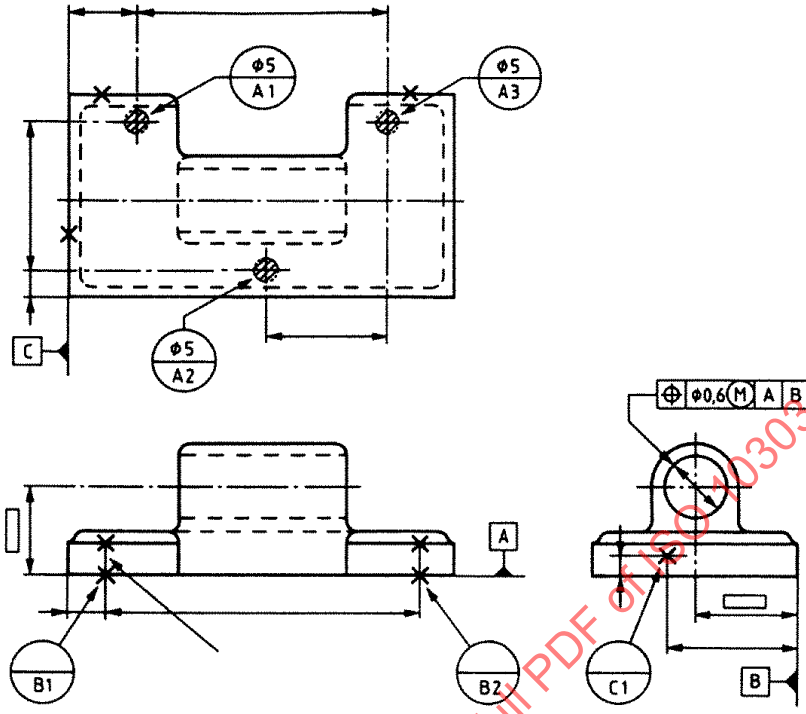


Figure 27 – Datum targets on a drawing

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4.2.127.1 rule_description

The rule_description specifies the type of datum that is formed by the Datum_target_set.

EXAMPLE The rule_description 'V-block' indicates that two Datum_target (see 4.2.125) objects on a cylindrical element are supposed to form the areas of contact in a V-shaped fixture.

See 4.3.567 for the application assertion.

The rule_description need not be specified for a particular Datum_target_set (see 4.2.127).

If present, there shall be exactly one object that defines the rule_description for a Datum_target_set.

4.2.127.2 target

The target specifies the set of Datum_target (see 4.2.125) objects that form the Datum_target_set.

See 4.3.566 for the application assertion.

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4.2.128 Default_chamfer

A Default_chamfer is the definition of a chamfer that shall be applied to each non-tangent continuous, convex edge of a shape where no other chamfer or edge round is specified. For a given context only one of Default_chamfer and Default_edge_round (see 4.2.130) shall be specified at a time. A Default_chamfer is applicable only to edges that do not change from convex to concave.

EXAMPLE During the creation of a 3D CAD model, the explicit modelling of chamfers is often omitted to save on time and model size.

The data associated with a Default_chamfer are the following:

— description;

— offset_value.

4.2.128.1 description

The description specifies additional information about the Default_chamfer.

See 4.3.569 for the application assertion.

The description need not be specified for a particular Default_chamfer (see 4.2.128).

If present, there shall be exactly one object that defines the description for a Default_chamfer.

4.2.128.2 offset_value

The offset_value specifies the width of the chamfer with respect to the two faces where it is applied to.

See 4.3.568 for the application assertion.

4.2.129 Default_draft_angle

A Default_draft_angle is the definition of an angle that is applied to each planar face of the part that is oriented in this draft direction.

NOTE 1 - For parts manufactured by casting, the draft angle is necessary to facilitate the extraction of the part out of the form after the casting.

NOTE 2 - There may be various draft directions depending on the actual shape of the part. The Default_-draft_angle is, therefore, not necessarily meant to enable a system to create a resulting shape out of the application of the angle; in most cases this is additional information that has to be interpreted by human beings.

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The data associated with a Default_draft_angle are the following:

— description;

— draft_angle_value.

4.2.129.1 description

The description specifies additional information about the Default_draft_angle.

See 4.3.571 for the application assertion.

The description need not be specified for a particular Default_draft_angle (see 4.2.129).

If present, there shall be exactly one object that defines the description for a Default_draft_angle.

4.2.129.2 draft_angle_value

The draft_angle_value specifies the value of the Default_draft_angle.

See 4.3.570 for the application assertion.

4.2.130 Default_edge_round

A Default_edge_round is the definition of an edge round that shall be applied to any non-tangent continuous, convex edge of a shape where no other edge round or chamfer is specified. For a given context only one of Default_edge_round and Default_chamfer (see 4.2.128) shall be specified at a time. A Default_edge_round is applicable only to edges that do not change from convex to concave.

> EXAMPLE During the creation of a 3D CAD model, the explicit modelling of edge rounds is often omitted to save on time and model size.

The data associated with a Default_edge_round are the following:

— description;

— radius_value.

4.2.130.1 description

The description specifies additional information about the Default_edge_round.

See 4.3.573 for the application assertion.

The description need not be specified for a particular Default_edge_round (see 4.2.130).

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If present, there shall be exactly one object that defines the description for a Default_edge_round.

4.2.130.2 radius_value

The radius_value specifies the amount of curvature for a convex transition between two faces.

See 4.3.572 for the application assertion.

4.2.131 Default_fillet

A Default_fillet is the definition of a fillet that shall be applied to each non-tangent continuous, concave edge of a shape model where no other fillet is specified and where its nature does not change from concave to convex.

EXAMPLE During the creation of a 3D CAD model, the explicit modelling of fillets is often omitted to save on time and model size.

The data associated with a Default_fillet are the following:

— description;

— radius_value.

4.2.131.1 description

The description specifies additional information about the Default_fillet.

See 4.3.575 for the application assertion.

The description need not be specified for a particular Default_fillet (see 4.2.131).

If present, there shall be exactly one object that defines the description for a Default_fillet.

4.2.131.2 radius_value

The radius_value specifies the amount of curvature for a concave transition between two faces.

See 4.3.574 for the application assertion.

4.2.132 Default_setting_association

A Default_setting_association is the setting of default values for one context.

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The data associated with a Default_setting_association are the following:

— default_context;

— default_value.

4.2.132.1 default_context

The default_context specifies the object in which the default settings apply.

See 4.3.582, 4.3.583, 4.3.584, 4.3.586, and 4.3.587 for the application assertions.

There shall be exactly one object that defines the default_context for a Default_setting_association (see 4.2.132).

4.2.132.2 default_value

The default_value specifies various defaults.

See 4.3.576, 4.3.577, 4.3.578, 4.3.579, 4.3.580, 4.3.581, and 4.3.585 for the application assertions.

There shall be at least one object that defines the default_value for a Default_setting_association (see 4.2.132).

4.2.133 Default_surface_texture

A Default_surface_texture is the definition of a surface texture that applies to each surface of a part in the given context that has no other surface texture explicitly specified.

The data associated with a Default_surface_texture are the following:

— measuring_method

The measuring_method specifies the method or the standard that defines the meaning of the parameters describing a surface texture. Where applicable, the following values shall be used:

— 'ISO 4287': The surface texture parameters are defined in ISO 4287;

— 'ISO 12085': The surface texture parameters are defined in ISO 12085;

— 'ISO 13565': The surface texture parameters are defined in ISO 13565.

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4.2.134 Default_thickness

A Default_thickness is the thickness value that is valid for all sheet-like objects in the context defined by the Default_setting_association (see 4.2.132) when a thickness value is not explicitly assigned.

The data associated with a Default_thickness are the following:

— description;

— parameter_name;

— thickness_value.

4.2.134.1 description

The description specifies additional information about the Default_thickness.

See 4.3.588 for the application assertion.

The description need not be specified for a particular Default_thickness (see 4.2.134).

If present, there shall be exactly one object that defines the description for a Default_thickness.

4.2.134.2 parameter_name

The parameter_name specifies the character, abbreviation, word or group thereof that designates the Default_thickness. The default value is 't'.

The parameter_name need not be specified for a particular Default_thickness (see 4.2.134).

4.2.134.3 thickness_value

The thickness_value specifies the actual value and the corresponding unit for the Default_thickness. The thickness_value is measured normal to the surface.

See 4.3.589 for the application assertion.

4.2.135 Defined_thread

A Defined_thread is a thread where the shape of the thread is specified by the values of the attributes. A Defined_thread may be an internal or an external thread.

A Defined_thread is a type of Thread_specification (see 4.2.518).

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The data associated with a Defined_thread are the following:

— crest;

— minor_diameter;

— pitch_diameter.

4.2.135.1 crest

The crest specifies the distance between the opposing points of the thread. The crest is formed by the intersection of the sides of the thread if extended, if necessary, beyond the top of the thread.

NOTE - It is possible to derive the crest from the form type and the major diameter.

See 4.3.590 for the application assertion.

The crest need not be specified for a particular Defined_thread (see 4.2.135).

4.2.135.2 minor_diameter

The minor_diameter specifies the dimension of the smallest diameter of a Defined_thread.

NOTE 1 - It is possible to derive the minor_diameter from the fit class and the major diameter.

NOTE 2 - The minor_diameter applies to both an internal and an external thread.

See 4.3.590 for the application assertion.

The minor_diameter need not be specified for a particular Defined_thread (see 4.2.135).

4.2.135.3 pitch_diameter

The pitch_diameter specifies the dimension of an imaginary cylinder passing through the threads so as to make equal the widths of the threads and the widths of the spaces cut by the cylinder.

See 4.3.590 for the application assertion.

4.2.136 Derived_geometry

A Derived_geometry is the identification of a Constructive_geometric_element (see 4.2.99) that is derived from an existing aspect of the shape of a part for tolerancing purposes.

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The data associated with a Derived_geometry are the following:

— geometry;

— is_derived_from;

— role.

4.2.136.1 geometry

The geometry specifies the Constructive_geometric_element (see 4.2.99) that is used for tolerancing.

See 4.3.591 for the application assertion.

4.2.136.2 is_derived_from

The is_derived_from specifies the set of Shape_element (see 4.2.449) objects from which the geometric element is derived.

See 4.3.592 for the application assertion.

4.2.136.3 role

The role specifies the function of the Constructive_geometric_element (see 4.2.99) when it is used as Derived_geometry.

EXAMPLE 'symmetry plane' is an example for the role.

4.2.137 Descriptive_specification

A Descriptive_specification is a textual description of an object.

NOTE - Usually, an object that is specified by a Descriptive_specification is not represented in the data structure as a Design_discipline_item_definition (see 4.2.142).

EXAMPLE 1 A Descriptive_specification may be used to describe the characteristics that distinguish a final item from the corresponding neutral item.

EXAMPLE 2 A Descriptive_specification may be used to describe a simple tool used as a resource for a Process_operation_definition (see 4.2.381).

The data associated with a Descriptive_specification are the following:

— description;

— id.

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4.2.137.1 description

The description specifies the Descriptive_specification.

EXAMPLE 1 The description specifying a final part may be 'arctic white' for the description of a car body colour. It may be 'chrome plated' for the description of an exhaust pipe. It may be 'standard cloth' for the description of the seat cover.

EXAMPLE 2 The description specifying a tool for a Process_operation_definition (see 4.2.381) may be, e.g., 'hammer' or 'screw driver'.

See 4.3.593 for the application assertion.

There shall be exactly one object that defines the description for a Descriptive_specification (see 4.2.137).

4.2.137.2 id

The id specifies the identifier of the Descriptive_specification.

The id need not be specified for a particular Descriptive_specification (see 4.2.137).

4.2.138 Design_constraint

A Design_constraint is a requirement that has to be considered in the design process of a Complex_-product (see 4.2.80). This constraint may be geometry based.

EXAMPLE 1 Ergonomic information like 'hip point' or 'forward driver vision' as well as 'door opening control lines', 'shipping critical dimensions', or 'stone throw zone' are examples for Design_constraint.

EXAMPLE 2 The diameter of a standard soft drink can is a constraint for designing the hole of a cup holder in a car.

Each Design_constraint may be a Design_constraint_version (see 4.2.141).

The data associated with a Design_constraint are the following:

— constraint_id;

— description;

— is_valid_for;

— name.

4.2.138.1 constraint_id

The constraint_id specifies the identifier of the Design_constraint.

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4.2.138.2 description

The description specifies additional information about the Design_constraint.

See 4.3.594 for the application assertion.

The description need not be specified for a particular Design_constraint (see 4.2.138).

If present, there shall be exactly one object that defines the description for a Design_constraint.

4.2.138.3 is_valid_for

The is_valid_for specifies the set of Product_class (see 4.2.392) objects that are affected by the Design_-constraint.

See 4.3.595 for the application assertion.

4.2.138.4 name

The name specifies the word or group of words by which the Design_constraint is referred to.

See 4.3.594 for the application assertion.

The name need not be specified for a particular Design_constraint (see 4.2.138).

If present, there shall be exactly one object that defines the name for a Design_constraint.

4.2.139 Design_constraint_association

A Design_constraint_association is a mechanism to associate a Design_constraint (see 4.2.138) with an object that is subject to the constraint indicated.

The data associated with a Design_constraint_association are the following:

— is_based_on;

— is_constraining;

— name.

4.2.139.1 is_based_on

The is_based_on specifies the Design_constraint (see 4.2.138) that represents the constraint.

See 4.3.597 for the application assertion.

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4.2.139.2 is_constraining

The is_constraining specifies the object that is affected by the Design_constraint (see 4.2.138).

See 4.3.596 for the application assertion.

4.2.139.3 name

The name specifies the word or group of words by which the Design_constraint_association is referred to.

See 4.3.598 for the application assertion.

The name need not be specified for a particular Design_constraint_association (see 4.2.139).

If present, there shall be exactly one object that defines the name for a Design_constraint_association.

4.2.140 Design_constraint_relationship

A Design_constraint_relationship is a relationship between two Design_constraint (see 4.2.138) objects.

The data associated with a Design_constraint_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.140.1 description

The description specifies additional information about the Design_constraint_relationship.

See 4.3.600 for the application assertion.

The description need not be specified for a particular Design_constraint_relationship (see 4.2.140).

If present, there shall be exactly one object that defines the description for a Design_constraint_relationship.

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4.2.140.2 related

The related specifies the second of the two Design_constraint (see 4.2.138) objects related by the Design_constraint_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.599 for the application assertion.

4.2.140.3 relating

The relating specifies the first of the two Design_constraint (see 4.2.138) objects related by the Design_constraint_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.599 for the application assertion.

4.2.140.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The application object defines a relationship where the related Design_constraint (see 4.2.138) is one of potentially more components into which the relating Design_constraint is broken down;

— 'precedence': The application object defines a relationship where the related Design_constraint has higher priority than the relating Design_constraint.

4.2.141 Design_constraint_version

A Design_constraint_version is a particular version of a Design_constraint (see 4.2.138).

A Design_constraint_version is a type of Design_constraint (see 4.2.138).

The data associated with a Design_constraint_version are the following:

— version_id

The version_id specifies the identification of a particular version of a Design_constraint. The version_id shall be unique within the scope of a Design_constraint.

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4.2.142 Design_discipline_item_definition

A Design_discipline_item_definition is a view of an Item_version (see 4.2.275). This view is relevant for the requirements of one or more life cycle stages and application domains and collects product data of the Item_version.

NOTE 1 - The selection of data describing an Item_version may be different for assembly purposes, shipping purposes or analysis purposes.

NOTE 2 - Each Design_discipline_item_definition may be any combination of Assembly_definition (see 4.2.27), Collection_definition (see 4.2.78), Mating_definition (see 4.2.313), and Process_state (see 4.2.391).

Each Design_discipline_item_definition may be a Mating_definition (see 4.2.313), a Collection_definition (see 4.2.78), an Assembly_definition (see 4.2.27), or a Process_state (see 4.2.391).

The data associated with a Design_discipline_item_definition are the following:

— additional_context;

— associated_item_version;

— id;

— initial_context;

— name.

4.2.142.1 additional_context

The additional_context specifies the set of Application_context (see 4.2.21) objects in which this view of the Item_version (see 4.2.275) is also relevant. The additional_context shall not contain the Application_context that is referenced as the 'initial_context'.

See 4.3.601 for the application assertion.

4.2.142.2 associated_item_version

The associated_item_version specifies the Item_version (see 4.2.275) for which the Design_discipline_item_definition is a view.

See 4.3.602 for the application assertion.

4.2.142.3 id

The id specifies the identifier of the Design_discipline_item_definition.

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4.2.142.4 initial_context

The initial_context specifies the Application_context (see 4.2.21) in which this view of the Item_version (see 4.2.275) has been designed primarily.

See 4.3.601 for the application assertion.

4.2.142.5 name

The name specifies the word or group of words used to refer to the Design_discipline_item_definition.

See 4.3.603 for the application assertion.

The name need not be specified for a particular Design_discipline_item_definition (see 4.2.142).

If present, there shall be exactly one object that defines the name for a Design_discipline_item_definition.

4.2.143 Detailed_element

A Detailed_element is a single element of a Geometric_model (see 4.2.238) or of a Styled_model (see 4.2.484).

Each Detailed_element is a Detailed_model_element (see 4.2.145), a Styled_element (see 4.2.482), or a Draughting_callout (see 4.2.169).

The data associated with a Detailed_element are the following:

— name

The name specifies the word or group of words by which the Detailed_element is referred to.

See 4.3.604 for the application assertion.

The name need not be specified for a particular Detailed_element.

If present, there shall be exactly one object that defines the name for a Detailed_element.

4.2.144 Detailed_geometric_model_element

A Detailed_geometric_model_element is the identification of a geometric element.

NOTE - The Detailed_geometric_model_element may be used to define the elements of a Geometric_-model (see 4.2.238).

A Detailed_geometric_model_element is a type of Detailed_model_element (see 4.2.145).

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Each Detailed_geometric_model_element is a Geometric_set_3d (see 4.2.242), a Topologically_connected_set (see 4.2.529), a Point_direction (see 4.2.369), a Boolean_result (see 4.2.41), a Point_direction_sequence (see 4.2.371), a Half_space_solid (see 4.2.252), a Curve_set_2d (see 4.2.111), a B_rep (see 4.2.34), a Faceted_b_rep (see 4.2.195), a Point_sequence (see 4.2.375), a Face (see 4.2.191), a Curve_set_3d (see 4.2.112), a Shell (see 4.2.451), a Curve (see 4.2.108), a Csg_primitive (see 4.2.107), a Surface (see 4.2.489), a Point (see 4.2.367), a Swept_face_solid (see 4.2.502), or a Solid_replica (see 4.2.462).

4.2.145 Detailed_model_element

A Detailed_model_element is a single element of a model.

A Detailed_model_element is a type of Detailed_element (see 4.2.143).

Each Detailed_model_element is a Template_instance (see 4.2.512) or a Detailed_geometric_model_element (see 4.2.144).

4.2.146 Diameter_taper

A Diameter_taper is a taper that has the grade of the taper specified by the final, smaller, diameter. A Diameter_taper shall only be applied to features that are defined by a swept Circular_closed_profile (see 4.2.58). The final diameter is measured at the end of the sweep path.

NOTE 1 - Tapers are applied after general end conditions are applied.

EXAMPLE Figure 28 illustrates a Diameter_taper.

The data associated with a Diameter_taper are the following:

— final_diameter

The final_diameter specifies the diameter of the circle at the end of the taper.

NOTE 2 - The diameter at the beginning of the taper is provided by the referencing feature itself.

See 4.3.605 for the application assertion.

4.2.147 Digital_document

A Digital_document is a piece of product data that is archived in a digital format.

A Digital_document is a type of Document_representation (see 4.2.163).

The data associated with a Digital_document are the following:

— file

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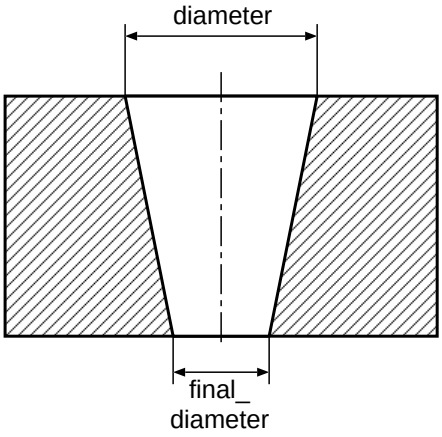


Figure 28 – Definition of a taper by two diameters

The file specifies a computer interpretable realization of the Digital_document.

See 4.3.606 for the application assertion.

4.2.148 Digital_file

A Digital_file contains computer interpretable data.

A Digital_file is a type of Document_file (see 4.2.159).

4.2.149 Dimension

A Dimension is the graphical presentation of the dimension value, of associated information, and of the symbology necessary to accurately depict its area of application.

Dimension objects cover linear dimensions, angular dimensions, curve dimensions, diameter dimensions, ordinate dimensions, radius dimensions, and leader directed dimensions.

For this particular type of Draughting_callout (see 4.2.169), the inherited attribute 'contents' shall refer to Annotation_curve (see 4.2.16) and Text (see 4.2.514) objects only.

EXAMPLE Examples for the symbology are leaders, projection curves, or dimension curves.

NOTE - The Text objects are shared with the 'primary_callout' and, if present, the 'secondary callout'.

A Dimension is a type of Draughting_callout (see 4.2.169).

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The data associated with a Dimension are the following:

— id;

— primary_callout;

— secondary_callout.

4.2.149.1 id

The id specifies the identifier of the Dimension.

4.2.149.2 primary_callout

The primary_callout specifies the first representation of the Dimension. Both the dimension value and the possible tolerance information are expressed in a primary unit of measure.

See 4.3.607 for the application assertion.

4.2.149.3 secondary_callout

The secondary_callout specifies the second representation of the Dimension. Both the dimension value and the possible tolerance information are expressed in a secondary unit of measure.

EXAMPLE The primary unit of measure used by primary_callout could be millimetres and the secondary unit of measure used by secondary_callout could be inches.

See 4.3.607 for the application assertion.

The secondary_callout need not be specified for a particular Dimension (see 4.2.149).

4.2.150 Dimension_callout

A Dimension_callout is a combination of text and of symbology that conveys presentation information about a dimension. This includes the dimension value, dimension units, tolerance information and any related notes.

The data associated with a Dimension_callout are the following:

— callout_element;

— is_displaying.

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4.2.150.1 callout_element

The callout_element specifies the text and possibly symbol that form the Dimension_callout.

See 4.3.608 and 4.3.610 for the application assertions.

There shall be at least one object that defines the callout_element for a Dimension_callout (see 4.2.150).

4.2.150.2 is_displaying

The is_displaying specifies the Geometric_dimension (see 4.2.237) that is displayed by the Dimension_-callout.

See 4.3.609 for the application assertion.

The is_displaying need not be specified for a particular Dimension_callout (see 4.2.150).

4.2.151 Dimension_curve

A Dimension_curve is a curve that is used for the graphical representation of a dimension. If necessary, it includes the additional symbology needed to show the extent of the dimension.

EXAMPLE Figure 29 shows the use of a Dimension_curve in a drawing.

A Dimension_curve is a type of Annotation_curve (see 4.2.16).

The data associated with a Dimension_curve are the following:

— terminator

The terminator specifies the list of terminating symbols for a particular Dimension_curve.

See 4.3.611 for the application assertion.

4.2.152 Dimension_sequence_pair

A Dimension_sequence_pair is the relationship between two adjacent dimensions that share a projection curve. This may be a chained or a parallel dimension pair.

The data associated with a Dimension_sequence_pair are the following:

— predecessor;

— successor.

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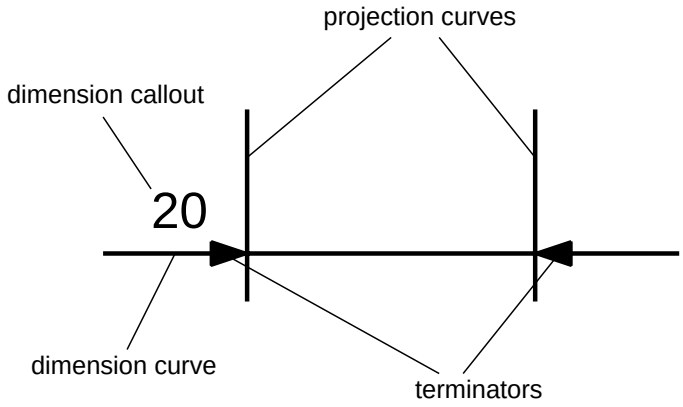


Figure 29 – Components of a dimension in a drawing

4.2.152.1 predecessor

The predecessor specifies the dimension that plays the role of a predecessor within a particular Dimension_sequence_pair.

See 4.3.612 for the application assertion.

4.2.152.2 successor

The successor specifies the dimension that plays the role of a successor within a particular Dimension_-sequence_pair.

See 4.3.612 for the application assertion.

4.2.153 Dimension_symbol

A Dimension_symbol is a predefined annotation symbol used to present information about dimensions.

This AP supports the dimension symbols shown in figure 30 .

4.2.154 Directed_taper

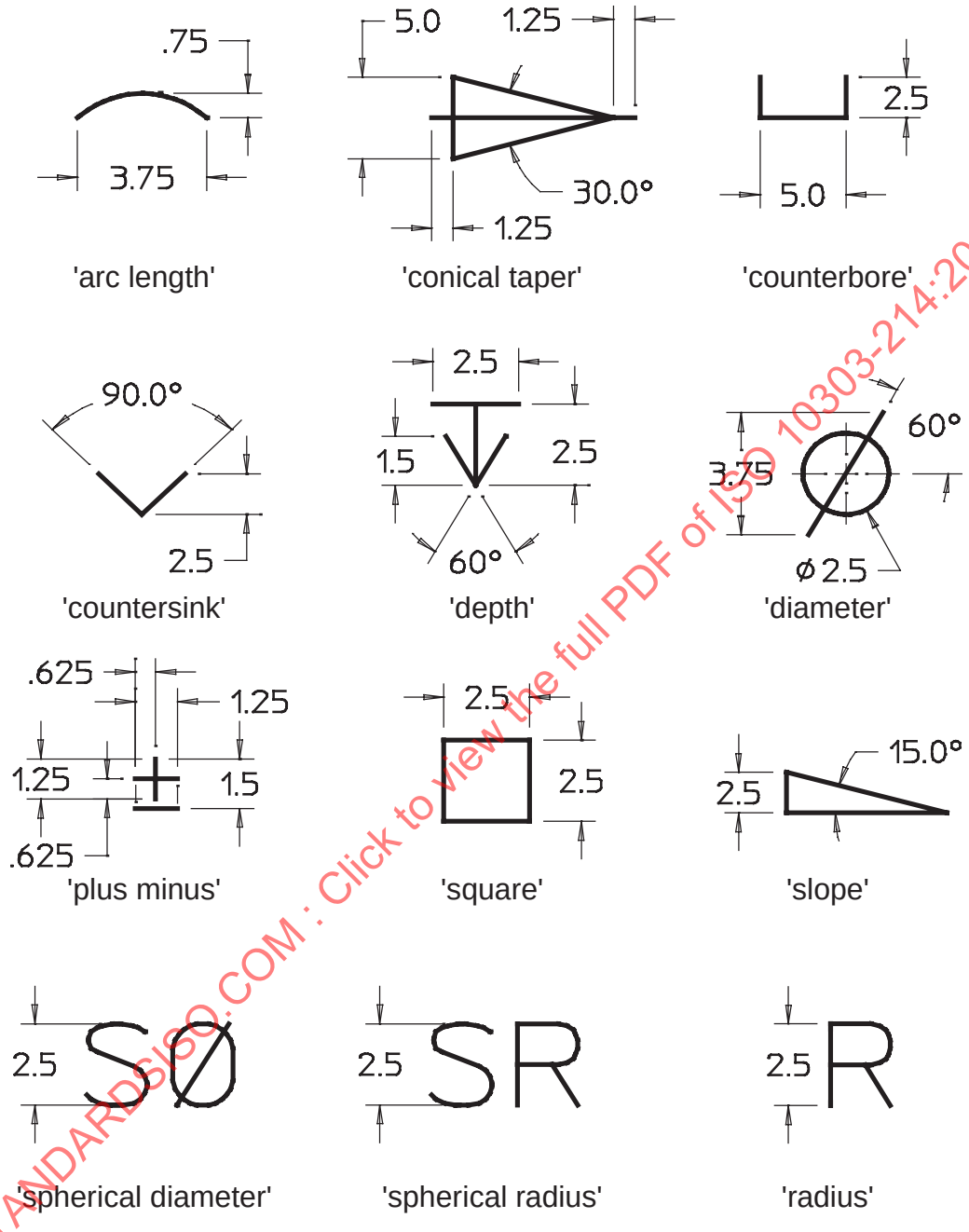
A Directed_taper is an angular deviation from a linear path where the angular deviation is measured from the specified direction.

NOTE 1 - This type of taper is primarily applied for drafting reasons.

NOTE 2 - Tapers are applied after general end conditions are applied.

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(Dimensions shown are in mm and prior to scaling)

Figure 30 – Predefined dimension symbols

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The data associated with a Directed_taper are the following:

— angle;

— direction.

4.2.154.1 angle

The angle specifies the Feature_parameter (see 4.2.201) that represents the angle.

An angle between 0 and 90 degrees or between -90 and -180 degrees indicates that the profile grows larger along the reference direction. An angle between 0 and -90 degrees or between 90 and 180 degrees indicates that the profile grows smaller along the reference direction.

See 4.3.613 for the application assertion.

4.2.154.2 direction

The direction specifies the reference direction from which the taper angle is measured.

The direction is defined in the same Cartesian_coordinate_space (see 4.2.44) as the concerned Process_-feature_in_solid (see 4.2.380).

4.2.155 Document

A Document is a logical document that serves as the identifier for a container for some product data.

The data associated with a Document are the following:

— description;

— document_id;

— name.

4.2.155.1 description

The description specifies additional information about the Document.

See 4.3.614 for the application assertion.

The description need not be specified for a particular Document (see 4.2.155).

If present, there shall be exactly one object that defines the description for a Document.

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4.2.155.2 document_id

The document_id specifies the identifier of the Document.

4.2.155.3 name

The name specifies the word or group of words by which the Document is referred to.

See 4.3.614 for the application assertion.

There shall be exactly one object that defines the name for a Document (see 4.2.155).

4.2.156 Document_assignment

A Document_assignment is a mechanism to associate a document with an object, where the assigned document provides information about the object it is associated to.

Each Document_assignment may be a Partial_document_assignment (see 4.2.341).

The data associated with a Document_assignment are the following:

— assigned_document;

— is_assigned_to;

— role.

4.2.156.1 assigned_document

The assigned_document specifies the Document (see 4.2.155), a Document_version (see 4.2.167), a Document_representation (see 4.2.163), or a Document_file (see 4.2.159) that is used to provide information.

See 4.3.630, 4.3.631, 4.3.632, and 4.3.633 for the application assertions.

There shall be exactly one object that defines the assigned_document for a Document_assignment (see 4.2.156).

4.2.156.2 is_assigned_to

The is_assigned_to specifies the object that information is provided for.

EXAMPLE A document assigned to Activity_element (see 4.2.3) may provide further description of the input or output of that activity.

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See 4.3.615, 4.3.616, 4.3.617, 4.3.618, 4.3.619, 4.3.620, 4.3.621, 4.3.622, 4.3.623, 4.3.624, 4.3.625, 4.3.626, 4.3.627, 4.3.628, 4.3.629, 4.3.634, 4.3.635, 4.3.636, 4.3.637, 4.3.638, 4.3.639, 4.3.640, 4.3.641, 4.3.642, 4.3.643, 4.3.644, 4.3.645, 4.3.646, 4.3.647, 4.3.648, 4.3.649, 4.3.650, 4.3.651, 4.3.652, 4.3.653, 4.3.654, 4.3.655, 4.3.656, 4.3.657, 4.3.658, 4.3.659, 4.3.660, 4.3.661, 4.3.662, 4.3.663, 4.3.664, 4.3.665, 4.3.666, 4.3.667, 4.3.668, 4.3.669, 4.3.670, 4.3.671, and 4.3.672 for the application assertions.

There shall be exactly one object that the Document_assignment (see 4.2.156) is_assigned_to.

4.2.156.3 role

The role specifies the meaning of the Document_assignment. Where applicable, the following values shall be used:

— 'additional information': The assigned document provides information that is relevant for the associated object, but is not a description of the associated object itself;

— 'behavior': The assigned document specifies information about the behaviour of the associated object;

— 'description': The assigned document provides textual information for the associated object itself;

— 'informative': The assigned document may or may not be considered;

— 'mandatory': The associated object shall conform to the content of the assigned document;

— 'mathematical description': The assigned document specifies the associated object by providing the algorithmic specification of its behavior.

EXAMPLE For a Product component (see 4.2.394) there is a textual document assigned, explaining the functionality, size, and other characteristics by a Document_assignment with role 'description'. Another document, representing the specification of the Product_class (see 4.2.392), in which the Product_component is used, is also assigned to the same Product_component by a Document_assignment with role 'additional information'.

4.2.157 Document_content_property

A Document_content_property specifies characteristics precising the content of a Document_file (see 4.2.159) or of a Document_representation (see 4.2.163). At least one of the optional attributes shall be specified for each instance of this object.

In the case where a Document_content_property is referred by a Document_representation, the characteristics apply to all individual Document_file objects, whereas in the case where it is referred by a Document_file, the characteristics apply on an individual basis.

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The data associated with a Document_content_property are the following:

— detail_level;

— geometry_type;

— languages;

— real_world_scale.

4.2.157.1 detail_level

The detail_level specifies the level of detail that the Document_file (see 4.2.159) or the Document_representation (see 4.2.163) provides. Where applicable, the following values shall be used:

— 'rough 3d shape': 3D shape model without edge rounds and fillets;

— 'rounded edges': 3D shape model with edge rounds and fillets.

The detail_level need not be specified for a particular Document_content_property (see 4.2.157).

4.2.157.2 geometry_type

The geometry_type specifies the kind or kinds of geometry that an object contains. Where applicable, the following values shall be used:

— '3D wireframe model': The document contains a 3D shape model in wireframe representation;

— '2D shape': The document contains a 2D shape model or contours only;

— 'surface model': The document contains a 3D shape model in surface representation;

— 'closed volume': The document contains a 3D shape model in closed body topological surface representation;

— 'solid model': The document contains a 3D shape model in advanced boundary representation;

— 'solid and surface model': The document contains a 3D shape model in surface and advanced boundary representation;

— 'assembly': The document contains an assembly structure with reference to the assembled components and their transformation matrices;

— 'assembly with mating elements': The document contains an assembly structure including the mating components only, such as screws or rivets, with exact positioning information. This assembly representation is intended to be overlayed with the assembly structure for the main components;

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— ’2D drawing’: The document contains a technical drawing without 3D shape representation;

— ’drawing derived from 3D data’: The document contains a technical drawing that has been derived from a 3D shape model;

— ’drawing related to 3D data’: The document contains a technical drawing that visualizes a 3D shape model and possibly establishes associative links to the 3D shape model.

The geometry_type need not be specified for a particular Document_content_property (see 4.2.157).

4.2.157.3 languages

The languages specifies which language or languages are used in the characterized objects.

EXAMPLE ’Japanese’ and ’German’ are examples for the fact that annotation on a drawing is provided in the language ’Japanese’ or ’German’ respectively.

See 4.3.673 for the application assertion.

4.2.157.4 real_world_scale

The real_world_scale specifies the scale that is used in the Document_file (see 4.2.159) or in the Document_representation (see 4.2.163) the Document_content_property is referred by.

See 4.3.674 for the application assertion.

The real_world_scale need not be specified for a particular Document_content_property (see 4.2.157).

4.2.158 Document_creation_property

A Document_creation_property specifies characteristics of Document_file (see 4.2.159) or of Document_representation (see 4.2.163) objects. It specifies the context of the creation of the object. At least one of the optional attributes shall be specified for each instance of this object.

In the case where a Document_creation_property is referred by a Document_representation the characteristics apply to all individual Document_file objects, whereas in the case it is referred by a Document_file, the characteristics apply on an individual basis.

The data associated with a Document_creation_property are the following:

— creating_interface;

— creating_system;

— operating_system.

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4.2.158.1 creating_interface

The creating_interface specifies the computer application used to create the Document_file (see 4.2.159) or Document_representation (see 4.2.163) object.

EXAMPLE 1 'Postscript Printer Driver' is an example for a creating interface of a Physical_document (see 4.2.351).

EXAMPLE 2 'SYSTEM-C-STL' is an example for a creating interface of a Physical_model (see 4.2.354) in the case of a stereolithographic model.

The creating_interface need not be specified for a particular Document_creation_property (see 4.2.158).

4.2.158.2 creating_system

The creating_system specifies the computer application or the machine which is used to create the object that is characterized.

4.2.158.3 operating_system

The operating_system specifies the operating system that is used to execute the computer application that created the characterized object.

The operating_system need not be specified for a particular Document_creation_property (see 4.2.158).

4.2.159 Document_file

A Document_file is one of potentially more files on a computer system or in actual stacks of paper that make up a Document_representation (see 4.2.163).

Each Document_file is a Hardcopy (see 4.2.253) or a Digital_file (see 4.2.148).

The data associated with a Document_file are the following:

— content;

— creation;

— document_file_type;

— external_id_and_location;

— file_format;

— file_id;

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— size;

— version_id.

4.2.159.1 content

The content characterizes the content of the Document_file.

See 4.3.675 for the application assertion.

The content need not be specified for a particular Document_file (see 4.2.159).

4.2.159.2 creation

The creation specifies further details of the context of the creation of the Document_file.

See 4.3.676 for the application assertion.

The creation need not be specified for a particular Document_file (see 4.2.159).

4.2.159.3 document_file_type

The document_file_type specifies the format of the Document_file. It shall only be specified, if the Document_file does not participate in a Document (see 4.2.155).

See 4.3.679 for the application assertion.

The document_file_type need not be specified for a particular Document_file (see 4.2.159).

4.2.159.4 external_id_and_location

The external_id_and_location specifies alternatives of the identifier and location of the Document_file.

EXAMPLE A copy of a document may be found in another department with a different id.

See 4.3.680 for the application assertion.

4.2.159.5 file_format

The file_format specifies the characteristics of the Document_file that specify the format of the object.

See 4.3.677 for the application assertion.

The file_format need not be specified for a particular Document_file (see 4.2.159).

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4.2.159.6 file_id

The file_id specifies the identifier which is used to locate the file either on a computer system or in a repository of paper documents.

4.2.159.7 size

The size specifies characteristics for the size of the Document_file.

See 4.3.678 for the application assertion.

The size need not be specified for a particular Document_file (see 4.2.159).

4.2.159.8 version_id

The version_id specifies the identification of the version that distinguishes one Document_file object from other versions of Document_file objects with the same file_id.

The version_id need not be specified for a particular Document_file (see 4.2.159).

4.2.160 Document_file_relationship

A Document_file_relationship is a relationship between two Document_file (see 4.2.159) objects. It specifies that the related Document_file is referenced from the relating Document_file.

> EXAMPLE A service manual may contain graphics for explanatory reasons. In this case the Document_-file objects that contain the graphics are referenced as related from the Document_file object that contains the body of the service manual with relation_type 'reference'.

The data associated with a Document_file_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.160.1 description

The description specifies additional information about the Document_file_relationship.

See 4.3.682 for the application assertion.

The description need not be specified for a particular Document_file_relationship (see 4.2.160).

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If present, there shall be exactly one object that defines the description for a Document_file_relationship.

4.2.160.2 related

The related specifies the second of the two objects related by the Document_file_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.681 for the application assertion.

4.2.160.3 relating

The relating specifies the first of the two objects related by the Document_file_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.681 for the application assertion.

4.2.160.4 relation_type

The relation_type specifies the meaning of the relationship. The values 'addition', 'decomposition', and 'peer' are only allowed if neither the relating nor the related Document_file (see 4.2.159) are included in a Document_representation (see 4.2.163). Where applicable, the following values shall be used:

— 'addition': The application object specifies that the related document provides supplementary or collateral information with regard to the information provided by the relating document;

EXAMPLE 1 The recommended practices for this part of ISO 10303 may be an addition.

— 'copy': The application object defines a relationship where the related Document_file is a copy of the relating Document_file;

— 'decomposition': The application object defines a relationship where the related Document_file is one of potentially more sub documents of the relating Document_file;

EXAMPLE 2 The decomposition of a document into clauses or into several CAD models is an example for 'decomposition'.

— 'derivation': The application object defines a relationship where the related Document_file is derived from the relating Document_file;

EXAMPLE 3 The derivation of a hypertext document from an text document is an example for 'derivation'.

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— 'peer': The application object specifies that the related document provides required information with regard to that provided by the relating document. The peer document is essential for a complete understanding;

— 'reference': The application object defines a relationship where the related document is referenced from the relating one;

EXAMPLE 4 The link in a hypertext document may be a reference.

— 'sequence': The application object defines a logical sequence where the related Document_file comes after the relating Document_file;

EXAMPLE 5 A sequence of clauses is an example for 'sequence'.

— 'substitution': The application object defines a relationship where the related Document_file replaces the relating Document_file;

— 'translation': The application object specifies that the related document is generated through a translation process from the relating document.

The values 'addition', 'decomposition', and 'peer' are used for the purpose of creating logical structures of documents. These values shall only be used for the relation_type of Document_file_relationship, if the referenced Document_file objects do not participate in a Document_representation. In the latter case, Document_structure (see 4.2.165) shall be used instead.

4.2.161 Document_format_property

A Document_format_property specifies characteristics of a Document_file (see 4.2.159) or of a Document_representation (see 4.2.163) that specify the format of the object. At least one of the optional attributes shall be specified for each instance of this object.

In the case where a Document_format_property is referred by a Document_representation, the characteristics apply to all individual Document_file objects, whereas in the case it is referred by a Document_file the characteristics apply on an individual basis.

The data associated with a Document_format_property are the following:

— character_code;

— data_format;

— size_format.

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4.2.161.1 character_code

The character_code specifies the character code that is used in the characterized object. Where applicable, the following values shall be used:

— 'binary': The document contains data in binary format;

— 'IEC 61286': The coded character set used to encode the document data according to IEC 61286;

— 'ISO 646': The coded character set used to encode the document data according to ISO 646;

NOTE 1 - The character set in ISO 646 is identical to the character set commonly known as ASCII

— 'ISO 3098-1': The coded character set used to encode the document data is according to ISO 3098-1;

— 'ISO 6937': The coded character set used to encode the document data is according to ISO/IEC 6937;

— 'ISO 8859-1': The coded character set used to encode the document data according to ISO 8859-1;

NOTE 2 - The character set in ISO 8859-1 is identical to the character set commonly known as LATIN-1.

— 'ISO 10646': The coded character set used to encode the document data according to ISO/IEC 10646.

The character_code need not be specified for a particular Document_format_property (see 4.2.161).

4.2.161.2 data_format

The data_format specifies the convention that was used to structure the information in the characterized object. Where applicable, the following values shall be used:

— 'DXF': The document contains data in Drawing Exchange File format;

— 'IGES': The document contains data in Initial Graphics Exchange Specification format;

— 'ISO 10303-203': The document contains data in ISO 10303-203 format;

— 'ISO 10303-214': The document contains data in ISO 10303-214 format;

— 'TIFF CCITT GR4': The document contains data in TIFF CCITT GR4 format;

— 'VDAFS': The document contains data in VDAFS format;

— 'VOXEL': The document contains data in VOXEL format.

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The data_format need not be specified for a particular Document_format_property (see 4.2.161).

4.2.161.3 size_format

The size_format specifies the dimensions of a physical presentation of the object the size_format is provided for.

EXAMPLE 1 'ISO A0' is an example for the size_format of a drawing that is stored digitally.

EXAMPLE 2 '0.2 x 0.4 x 0.4 meters' is an example for the size_format of a wooden model.

See 4.3.683 for the application assertion.

The size_format need not be specified for a particular Document_format_property (see 4.2.161).

4.2.162 Document_location_property

A Document_location_property specifies where a Document_file (see 4.2.159) or a Document_representation (see 4.2.163) can be found in a digital or physical data storage system.

In the case where a Document_location_property is referred by a Document_representation, the characteristics apply to all individual objects, whereas in the case it is referred by a Document_file, the characteristics apply on an individual basis.

The data associated with a Document_location_property are the following:

— location_name

The location_name specifies the location, where the object that refers to the Document_location_property, can be found.

EXAMPLE 1 'C:\programs' and '/usr/local/bin' are examples for a location_name.

NOTE - Multiple paths may be specified for a single object, e.g., a database in the context of an electronic vault.

EXAMPLE 2 The linking mechanism of many operating systems allows references to a single object from various places in the file system without copying its contents.

4.2.163 Document_representation

A Document_representation is one of potentially more alternative representations of a Document_version (see 4.2.167).

EXAMPLE A version of a logical document, which contains a shape model, may be represented in the different native formats of two 3D CAD systems.

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Each Document_representation is a Digital_document (see 4.2.147) or a Physical_representation (see 4.2.355).

The data associated with a Document_representation are the following:

— associated_document_version;

— common_location;

— content;

— creation;

— description;

— id;

— representation_format;

— size.

4.2.163.1 associated_document_version

The associated_document_version specifies the version of the logical document that is being represented.

See 4.3.689 for the application assertion.

4.2.163.2 common_location

The common_location specifies the location of a Document_representation, where all its constituents can be found.

NOTE - Different common locations represent alternative representations of the same physical location.

See 4.3.687 for the application assertion.

4.2.163.3 content

The content specifies characteristics of the content of the Document_representation.

See 4.3.684 for the application assertion.

The content need not be specified for a particular Document_representation (see 4.2.163).

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4.2.163.4 creation

The creation specifies further details of the creation of the Document_representation.

See 4.3.685 for the application assertion.

The creation need not be specified for a particular Document_representation (see 4.2.163).

4.2.163.5 description

The description specifies additional information about the Document_representation.

See 4.3.690 for the application assertion.

The description need not be specified for a particular Document_representation (see 4.2.163).

If present, there shall be exactly one object that defines the description for a Document_representation.

4.2.163.6 id

The id specifies the identifier of the Document_representation.

4.2.163.7 representation_format

The representation_format specifies the format of the document represented by Document_representation.

See 4.3.686 for the application assertion.

The representation_format need not be specified for a particular Document_representation (see 4.2.163).

4.2.163.8 size

The size specifies the size of the represented document.

See 4.3.688 for the application assertion.

The size need not be specified for a particular Document_representation (see 4.2.163).

4.2.164 Document_size_property

A Document_size_property specifies the size of a Document_file (see 4.2.159) or of a Document_representation (see 4.2.163) object. At least one of the optional attributes shall be specified for each instance of this object.

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In the case where a Document_size_property is referred by a Document_representation, the size information is the sum of the sizes of all individual objects that are collected by this object, whereas in the case it is referred by a Document_file, the size information is the one of the individual objects that is referenced.

The data associated with a Document_size_property are the following:

— file_size;

— page_count.

4.2.164.1 file_size

The file_size specifies the Value_with_unit (see 4.2.549) that represents the size of a digitally stored document. The file_size shall only be applied in cases where the Document_size_property is referred by a Digital_document (see 4.2.147) or a Document_file (see 4.2.159).

EXAMPLE ’15021 Bytes’ and ’less than 500 Bytes’ are examples for a file_size.

See 4.3.691 for the application assertion.

The file_size need not be specified for a particular Document_size_property (see 4.2.164).

4.2.164.2 page_count

The page_count specifies the number of pages of the application object the Document_size_property is referred by. The page_count shall only be used in cases where the Document_size_property is referred by a Hardcopy (see 4.2.253) or a Physical_representation (see 4.2.355).

EXAMPLE ’42 pages’ and ’more than 1 page’ are examples of a page_count.

See 4.3.691 for the application assertion.

The page_count need not be specified for a particular Document_size_property (see 4.2.164).

4.2.165 Document_structure

A Document_structure is a relationship between two Document_representation (see 4.2.163) objects.

The data associated with a Document_structure are the following:

— description;

— related;

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— relating;

— relation_type.

4.2.165.1 description

The description specifies additional information about the Document_structure.

See 4.3.693 for the application assertion.

The description need not be specified for a particular Document_structure (see 4.2.165).

If present, there shall be exactly one object that defines the description for a Document_structure.

4.2.165.2 related

The related specifies the second of the two objects related by the Document_structure.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.692 for the application assertion.

4.2.165.3 relating

The relating specifies the first of the two objects related by the Document_structure.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.692 for the application assertion.

4.2.165.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'addition': The application object specifies that the related document provides supplementary or collateral information with regard to the information provided by the relating document;

— 'copy': The application object defines a relationship where the related Document_representation (see 4.2.163) is a copy of the relating Document_representation;

— 'decomposition': The application object defines a relationship where the related Document_representation is one of potentially more sub documents of the relating Document_representation;

EXAMPLE 1 The decomposition of a document into clauses is an example for the use of this value.

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— ’derivation’: The application object defines a relationship where the related Document_representation is derived from the relating Document_representation;

EXAMPLE 2 A raster image may be derived from a 3D CAD model.

EXAMPLE 3 A html version may be derived from a text document as an alternative.

— ’peer’: The application object specifies that the related document provides required information with regard to that provided by the relating document. The peer document is essential for a complete understanding;

— ’reference’: The application object defines a relationship where the related document is referenced from the relating;

EXAMPLE 4 A hyperlink is an example for a ’reference’.

— ’sequence’: The application object defines a logical sequence where the related Document_representation comes after the relating Document_representation;

EXAMPLE 5 A sequence of clauses.

— ’substitution’: The application object defines a relationship where the related Document_representation replaces the relating Document_representation;

— ’translation’: The Document_structure specifies that the related document is generated through a translation process from the relating document.

4.2.166 Document_type_property

A Document_type_property specifies the kind of a Document_file (see 4.2.159).

The data associated with a Document_type_property are the following:

— document_type_name;

— used_classification_system.

4.2.166.1 document_type_name

The document_type_name specifies the word or the group of words that describe the kind of object the characteristics are provided for. Where applicable, the following values shall be used:

— ’geometry’: The document represents a shape model;

— ’NC data’: The document represents numerical control data;

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— ’FE data’: The document represents finite element data;

— ’sample data’: The document represents measured data;

— ’process plan’: The document represents process planning data;

— ’check plan’: The document represents quality control planning data;

— ’drawing’: The document represents a technical drawing.

4.2.166.2 used_classification_system

The used_classification_system specifies the Classification_system (see 4.2.71) the document_type_-name is defined in.

EXAMPLE A Document_type_property may be used with ’specification type 1’ and ’specification type 2’ as values for the attribute ’document_type_name’ due to a company wide definition. By inclusion of these types in a General_classification (see 4.2.216) with name ’specification’ and description ’specification of company XY’ these types of documents are better classified and the meaning of ’specification type 1’ and ’specification type 2’ can be further detailed in an attached document to the General_classification or by a reference to a Classification_system for document types with that organization.

See 4.3.694 for the application assertion.

The used_classification_system need not be specified for a particular Document_type_property (see 4.2.166).

4.2.167 Document_version

A Document_version is a release of a Document (see 4.2.155).

The data associated with a Document_version are the following:

— associated_document;

— description;

— id.

4.2.167.1 associated_document

The associated_document specifies the logical document the Document_version is a version of.

See 4.3.695 for the application assertion.

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4.2.167.2 description

The description specifies additional information about the Document_version.

See 4.3.696 for the application assertion.

The description need not be specified for a particular Document_version (see 4.2.167).

If present, there shall be exactly one object that defines the description for a Document_version.

4.2.167.3 id

The id specifies the identifier of the Document_version. The id shall be unique within the scope of the associated Document (see 4.2.155).

4.2.168 Document_version_relationship

A Document_version_relationship is a relationship between two Document_version (see 4.2.167) objects.

The data associated with a Document_version_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.168.1 description

The description specifies additional information about the Document_version_relationship.

See 4.3.698 for the application assertion.

The description need not be specified for a particular Document_version_relationship (see 4.2.168).

If present, there shall be exactly one object that defines the description for a Document_version_relationship.

4.2.168.2 related

The related specifies the second of the two objects related by the Document_version_relationship.

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NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.697 for the application assertion.

4.2.168.3 relating

The relating specifies the first of the two objects related by the Document_version_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.697 for the application assertion.

4.2.168.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'derivation': The application object defines a deriving relationship where the related Document_version (see 4.2.167) is based on the relating Document_version which is an earlier version of the same or of a different Document (see 4.2.155);

— 'hierarchy': The application object defines a hierarchical relationship where the related Document_version is a sub version of the relating Document_version;

EXAMPLE 'Revision 1.1' and 'revision 1.2' are examples of sub-versions of 'version 1'.

— 'sequence': The application object defines a version sequence where the relating Document_version is the preceding version and the related Document_version is the following version.

Each document shall be referred to by at most one Document_version_relationship as related and a 'relation_type' of 'sequence';

— 'supplied document': The application object defines a relationship between two Document_version objects representing the same object in different organizational contexts.

NOTE - The different organizational contexts can be represented by different general organizational data associations with the related Document_version objects.

4.2.169 Draughting_callout

A Draughting_callout is a combination of annotation elements that, as collection, represent a recognized annotation concept.

EXAMPLE Figure 26 shows typical Draughting_callout objects on a drawing.

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NOTE - Each Draughting_callout may be a combination of an Associated_draughting_callout (see 4.2.29) and one of the other types of Draughting_callout.

A Draughting_callout is a type of Detailed_element (see 4.2.143).

Each Draughting_callout may be an Associated_draughting_callout (see 4.2.29).

Each Draughting_callout may be one of the following: a Surface_condition_callout (see 4.2.494), a Geometric_tolerance_callout (see 4.2.244), a Dimension (see 4.2.149), a Datum_target_callout (see 4.2.126), or a Datum_feature_callout (see 4.2.124).

The data associated with a Draughting_callout are the following:

— contents

The contents specifies the Annotation_element (see 4.2.17) objects that form the Draughting_callout.

See 4.3.699, 4.3.700, 4.3.701, and 4.3.702 for the application assertions.

There shall be at least one object that defines the contents for a Draughting_callout.

4.2.170 Drawing

A Drawing is the presentation of product data in a human interpretable form wherein the physical and functional requirements for that product data are presented by pictures or text.

The data associated with a Drawing are the following:

— drawing_id;

— drawing_revision_id;

— drawing_specification;

— drawing_type;

— language;

— title.

4.2.170.1 drawing_id

The drawing_id specifies the identifier of a particular Drawing. The drawing_id shall be unique within the scope of the object, to which the Drawing is associated to.

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4.2.170.2 drawing_revision_id

The drawing_revision_id specifies the identifier of the revision of the drawing.

4.2.170.3 drawing_specification

The drawing_specification specifies the identification of standards that the drawing conforms to. These standards specify the rationale of presentation used in the drawing.

EXAMPLE A drawing_specification could be 'ISO 129' [3].

There may be more than zero drawing_specification for a Drawing (see 4.2.170).

4.2.170.4 drawing_type

The drawing_type specifies the category of the Drawing (see 4.2.170) and may indicate the information content.

EXAMPLE A drawing_type could be 'assembly drawing', 'casting drawing', or 'piping diagram'.

4.2.170.5 language

The language specifies the languages that are used for textual information on the Drawing.

There may be more than zero language for a Drawing (see 4.2.170).

4.2.170.6 title

The title specifies the description of the content or of the subject matter of the Drawing (see 4.2.170).

EXAMPLE 'fender' and 'assembly of engine' are examples for title.

See 4.3.703 for the application assertion.

The title need not be specified for a particular Drawing.

If present, there shall be exactly one object that defines the title for a Drawing.

4.2.171 Drawing_assignment

A Drawing_assignment is a mechanism to associate a Drawing (see 4.2.170) with the object that is presented on the Drawing.

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The data associated with a Drawing_assignment are the following:

— associated_drawing;

— is_describing.

4.2.171.1 associated_drawing

The associated_drawing specifies the Drawing (see 4.2.170) that is associated with the object.

See 4.3.707 for the application assertion.

4.2.171.2 is_describing

The is_describing specifies the object that is associated with the Drawing (see 4.2.170).

> EXAMPLE An example for assigning a Drawing to an Item_version (see 4.2.275) is the case, when two Mating_definition (see 4.2.313) objects belonging to the same Item_version but to different mating trees are shown and annotated in one Drawing for the purpose of giving additional information, e.g., for handling operations.

See 4.3.704, 4.3.705, 4.3.706, 4.3.708, 4.3.709, 4.3.710, 4.3.711, 4.3.712, 4.3.713, 4.3.714, 4.3.715, 4.3.716, 4.3.717, and 4.3.718 for the application assertions.

There shall be exactly one object that the Drawing_assignment (see 4.2.171) is_describing.

4.2.172 Drawing_sequence

A Drawing_sequence is a revision sequence between two Drawing (see 4.2.170) objects.

The data associated with a Drawing_sequence are the following:

— preceding_drawing;

— succeeding_drawing.

4.2.172.1 preceding_drawing

The preceding_drawing specifies the previous revision of the Drawing (see 4.2.170).

See 4.3.719 for the application assertion.

4.2.172.2 succeeding_drawing

The succeeding_drawing specifies the following revision of the Drawing (see 4.2.170).

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See 4.3.719 for the application assertion.

4.2.173 Drawing_sheet

A Drawing_sheet is a logical division of a drawing into a two-dimensional area for the presentation of product data.

NOTE - Usually, these divisions correspond to sheet paper sizes suitable for plotting.

The data associated with a Drawing_sheet are the following:

— associated_drawing;

— sheet_id;

— sheet_revision_id;

— sheet_space;

— size;

— title.

4.2.173.1 associated_drawing

The associated_drawing specifies the Drawing (see 4.2.170) that is valid for the Drawing_sheet.

See 4.3.721 for the application assertion.

4.2.173.2 sheet_id

The sheet_id specifies the page number for a particular Drawing_sheet.

4.2.173.3 sheet_revision_id

The sheet_revision_id specifies the identifier of the sheet revision.

4.2.173.4 sheet_space

The sheet_space specifies the Cartesian_coordinate_space_2d (see 4.2.45) that is valid for the drawing sheet.

See 4.3.720 for the application assertion.

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4.2.173.5 size

The size specifies the width and the height of the Drawing_sheet.

4.2.173.6 title

The title specifies a description of the content or subject matter of the Drawing_sheet.

See 4.3.722 for the application assertion.

The title need not be specified for a particular Drawing_sheet (see 4.2.173).

If present, there shall be exactly one object that defines the title for a Drawing_sheet.

4.2.174 Duration

A Duration is the definition of a period of time.

The data associated with a Duration are the following:

— time;

— time_unit.

4.2.174.1 time

The time specifies the extend of the Duration.

4.2.174.2 time_unit

The time_unit specifies the unit in which the time is specified.

4.2.175 Duration_property

A Duration_property is a property that specifies a period of time during which a given object is used or will last.

EXAMPLE Duration_property may be used to specify the duration of a Process_operation_definition (see 4.2.381).

A Duration_property is a type of Property (see 4.2.409).

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4.2.176 Edge_loop

An Edge_loop is a closed loop made up of a sequence of edges. In this sequence the start vertex of an edge coincides with the end vertex of its preceding edge and the first vertex of the Edge_loop coincides with the last vertex.

NOTE - The Edge_loop is used for topological representation.

The data associated with an Edge_loop are the following:

— edge

The edge specifies the edges that compose the Edge_loop.

See 4.3.723 for the application assertion.

4.2.177 Edge_round

An Edge_round is a transition area between corresponding edges of two joining non-planar faces. This transition has a convex circular arc section perpendicular to the intersection of the faces and no constraints concerning changes of the radius along the Edge_round.

An Edge_round is a type of Transition_feature (see 4.2.537).

Each Edge_round may be a Constant_radius_edge_round (see 4.2.97).

The data associated with an Edge_round are the following:

— edge_round_face

The edge_round_face specifies the Face (see 4.2.191) that results from the application of an Edge_round.

See 4.3.724 for the application assertion.

4.2.178 Edge_transition

An Edge_transition is a state of geometric continuity for the intersection of two adjacent edges.

EXAMPLE Figure 31 depicts an Edge_transition.

The data associated with an Edge_transition are the following:

— edge_1;

— edge_2;

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— transition;

— vertex_joint.

4.2.178.1 edge_1

The edge_1 specifies the first of the two adjacent Oriented_edge_curve (see 4.2.334) objects associated with the Edge_transition.

See 4.3.725 for the application assertion.

4.2.178.2 edge_2

The edge_2 specifies the second of the two Oriented_edge_curve (see 4.2.334) objects associated with the Edge_transition.

See 4.3.725 for the application assertion.

4.2.178.3 transition

The transition specifies the state of geometric continuity from the end vertex of the first edge to the start vertex of the second edge by a textual description. The following values shall be used:

— 'g0': G_0 continuity between two curves is a condition stating that the connected segments have common end/start points [22];

— 'g1': G_1 continuity between two curves is a condition set on the direction of the two tangents in the connection point between the curves; for true G_1 continuity no angular difference is allowed [22];

— 'g2': G_2 continuity between two curves is a condition set on the radius of curvature of the two curves in the connection point; for true G_2 continuity the radii in the connection point must be the same and the circles of curvature lie in the same plane [22].

NOTE - Information provided by the object Accuracy (see 4.2.1) applies when determining the level of continuity.

4.2.178.4 vertex_joint

The vertex_joint specifies the vertex at the intersection of the two edges the continuity is described for.

See 4.3.726 for the application assertion.

4.2.179 Effectivity

An Effectivity is the identification of the valid use of an aspect of product data tracked by date or event.

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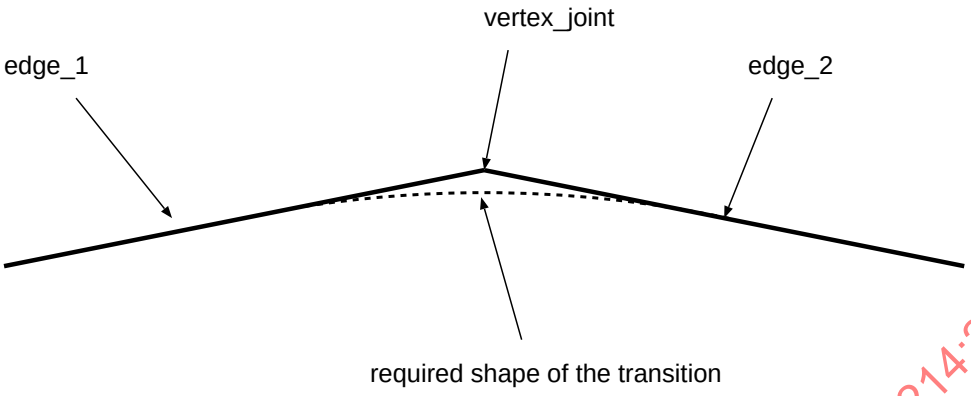


Figure 31 – Edge transition

NOTE 1 - An instance of Effectivity may define a period of ineffectivity, i.e., of invalid use, if it is referred to by an instance of Effectivity_assignment (see 4.2.180) with 'effectivity_indication' set to 'false'.

Either 'start_definition' or 'end_definition' or both shall be specified for a particular Effectivity. The only exception from this rule is an Effectivity that 'inherits' its interval from another Effectivity through an Effectivity_relationship (see 4.2.181) with relation_type 'inheritance'. If a start_definition and no end_definition is specified, the period is added to start_definition in order to get the actual end of the effectivity or ineffectivity period.

NOTE 2 - If period is not specified, the effectivity or ineffectivity period is endless.

If no start_definition, but an end_definition is specified, the period shall also be specified and is subtracted from end_definition in order to get the actual start of the effectivity or ineffectivity period.

NOTE 3 - This application protocol does not allow to specify effectivity or ineffectivity intervals which are left-unbounded.

If both start_definition and end_definition are specified, the period should not be specified because of the redundancy. If specified, it shall be equal to the measure of time between the start_definition and the end_definition of the effectivity or ineffectivity period.

The data associated with an Effectivity are the following:

— concerned_organization;

— description;

— effectivity_context;

— end_definition;

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— id;

— period;

— start_definition;

— version_id.

4.2.179.1 concerned_organization

The concerned_organization specifies the set of Organization (see 4.2.331) objects in which the Effectivity is valid.

EXAMPLE The Effectivity of the same item may be different in the various production sites of a car manufacturer.

The case where the concerned_organization is an empty set means that the effectivity regards any organization that may consider the product data, the effectivity is applied to.

NOTE - As effectivity is most of the time organization dependent, it is recommended always to populate the concerned_organization

See 4.3.731 for the application assertion.

4.2.179.2 description

The description specifies additional information about the Effectivity.

See 4.3.730 for the application assertion.

The description need not be specified for a particular Effectivity (see 4.2.179).

If present, there shall be exactly one object that defines the description for an Effectivity.

4.2.179.3 effectivity_context

The effectivity_context specifies the life cycle stage for which the Effectivity is valid.

The effectivity_context need not be specified for a particular Effectivity (see 4.2.179).

4.2.179.4 end_definition

The end_definition specifies the end of the period. The bound specified by the end_definition is excluded from the interval of effectivity.

See 4.3.727 and 4.3.729 for the application assertions.

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The end_definition need not be specified for a particular Effectivity (see 4.2.179).

If present, there shall be exactly one object that defines the end_definition for an Effectivity.

4.2.179.5 id

The id specifies the identifier of the Effectivity.

The id need not be specified for a particular Effectivity (see 4.2.179).

4.2.179.6 period

The period specifies the period of time in which the Effectivity is defined, either starting at the point in time specified by 'start_definition' or ending at the point in time specified by 'end_definition'. period shall be specified with a positive value.

See 4.3.728 for the application assertion.

The period need not be specified for a particular Effectivity (see 4.2.179).

4.2.179.7 start_definition

The start_definition specifies the start of the period. The bound specified by the start_definition is included in the interval of effectivity.

NOTE - The meaning of this attribute is further detailed by the attribute role of Effectivity_assignment (see 4.2.180).

Either start_definition or end_definition shall be specified for a particular Effectivity.

See 4.3.727 and 4.3.729 for the application assertions.

The start_definition need not be specified for a particular Effectivity (see 4.2.179).

If present, there shall be exactly one object that defines the start_definition for an Effectivity.

4.2.179.8 version_id

The version_id specifies the identification of a particular version of the Effectivity.

The version_id need not be specified for a particular Effectivity (see 4.2.179).

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4.2.180 Effectivity_assignment

An Effectivity_assignment associates an Effectivity (see 4.2.179) with the object whose effectivity is controlled by the associated Effectivity. The association of an Effectivity to product data does not imply any statement concerning the effectivity outside of the specified interval. The same applies in the absence of any assigned effectivity, i.e. no statement concerning the effectivity is implied.

The data associated with an Effectivity_assignment are the following:

— assigned_effectivity;

— effective_element;

— effectivity_indication;

— role.

4.2.180.1 assigned_effectivity

The assigned_effectivity specifies the Effectivity (see 4.2.179) that is assigned.

See 4.3.748 for the application assertion.

4.2.180.2 effective_element

The effective_element specifies the object that has an Effectivity (see 4.2.179) assigned to it.

See 4.3.732, 4.3.733, 4.3.734, 4.3.735, 4.3.736, 4.3.737, 4.3.738, 4.3.739, 4.3.740, 4.3.741, 4.3.742, 4.3.743, 4.3.744, 4.3.745, 4.3.746, 4.3.747, 4.3.749, 4.3.750, 4.3.751, 4.3.752, 4.3.753, 4.3.754, 4.3.755, 4.3.756, 4.3.757, 4.3.758, 4.3.759, 4.3.760, 4.3.761, 4.3.762, 4.3.763, 4.3.764, 4.3.765, 4.3.766, 4.3.767, 4.3.768, 4.3.769, 4.3.770, 4.3.771, 4.3.772, 4.3.773, 4.3.774, 4.3.775, and 4.3.776 for the application assertions.

There shall be exactly one object that defines the effective_element for an Effectivity_assignment (see 4.2.180).

4.2.180.3 effectivity_indication

The effectivity_indication specifies whether the assigned_effectivity defines a period of effectivity (value equal 'TRUE') or a period of ineffectivity (value equal 'FALSE') for the effective_element. In the first case, use of the effective_element is or was valid during the considered period.

NOTE - This does not imply that use of the effectivity_element is mandatory.

In the second case, use of effective_element is or was not valid during the considered period.

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4.2.180.4 role

The role specifies the relationship between the Effectivity (see 4.2.179) and the object that has an effectivity assigned to it. Where applicable, the following values shall be used:

— 'actual': The actual period during which the Effectivity lasted;

— 'planned': The period associated with the Effectivity defines a planned period of time during which the associated object is or was supposed to be effective;

— 'required': The associated object must be kept effective for this period.

4.2.181 Effectivity_relationship

An Effectivity_relationship is a relationship between two Effectivity (see 4.2.179) objects.

NOTE - Sometimes the effectivity is not dependent on particular dates but on the effectivity of other items. In this case the dates are not instantiated and there is an Effectivity_relationship to the reference Effectivity.

The data associated with an Effectivity_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.181.1 description

The description specifies additional information about the Effectivity_relationship.

See 4.3.778 for the application assertion.

The description need not be specified for a particular Effectivity_relationship (see 4.2.181).

If present, there shall be exactly one object that defines the description for an Effectivity_relationship.

4.2.181.2 related

The related specifies the second of the two Effectivity (see 4.2.179) objects related by the Effectivity_relationship.

NOTE - The semantics of this attribute are defined by the attribute 'relation_type'.

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See 4.3.777 for the application assertion.

4.2.181.3 relating

The relating specifies the first of the two Effectivity (see 4.2.179) objects related by the Effectivity_-relationship.

NOTE - The semantics of this attribute are defined by the attribute 'relation_type'.

See 4.3.777 for the application assertion.

4.2.181.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'constraint': The time period between the start and end definition of the related Effectivity (see 4.2.179) shall be within the time period of the relating Effectivity;

— 'inheritance': The related Effectivity shall not have a 'start_definition' and 'end_definition' specified but inherits the effectivity dates from the relating Effectivity.

4.2.182 Element_delivery

An Element_delivery is the specification of the expected delivery of an Activity_element (see 4.2.3).

The data associated with an Element_delivery are the following:

— deliverable_element;

— destination;

— quantity.

4.2.182.1 deliverable_element

The deliverable_element specifies the Activity_element (see 4.2.3) that is subject to the delivery. This Activity_element shall refer to an Item_version (see 4.2.275), a Product_identification (see 4.2.398), or a Physical_instance (see 4.2.352).

See 4.3.779 for the application assertion.

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4.2.182.2 destination

The destination specifies the Organization (see 4.2.331) the Activity_element (see 4.2.3) is to be delivered to.

See 4.3.780 for the application assertion.

4.2.182.3 quantity

The quantity specifies the number of objects referred by the Activity_element (see 4.2.3) to be delivered.

See 4.3.781 for the application assertion.

4.2.183 Ellipse

An Ellipse is a conic section defined by the lengths of the semi-major and semi-minor diameters and by the position (centre or mid point of the line joining the foci) and orientation of the curve.

An Ellipse is a type of Curve (see 4.2.108).

4.2.184 Event_reference

An Event_reference is the definition of a point in time established relative to an event.

The data associated with an Event_reference are the following:

— description;

— event_context;

— event_type;

— offset.

4.2.184.1 description

The description specifies additional information about the Event_reference.

> EXAMPLE The description may also be used to describe the event further if the event_type is not sufficient. The description may, e.g., contain a number that represents a model year.

See 4.3.821 for the application assertion.

The description need not be specified for a particular Event_reference (see 4.2.184).

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If present, there shall be exactly one object that defines the description for an Event_reference.

4.2.184.2 event_context

The event_context specifies the piece of product data the Event_reference refers to.

> EXAMPLE In the case of an Event_reference with event_type 'start of production' the event_context would refer to the Item_version (see 4.2.275) that is subject to production.

See 4.3.782, 4.3.783, 4.3.784, 4.3.785, 4.3.786, 4.3.787, 4.3.788, 4.3.789, 4.3.790, 4.3.791, 4.3.792, 4.3.793, 4.3.794, 4.3.795, 4.3.796, 4.3.797, 4.3.798, 4.3.799, 4.3.800, 4.3.801, 4.3.802, 4.3.803, 4.3.804, 4.3.805, 4.3.806, 4.3.807, 4.3.809, 4.3.810, 4.3.811, 4.3.812, 4.3.813, 4.3.814, 4.3.815, 4.3.816, 4.3.817, 4.3.818, 4.3.819, 4.3.820, 4.3.822, 4.3.823, 4.3.824, 4.3.825, 4.3.826, 4.3.827, 4.3.828, 4.3.829, 4.3.830, 4.3.831, 4.3.832, 4.3.833, 4.3.834, 4.3.835, 4.3.836, 4.3.837, 4.3.838, 4.3.839, 4.3.840, 4.3.841, 4.3.842, 4.3.843, 4.3.844, 4.3.845, 4.3.846, and 4.3.847 for the application assertions.

The event_context need not be specified for a particular Event_reference (see 4.2.184).

If present, there shall be exactly one object that defines the event_context for an Event_reference.

4.2.184.3 event_type

The event_type specifies the kind of event that serves as reference.

> EXAMPLE The event_type may be the 'start of production' of a Product_class (see 4.2.392) specified as 'event_context'

4.2.184.4 offset

The offset specifies the amount of time before or after the defined event that shall be used to calculate the actual point in time.

See 4.3.808 for the application assertion.

The offset need not be specified for a particular Event_reference (see 4.2.184).

4.2.185 External_file_id_and_location

An External_file_id_and_location specifies the location of a file in an external storage system.

The data associated with an External_file_id_and_location are the following:

— external_id;

— location.

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4.2.185.1 external_id

The external_id specifies the identifier of a document in an external storage system.

EXAMPLE An example for external_id is 'specification.txt'.

The external_id need not be specified for a particular External_file_id_and_location (see 4.2.185).

4.2.185.2 location

The location specifies the location of the Document_file (see 4.2.159) in the external storage system.

EXAMPLE 1 Examples for the location are 'D:\ project1\ ' and '/projects/project1/'.

EXAMPLE 2 The combination of file id and its location taken from the previous examples are 'D:\ project1\ specification.txt' and '/projects/project1/specification.txt' respectively.

See 4.3.848 for the application assertion.

4.2.186 External_geometric_model

An External_geometric_model is the identification of a model that contains geometry in a 3D context only.

An External_geometric_model is a type of External_model (see 4.2.189).

Each External_geometric_model may be an External_geometric_model_with_parameters (see 4.2.187).

The data associated with an External_geometric_model are the following:

— model_extent

The model_extent specifies the radius of a sphere that contains all elements of the model and whose centre is at the origin of the Cartesian_coordinate_space (see 4.2.44) of the External_geometric_model. The model_extent is specified using a length unit.

The model_extent need not be specified for a particular External_geometric_model.

4.2.187 External_geometric_model_with_parameters

An External_geometric_model_with_parameters is the identification of a model that contains geometry in a 3D context, and where some characteristics of the model may be controlled or changed in a predefined way in each occurrence of the model.

EXAMPLE A geometric model may have predefined aspect ratios of its overall dimensions, but a parameterized volume. In each occurrence of the External_geometric_model_with_parameters, the volume may be

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specified by the user and the dimensions of the model are set automatically while the predefined aspect ratio requirements are met.

The usage of the controlled characteristics shall be subject of an agreement of common understanding by partners sharing this information.

An External_geometric_model_with_parameters is a type of External_geometric_model (see 4.2.186).

The data associated with an External_geometric_model_with_parameters are the following:

— parameter_value

The parameter_value specifies the Property_value_representation (see 4.2.414) object or group of Property_value_representation objects that may be varied in each occurrence.

See 4.3.849 for the application assertion.

4.2.188 External_library_reference

An External_library_reference is a mechanism to refer to an entry in an external library other than ISO 13584.

The data associated with an External_library_reference are the following:

— description;

— external_id;

— library_type.

4.2.188.1 description

The description specifies additional information about the External_library_reference.

See 4.3.850 for the application assertion.

The description need not be specified for a particular External_library_reference (see 4.2.188).

If present, there shall be exactly one object that defines the description for an External_library_reference.

4.2.188.2 external_id

The external_id specifies the unique identifier of the referenced entry in the external library.

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4.2.188.3 library_type

The library_type specifies the type of library that is used.

4.2.189 External_model

An External_model is the identification of a model that is described in a Digital_file (see 4.2.148) and by the Cartesian_coordinate_space (see 4.2.44) that is needed to further process the externally described information.

Each External_model is an External_picture (see 4.2.190) or an External_geometric_model (see 4.2.186).

The data associated with an External_model are the following:

— description;

— is_defined_as;

— is_defined_in;

— model_id.

4.2.189.1 description

The description specifies additional information about the External_model.

See 4.3.853 for the application assertion.

The description need not be specified for a particular External_model (see 4.2.189).

If present, there shall be exactly one object that defines the description for an External_model.

4.2.189.2 is_defined_as

The is_defined_as specifies the Digital_file (see 4.2.148) that contains the externally defined geometry information.

See 4.3.852 for the application assertion.

4.2.189.3 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) that defines the context for the externally described geometry.

See 4.3.851 for the application assertion.

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4.2.189.4 model_id

The model_id specifies the identifier of the External_model.

4.2.190 External_picture

An External_picture is the identification of a model that is described by a two dimensional image.

An External_picture is a type of External_model (see 4.2.189).

The data associated with an External_picture are the following:

— is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space_2d (see 4.2.45) that defines the context for the externally defined geometry.

For picture formats having no explicit origin, e.g., raster format, the lower left corner is defined as the origin of the picture, the x-axis pointing to the right, the y-axis pointing to the top.

See 4.3.854 for the application assertion.

4.2.191 Face

A Face is a topological object corresponding to a piece of a surface bounded by loops.

A Face may have holes, each hole being bounded by a loop. A geometric surface is always associated with a Face. A Face has a normal N, and the tangent to a loop is T. For a loop bounding a Face, the cross product N $\times$ T points towards the interior of the Face.

A Face is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Face are the following:

— bound;

— face_geometry.

4.2.191.1 bound

The bound specifies the loop objects representing the boundaries of the Face.

See 4.3.855 for the application assertion.

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4.2.191.2 face_geometry

The face_geometry specifies the basis geometry of the Face that is represented by a geometrical surface.

See 4.3.856 for the application assertion.

4.2.192 Face_bound

A Face_bound is a loop object defining the boundary of a Face (see 4.2.191).

The data associated with a Face_bound are the following:

— loop;

— outer.

4.2.192.1 loop

The loop specifies an Edge_loop (see 4.2.176) or a Vertex_loop (see 4.2.552) representing a boundary of a Face (see 4.2.191).

See 4.3.857 and 4.3.858 for the application assertions.

There shall be exactly one object that defines the loop for a Face_bound (see 4.2.192).

4.2.192.2 outer

The outer specifies whether the loop defines the outer boundary of the Face (see 4.2.191) or not.

4.2.193 Face_termination

A Face_termination is a condition specifying that a Joggle_feature (see 4.2.277) extends from the rim of a panel to the next face with which the Joggle_feature intersects.

A Face_termination is a type of Joggle_termination (see 4.2.278).

4.2.194 Face_transition

A Face_transition is the state of geometric continuity between one Face (see 4.2.191) and its neighbouring Face along one common edge.

The data associated with a Face_transition are the following:

— edge_joint;

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— face_1;

— face_2;

— transition.

4.2.194.1 edge_joint

The edge_joint specifies the edge at the intersection of the two faces for which the Face_transition is describing the continuity.

NOTE - There may be cases where the two faces have more than one edge in common. In such a case the edge_joint is needed to identify for which of the edges the Face_transition is defined.

See 4.3.860 for the application assertion.

4.2.194.2 face_1

The face_1 specifies the first of the two neighbouring Face (see 4.2.191) objects.

See 4.3.859 for the application assertion.

4.2.194.3 face_2

The face_2 specifies the second of the two neighbouring Face (see 4.2.191) objects.

See 4.3.859 for the application assertion.

4.2.194.4 transition

The transition specifies the state of geometric continuity from the first face to the second face along the intersecting edge by either a textual description or the definition of the required shape. The following values shall be used:

— 'g0': G_0 continuity between two surfaces is a condition stating that the connected patches have common boundary curves [22];

— 'g1': G_1 continuity between two surfaces is a condition set on the two surface normals (in the tangency planes) along the boundary between the surfaces; for true G_1 continuity no angular difference is allowed [22];

— 'g2': G_2 continuity between two curves is a condition set on the radii of curvature of the surfaces along the boundary between the surfaces; for true G_2 continuity the radii along the boundary must be equal [22].

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NOTE - Information provided by the object Accuracy (see 4.2.1) applies when determining the level of continuity.

4.2.195 Faceted_b_rep

A Faceted_b_rep is defined by exactly one outer Faceted_closed_shell (see 4.2.197) and zero or more inner Faceted_closed_shell objects.

A Faceted_b_rep is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Faceted_b_rep are the following:

— outer;

— void.

4.2.195.1 outer

The outer specifies a Faceted_closed_shell (see 4.2.197) that defines the outer boundary of the Faceted_b_rep.

See 4.3.861 for the application assertion.

4.2.195.2 void

The void specifies a set of Faceted_closed_shell (see 4.2.197) objects that define internal cavities of a Faceted_b_rep.

NOTE - These shells have a normal pointing into the empty space inside.

See 4.3.861 for the application assertion.

4.2.196 Faceted_b_rep_model

A Faceted_b_rep_model is a collection of Faceted_b_rep (see 4.2.195) objects.

A Faceted_b_rep_model is a type of Geometric_model (see 4.2.238).

The data associated with a Faceted_b_rep_model are the following:

— element

The element specifies a set of Faceted_b_rep objects that form the Faceted_b_rep_model.

See 4.3.862 for the application assertion.

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4.2.197 Faceted_closed_shell

A Faceted_closed_shell is a collection of at least four Faceted_face (see 4.2.198) objects that bounds a region in three-dimensional space. The topological normal of the shell is defined as being directed from the finite to the infinite region. A Faceted_closed_shell shall not self-intersect.

The data associated with a Faceted_closed_shell are the following:

— shell_boundary

The shell_boundary specifies the planar faces that represent the boundary of a closed shell.

See 4.3.863 for the application assertion.

4.2.198 Faceted_face

A Faceted_face is a topological object corresponding to a portion of a planar surface bounded by Poly_-loop (see 4.2.376) objects. A Faceted_face may have holes, where each hole is bounded by a Poly_loop.

The data associated with a Faceted_face are the following:

— bound;

— face_geometry.

4.2.198.1 bound

The bound specifies the Poly_loop (see 4.2.376) objects representing the boundaries of the Faceted_face.

See 4.3.865 for the application assertion.

4.2.198.2 face_geometry

The face_geometry specifies the geometric representation of a planar surface that is represented by a Plane (see 4.2.360).

See 4.3.864 for the application assertion.

4.2.199 Feature_definition

A Feature_definition is a set of parameters and type information representing a feature that is either defined as a component of an item (Included_feature (see 4.2.261)) or independently in its own coordinate space for multiple use (Placed_feature (see 4.2.356)).

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Each Feature_definition is a Process_feature_in_solid (see 4.2.380), a Process_feature_in_panel (see 4.2.379), or a Replicate_feature (see 4.2.433).

The data associated with a Feature_definition are the following:

— is_defined_in;

— location_and_orientation.

4.2.199.1 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space_3d (see 4.2.46) in which the feature is defined.

In the case where the Feature_definition is used for defining an Included_feature (see 4.2.261) this Cartesian_coordinate_space_3d shall be the coordinate space in which the Included_feature is defined. In the case where the Feature_definition is used for defining a Placed_feature (see 4.2.356) this Cartesian_coordinate_space_3d is the local coordinate space of the feature.

See 4.3.867 for the application assertion.

4.2.199.2 location_and_orientation

The location_and_orientation specifies the Axis_placement (see 4.2.33) that defines the location and orientation of the feature.

See 4.3.866 for the application assertion.

The location_and_orientation need not be specified for a particular Feature_definition (see 4.2.199).

4.2.200 Feature_occurrence

A Feature_occurrence is the identification of a feature that is applied on an Item_shape (see 4.2.274).

NOTE 1 - It is therefore an aspect of this shape.

If a Feature_occurrence is related to shape information by a Shape_description_association (see 4.2.448), the representing model shall refer to the same Cartesian_coordinate_space (see 4.2.44) as any representation of the Item_shape in which the feature occurs.

NOTE 2 - For the description of the rationale behind the application of a feature (e.g., the feature function, the inherited 'description' attribute may be used.

A Feature_occurrence is a type of Shape_element (see 4.2.449).

Each Feature_occurrence is an Included_feature (see 4.2.261) or a Placed_feature (see 4.2.356).

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The data associated with a Feature_occurrence are the following:

— maximum_feature_limit

The maximum_feature_limit specifies the Plane (see 4.2.360) beyond which a machining tool has cleared the feature.

See 4.3.868 for the application assertion.

4.2.201 Feature_parameter

A Feature_parameter is the representation of a characteristic of a Feature_definition (see 4.2.199).

The data associated with a Feature_parameter are the following:

— parameter_name;

— parameter_value.

4.2.201.1 parameter_name

The parameter_name specifies the character, abbreviation, or word by which the Feature_parameter is referred to.

EXAMPLE ’a’, ’b1’, and ’r’ are typical examples for the parameter_name.

The parameter_name need not be specified for a particular Feature_parameter (see 4.2.201).

4.2.201.2 parameter_value

The parameter_value specifies the value of the Feature_parameter.

NOTE - This includes information about units and possibly about limitations such as tolerances.

See 4.3.869 for the application assertion.

4.2.202 Feature_placement

A Feature_placement is the information about a geometric Transformation (see 4.2.533) and about a Geometric_model (see 4.2.238) that has the reference coordinate space used to define the placement of a Placed_feature (see 4.2.356).

The data associated with a Feature_placement are the following:

— placed_definition;

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— placement;

— placement_reference.

4.2.202.1 placed_definition

The placed_definition specifies the Feature_definition (see 4.2.199) that is applied to a shape in order to create a feature.

See 4.3.870 for the application assertion.

4.2.202.2 placement

The placement specifies the geometric Transformation (see 4.2.533) that defines the placement and the orientation of the occurrence of a Feature_definition (see 4.2.199) in a reference coordinate space.

See 4.3.872 for the application assertion.

4.2.202.3 placement_reference

The placement_reference specifies the Geometric_model (see 4.2.238) that has the information about the reference coordinate space.

See 4.3.871 for the application assertion.

4.2.203 Featured_shape

A Featured_shape is the shape of an item that includes features. There shall be at least one Feature_occurrence (see 4.2.200) that refers to the Featured_shape through its inherited attribute composition.

NOTE - The Featured_shape may be used to create a sequence of different shapes of the same item where each single Featured_shape defines the shape at a different stage of design or of manufacturing.

EXAMPLE A sequence of Item_shape (see 4.2.274) respectively Featured_shape objects may consist of the following: Block without feature – Block with pocket – Block with pocket and hole.

A Featured_shape is a type of Item_shape (see 4.2.274).

The data associated with a Featured_shape are the following:

— base_shape

The base_shape specifies the Item_shape that identifies the shape of the item before the application of the Feature_occurrence objects that refer to the Featured_shape through the inherited attribute composition.

See 4.3.873 for the application assertion.

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4.2.204 Fill_area

A Fill_area is a bounded area containing colouring, hatching, or tiling.

NOTE - A Fill_area communicates some aspect of a physical part characteristic or distinguishes it from its surroundings.

EXAMPLE Figure 32 depicts some fill area styles.

A Fill_area is a type of Annotation_element (see 4.2.17).

Each Fill_area may be an Associated_fill_area (see 4.2.30).

The data associated with a Fill_area are the following:

— boundary;

— reference_point.

4.2.204.1 boundary

The boundary specifies the set of curves bounding a particular fill area. The resulting loop shall be closed and shall not self-intersect and it shall be planar.

See 4.3.874 for the application assertion.

4.2.204.2 reference_point

The reference_point specifies a point within the fill area, used in the placement and initiation of the fill area appearance. The reference point is a point through that a line of a hatching pattern shall pass or at which the origin of a tile shall be located. The reference point also establishes the point at which the first visible segment of a line font used as the curve appearance for a hatching pattern starts.

The reference_point need not be specified for a particular Fill_area (see 4.2.204).

4.2.205 Fillet

A Fillet is a transition area between corresponding edges of two joining non-planar faces. This transition has a concave circular arc section perpendicular to the intersection of the faces and no constraints concerning changes of the radius along the Fillet.

A Fillet is a type of Transition_feature (see 4.2.537).

Each Fillet may be a Constant_radius_fillet (see 4.2.98).

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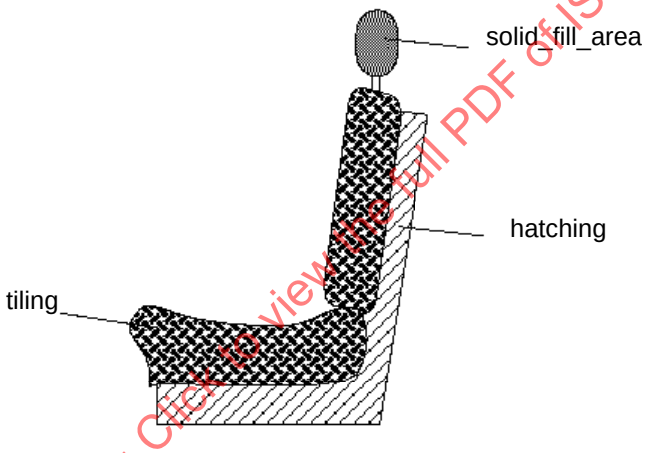


Figure 32 – Fill area styles

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The data associated with a Fillet are the following:

— fillet_face

The fillet_face specifies the Face (see 4.2.191) that results from the application of a Fillet.

See 4.3.875 for the application assertion.

4.2.206 Final_solution

A Final_solution is the specification of a set of additional sensual characteristics that can be applied to an Item_instance (see 4.2.271) that represents a neutral part in order to finalize its definition.

EXAMPLE In the case of a car body, the neutral parts are parts without paint; the final parts are the parts with paint. In the case of a seat, the neutral part is the seat with unspecified cover material; the final part may be the seat covered with red leather.

NOTE 1 - A Final_solution may be associated with an Item_instance that represents the finalized part through a Product_structure_relationship (see 4.2.400) with a 'relation_type' of 'realization'.

NOTE 2 - The information common to all final solutions based on the same neutral part may identified by use of instances of Make_from_relationship (see 4.2.304).

A Final_solution is a type of Alternative_solution (see 4.2.10).

The data associated with a Final_solution are the following:

— final_specification;

— final_status.

4.2.206.1 final_specification

The final_specification specifies the means of finalization that is applied to the neutral part and which may be objects of type Descriptive_specification (see 4.2.137), Physical_instance (see 4.2.352), or Design_discipline_item_definition (see 4.2.142).

EXAMPLE The final_specification may be, e.g., the Design_discipline_item_definition of a certain kind of paint.

NOTE - The Design_discipline_item_definition that is referenced here, is not a view of the Item (see 4.2.267) that results from the finalization. The Item that results from the finalization, e.g., an Item with colour, is identified by an association between Final_solution and Item_instance (see 4.2.271) through a Product_structure_relationship (see 4.2.400).

See 4.3.876, 4.3.877, and 4.3.878 for the application assertions.

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There shall be at least one object that defines the final_specification for a Final_solution (see 4.2.206).

4.2.206.2 final_status

The final_status specifies the level of completion between the neutral part and the final part.

EXAMPLE ’final for shipping overseas’, ’final for transport by truck’, or ’final for sale’ are examples for the final_status.

4.2.207 Flat_bottom

A Flat_bottom is a hole bottom that is flat.

A Flat_bottom is a type of Hole_bottom_condition (see 4.2.257).

4.2.208 Flat_slot_end_type

A Flat_slot_end_type is an end condition of a slot that is a planar face that is normal to the sweep path at its start or end point respectively. The intersection of the slot wall surfaces and the end planar shape may but need not be blended by a radius.

EXAMPLE Figure 33 depicts a Flat_slot_end_type.

A Flat_slot_end_type is a type of Slot_end_type (see 4.2.457).

The data associated with a Flat_slot_end_type are the following:

— first_radius;

— second_radius.

4.2.208.1 first_radius

The first_radius specifies the constant amount of curvature of the first of two corners of the Flat_slot_-end_type. The circle that defines the first radius is oriented normal to the first corner at each point of the corner.

The first corner of a Flat_slot_end_type is located where the slot wall intersects with the slot end at a positive value on the x-axis of the defining Open_profile (see 4.2.328). The sum of the values of the two radii shall not exceed the smallest width of the Slot_feature (see 4.2.458).

NOTE - For this definition, the profile and its x-axis is considered as ’moving’ along the sweep path from one end of the slot to the other.

See 4.3.879 for the application assertion.

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4.2.208.2 second_radius

The second_radius specifies the constant amount of curvature of the second of two corners of the Flat_-slot_end_type. The circle that defines the first radius is oriented normal to the first corner at each point of the corner.

The second corner of a Flat_slot_end_type is located where the slot wall intersects with the slot end at a negative value on the x-axis of the defining Open_profile (see 4.2.328). The sum of the values of the two radii shall not exceed the smallest width of the Slot_feature (see 4.2.458).

NOTE - For this definition, the profile and its x-axis is considered as 'moving' along the sweep path from one end of the slot to the other.

See 4.3.879 for the application assertion.

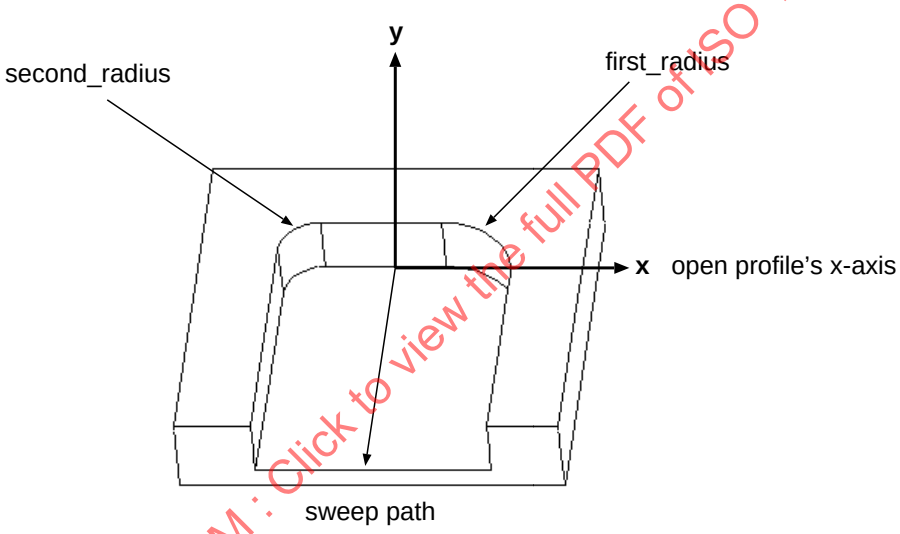


Figure 33 – Parameters defining a Flat_slot_end_type

4.2.209 Flat_with_radius_bottom

A Flat_with_radius_bottom is a hole bottom that is flat and has a corner radius that is smaller than the radius of the Round_hole (see 4.2.439).

A Flat_with_radius_bottom is a type of Hole_bottom_condition (see 4.2.257).

The data associated with a Flat_with_radius_bottom are the following:

— radius

The radius specifies the corner radius between the side and the floor of the Round_hole.

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See 4.3.880 for the application assertion.

4.2.210 Flat_with_taper_bottom

A Flat_with_taper_bottom is a hole bottom that is flat and has a taper along the floor edge.

A Flat_with_taper_bottom is a type of Hole_bottom_condition (see 4.2.257).

The data associated with a Flat_with_taper_bottom are the following:

— final_diameter;

— taper_angle.

4.2.210.1 final_diameter

The final_diameter specifies the diameter at the bottom of the Flat_with_taper_bottom.

See 4.3.881 for the application assertion.

4.2.210.2 taper_angle

The taper_angle specifies the angle that is used to create the taper.

See 4.3.881 for the application assertion.

4.2.211 Flatness_tolerance

A Flatness_tolerance is a constraint on a surface that defines a tolerance zone limited by two parallel planes within which the surface must lie.

A Flatness_tolerance is a type of Geometric_tolerance (see 4.2.243).

4.2.212 Form_feature_in_panel

A Form_feature_in_panel is the definition of a local modification in the shape of a panel. This modification consists of a base boundary on the panel surface and of a target face that is a result of stamping the area that is enclosed by the base boundary.

The Form_feature_in_panel is specified either by two Closed_profile_usage (see 4.2.73) objects or by a Closed_profile_usage and an Angle_specification (see 4.2.11). The use of two Angle_specification objects is not valid. In the case of a Form_feature_in_panel that has its base boundary defined by a Closed_profile (see 4.2.72), the placement of the feature shall be in a way that the base profile lies on the surface of the original panel or as close as possible if the surface is not planar.

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NOTE - In order to achieve intersection of the feature wall and the base surface it may be necessary to extend the wall linearly towards the base surface.

The wall of the feature is a ruled surface. In the case of two profiles defining the feature, the following rule applies: If P_b is a point on the base, P_t the corresponding point on the target, T_b the tangent to the base profile in P_b, and V the surface normal in P_b or the punch direction respectively, then the scalar product

$$(P_t - P_b) \cdot (V \times (T_b \times V))$$

shall evaluate to zero. If no punch direction is specified, the surface normal shall be used for the definition of the ruled surface. In the case of one profile and an angle the rule for the ruled surface is implicit.

A Form_feature_in_panel is a type of Process_feature_in_panel (see 4.2.379).

The data associated with a Form_feature_in_panel are the following:

— base_boundary_defined_by;

— base_radius;

— feature_type;

— target_boundary_defined_by;

— target_face;

— target_radius.

4.2.212.1 base_boundary_defined_by

The base_boundary_defined_by specifies either a Closed_profile_usage (see 4.2.73) on the panel surface, or an Angle_specification (see 4.2.11) that defines the base boundary by applying an angle to the target boundary.

See 4.3.882 and 4.3.883 for the application assertions.

There shall be exactly one object that defines the base_boundary_defined_by for a Form_feature_in_panel (see 4.2.212).

4.2.212.2 base_radius

The base_radius specifies the blend of the edge where the Form_feature_in_panel meets the panel surface. The sum of the values of the base radius and target radius shall not exceed the minimum distance between the profile defining the base of the feature and the profile defining the target of the feature.

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See 4.3.884 for the application assertion.

4.2.212.3 feature_type

The feature_type specifies the kind of Form_feature_in_panel that results from the application of the specified parameters. The following values shall be used:

— 'boss';

— 'pocket';

— 'stairstep'.

NOTE - Usually a pocket in panel and a boss in panel don't differ in their shape but only in the function they perform.

EXAMPLE Figure 34 shows an example for a Form_feature_in_panel of feature_type 'stairstep'.

4.2.212.4 target_boundary_defined_by

The target_boundary_defined_by specifies either a Closed_profile_usage (see 4.2.73) that corresponds to the boundary of the target face, or an Angle_specification (see 4.2.11) that defines the target boundary by applying an angle to the base boundary.

See 4.3.882 and 4.3.883 for the application assertions.

There shall be exactly one object that defines the target_boundary_defined_by for a Form_feature_in_-panel (see 4.2.212).

4.2.212.5 target_face

The target_face specifies the Surface (see 4.2.489) or the Shell (see 4.2.451) that defines that end of the Form_feature_in_panel that results from its application.

The geometric elements representing the target shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the Form_feature_in_panel. In the case of a Form_feature_in_panel defined by a base profile and an Angle_specification (see 4.2.11), the target_face shall also be specified.

NOTE - If the target_face is not specified explicitly, it is defined implicitly as a flat face bounded by the target profile.

See 4.3.885 and 4.3.886 for the application assertions.

The target_face need not be specified for a particular Form_feature_in_panel (see 4.2.212).

If present, there shall be exactly one object that defines the target_face for a Form_feature_in_panel.

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4.2.212.6 target_radius

The target_radius specifies the blend of the edge where the feature walls meet the target face. The sum of the values of the base radius and target radius shall not exceed the minimum distance between the profile defining the base of the feature and the profile defining the target of the feature.

See 4.3.884 for the application assertion.

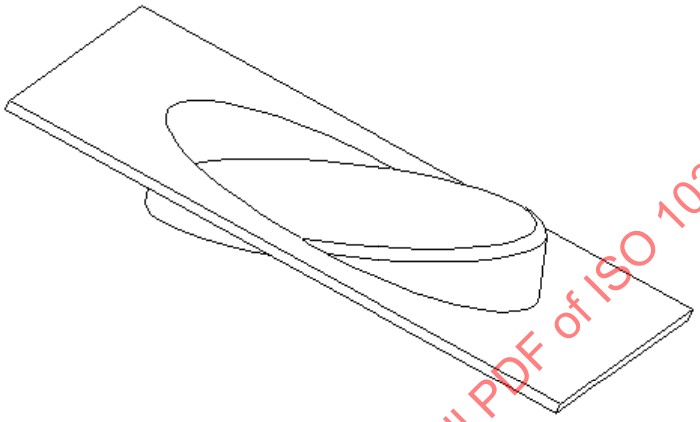


Figure 34 – Panel feature with the shape of a 'stairstep'

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4.2.213 Full_model_change

A Full_model_change is a mechanism to describe the differences between two objects with respect to geometry, style, or presentation. A Full_model_change states the fact that the base model is fully replaced by the succeeding model.

A Full_model_change is a type of Model_change (see 4.2.315).

The data associated with a Full_model_change are the following:

— added_element;

— related_description.

4.2.213.1 added_element

The added_element specifies the elements belonging to the model or the view area representing the situation after the change that have been added during the change.

See 4.3.887 for the application assertion.

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4.2.213.2 related_description

The related_description specifies the relationship object that references the replaced (relating) and the replacing (related) model.

See 4.3.888, 4.3.889, 4.3.890, and 4.3.891 for the application assertions.

There shall be exactly one object that defines the related_description for a Full_model_change (see 4.2.213).

4.2.214 General_boss

A General_boss is a volume adding feature that is specified by an enclosed volume bounded by an arbitrary closed profile. The boundary of the General_boss shall be defined using either a General_-closed_profile (see 4.2.218) or a Ngon_profile (see 4.2.323).

EXAMPLE Figure 35 shows an example of a General_boss.

A General_boss shall not have a taper of type Directed_taper (see 4.2.154).

A General_boss is a type of Boss_feature (see 4.2.42).

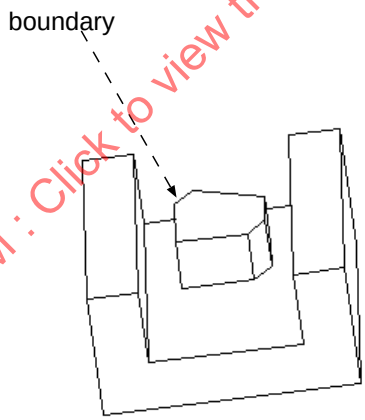


Figure 35 – Boundary of a General_boss

4.2.215 General_bottom_condition

A General_bottom_condition is a bottom of a Pocket_feature (see 4.2.366) that is an enclosed area bounded by arbitrary non-planar shape.

A General_bottom_condition is a type of Pocket_bottom_condition (see 4.2.365).

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The data associated with a General_bottom_condition are the following:

— floor_face;

— floor_radius.

4.2.215.1 floor_face

The floor_face specifies the Surface (see 4.2.489) or the Shell (see 4.2.451) that defines the bottom of the pocket. The geometric elements representing the floor shall be defined in the same Cartesian_-coordinate_space (see 4.2.44) as the concerned Pocket_feature (see 4.2.366).

See 4.3.893 and 4.3.894 for the application assertions.

There shall be exactly one object that defines the floor_face for a General_bottom_condition (see 4.2.215).

4.2.215.2 floor_radius

The floor_radius specifies the blend radius at the bottom edges of the Pocket_feature (see 4.2.366).

See 4.3.892 for the application assertion.

The floor_radius need not be specified for a particular General_bottom_condition (see 4.2.215).

4.2.216 General_classification

A General_classification is a classification of an object which characterizes all objects of the same kind; such a classification is independent from the application of the classified object.

EXAMPLE 1 A fastener with subclasses, such as fastener with 2 or 3 fixture holes, a bracket with sub-classes, e.g., with 90 or 100 degrees bending angle, or screws with subclasses such as metal screws or machine screws are examples for General_classification.

EXAMPLE 2 For facilitating an effective part retrieval for slotted screws, several General_classification objects may be defined to classify screws:

— A General_classification *1 with description 'slotted screws' and three subclasses with the descriptions *2: 'slotted cheese head screws - product grade A', *3: 'slotted pan head screws - product grade A', and *4: 'slotted countersunk flat head screws - product grade A'.

— Each of the General_classification objects is based on a Classification_system (see 4.2.71) that further defines where the definition of the General_classification comes from. For General_classification *1 this is a company internal Classification_system for 'screw classes'. For the other General_classification objects these are ISO standardized Classification_system objects, namely for *2 'ISO 1207' [8], for *3 'ISO 1580' [9], and for *4 'ISO 2009' [10].

— The General_classification objects may be defined as well in an ISO 13584 compliant library (PLIB). In this case, General_classification *1 references as a classification source an External_library_reference

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(see 4.2.188) that has an id corresponding to the class_BSU, i. e. a world wide unique identification of that class as defined according to ISO 13584 – 42. In another case, the source of a General_classification may only be available as a document in paper form. In this case, General_classification *4 references a Physical_document (see 4.2.351) with document id 'DIN EN ISO 2009' and description 'slotted countersunk flat head screws - product grade A'.

— The General_classification objects may be characterized further by Classification_attribute (see 4.2.70) objects. According to ISO 1207, the General_classification *2 has the attributes *11 with id 'd' and description 'thread', *12 with id 'l' and description 'nominal length', *13 with id 'mechanical properties' and description 'property class', etc. The possible values 'M1.6', 'M2', ..., 'M10' for Classification_attribute *11 may be defined as Property_value_representation (see 4.2.414) objects in a set of the attribute allowed_value. The according specification is given as 'value_name' of the AO Property_value (see 4.2.412) referenced by 'specified_value'. The Property_value_representation refer as their definition to a General_property (see 4.2.230) with the 'property_type' 'nominal metric thread diameter'.

— To identify the designation 'Cheese head screw ISO 1207 - M5 x 20 x 4.8', a subclass of General_classification *2 is defined with the same description and classification source and the description 'slotted cheese head screws ISO 1207 -M5 x 20 x 4.8' but with the values for Classification_attribute corresponding to *11 restricted to 'M5' only, i.e., to get just the M5 screws, corresponding to *12 restricted to value '20' only, and corresponding to *13 restricted to value '4.8' only (for steel according to ISO 898 – 1 [7]).

The data associated with a General_classification are the following:

— classification_source;

— description;

— id;

— used_classification_system;

— version_id.

4.2.216.1 classification_source

The classification_source specifies the External_library_reference (see 4.2.188) or the Plib_class_reference (see 4.2.361) that contains the specification of the General_classification.

See 4.3.896 and 4.3.898 for the application assertions.

The classification_source need not be specified for a particular General_classification (see 4.2.216).

If present, there shall be exactly one object that defines the classification_source for a General_classification.

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4.2.216.2 description

The description specifies additional information about the General_classification.

EXAMPLE ’fastener with 2 fixture holes’ or ’bracket with 90 degree bending angle’ are examples for description.

See 4.3.897 for the application assertion.

The description need not be specified for a particular General_classification (see 4.2.216).

If present, there shall be exactly one object that defines the description for a General_classification.

4.2.216.3 id

The id specifies the identifier of the General_classification.

4.2.216.4 used_classification_system

The used_classification_system specifies the Classification_system (see 4.2.71) that contains the information about the definition of the classification and how to interpret the name of the General_classification.

See 4.3.895 for the application assertion.

The used_classification_system need not be specified for a particular General_classification (see 4.2.216).

4.2.216.5 version_id

The version_id specifies the identification of a particular version of the General_classification.

The version_id need not be specified for a particular General_classification (see 4.2.216).

4.2.217 General_classification_hierarchy

A General_classification_hierarchy defines a hierarchical relationship between two instances of General_classification (see 4.2.216).

EXAMPLE With General_classification, part families such as screws can be classified. Additionally subclasses can be built and linked to the super-category screws, such as machine screw or self-tapping screw.

NOTE - The General_classification_hierarchy is used to build up hierarchical structures of General_classification objects.

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The data associated with a General_classification_hierarchy are the following:

— sub_classification;

— super_classification.

4.2.217.1 sub_classification

The sub_classification specifies the lower level of General_classification (see 4.2.216) in a General_-classification_hierarchy that is included in the super class.

See 4.3.899 for the application assertion.

4.2.217.2 super_classification

The super_classification specifies the higher level of General_classification (see 4.2.216) in a General_-classification_hierarchy that includes the sub class.

See 4.3.899 for the application assertion.

4.2.218 General_closed_profile

A General_closed_profile is a planar closed profile defined by an arbitrary Curve (see 4.2.108).

The Curve shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the General_closed_-profile.

EXAMPLE Figure 36 illustrates a General_closed_profile.

The x-axis of the inherited Axis_placement (see 4.2.33) shall be tangent to the Curve in its start point, the y-axis is oriented such that the encompassed area lies in the positive direction of this axis in the start point. The Axis_placement is located in the start point of the Curve.

A General_closed_profile is a type of Closed_profile (see 4.2.72).

The data associated with a General_closed_profile are the following:

— profile_shape

The profile_shape specifies the Curve that defines the closed profile shape.

See 4.3.900 for the application assertion.

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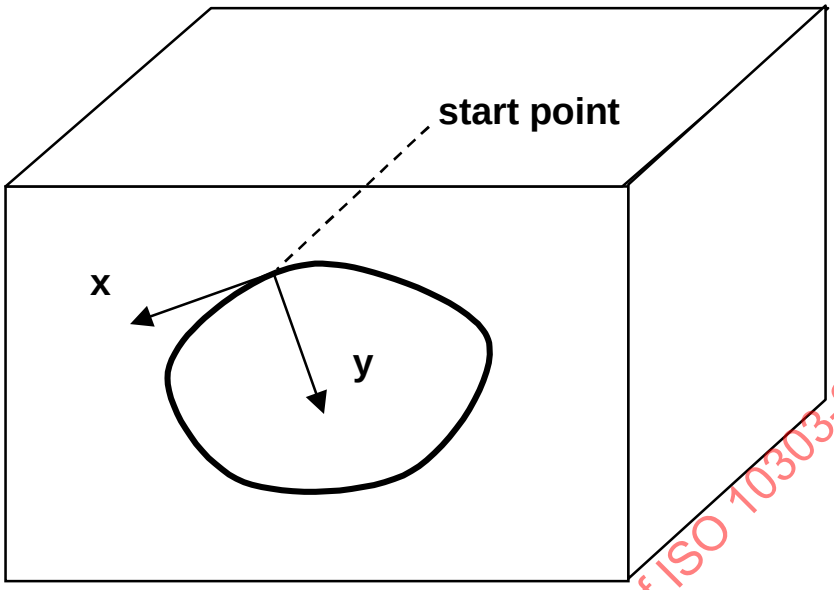


Figure 36 – Definition of a General_closed_profile

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4.2.219 General_compound_feature

A General_compound_feature is a General_feature (see 4.2.221) that is composed of several other features.

A General_compound_feature is a type of General_feature (see 4.2.221).

The data associated with a General_compound_feature are the following:

— elements

The elements specify the features that form the General_compound_feature.

See 4.3.901, 4.3.902, 4.3.903, and 4.3.904 for the application assertions.

There shall be at least two objects that define the elements for a General_compound_feature.

4.2.220 General_compound_feature_in_solid

A General_compound_feature_in_solid is an arbitrary Compound_feature_in_solid (see 4.2.88) that is not a Compound_hole (see 4.2.91). The Axis_placement (see 4.2.33) referenced by the inherited attribute 'location_and_orientation' is dependent on the combinations of the Compound_feature_in_solid_element (see 4.2.89) specified for a particular General_compound_feature_in_solid. The location and orientation of the Axis_placement shall be subject of an agreement of common understanding by partners sharing this information.

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NOTE - The types of General_compound_feature_in_solid for which a common understanding of the use of Axis_placement exists, may be identified by particular values of the attribute 'feature_type'.

A General_compound_feature_in_solid is a type of Compound_feature_in_solid (see 4.2.88).

The data associated with a General_compound_feature_in_solid are the following:

— feature_type

The feature_type specifies a user defined name for the kind of General_compound_feature_in_solid.

4.2.221 General_feature

A General_feature is a type of feature that provides a mechanism to categorize an area of interest in a shape and to associate additional information, not intended for shape generation, with the identified aspect of the shape.

Each General_feature may be a General_compound_feature (see 4.2.219).

The data associated with a General_feature are the following:

— additional_parameter;

— feature_category;

— feature_type;

— location_and_orientation.

4.2.221.1 additional_parameter

The additional_parameter specifies General_parameter (see 4.2.226) objects that give additional information about particular aspects of the General_feature.

See 4.3.906 for the application assertion.

4.2.221.2 feature_category

The feature_category specifies the class to which the General_feature belongs.

NOTE - The values of feature_category are company specific.

EXAMPLE 'design feature', 'machining feature', and 'assembly feature' are examples for feature_category.

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4.2.221.3 feature_type

The feature_type specifies the kind of feature that is represented by the General_feature.

EXAMPLE ’planar feature’ and ’logo feature’ are examples for feature_type.

4.2.221.4 location_and_orientation

The location_and_orientation specifies an Axis_placement (see 4.2.33) that represents the location and the orientation of the General_feature in the item’s coordinate space.

Since the occurrence of a General_feature is an Included_feature (see 4.2.261) this Axis_placement as well as the shape representation of the General_feature shall be defined in a Geometric_model (see 4.2.238) referring to the same Cartesian_coordinate_space (see 4.2.44) as any representation of the corresponding Item_shape (see 4.2.274).

NOTE 1 - This Axis_placement is not a local coordinate system of the General_feature that might be used for geometric transformations.

The Axis_placement referenced by the location_and_orientation is dependent on the combinations of Path (see 4.2.342) and Profile (see 4.2.401) objects, and, in case of a General_compound_feature (see 4.2.219), of additional elements specified for a particular General_feature. The location and orientation of the Axis_placement shall be subject of an agreement of common understanding by partners sharing this information.

NOTE 2 - The types of General_feature for which a common understanding of the use of Axis_placement exists may be identified by particular values of the attribute ’feature_type’.

See 4.3.905 for the application assertion.

The location_and_orientation need not be specified for a particular General_feature (see 4.2.221).

4.2.222 General_item_definition_instance_relationship

A General_item_definition_instance_relationship is a relationship between a Design_discipline_item_definition (see 4.2.142) and an Item_instance (see 4.2.271) whose meaning is defined by the attribute ’relation_type’.

EXAMPLE The relationship between the definition (Design_discipline_item_definition) of a rubber gasket and the instances (Item_instance) of the doors the gasket is used for, is an example for a General_item_definition_instance_relationship. In this case the relationship gives information that the length of the gasket depends on the actual shape of each door.

A General_item_definition_instance_relationship is a type of Item_definition_instance_relationship (see 4.2.268).

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The data associated with a General_item_definition_instance_relationship are the following:

— description;

— relation_type.

4.2.222.1 description

The description specifies additional information about the General_item_definition_instance_relationship.

See 4.3.907 for the application assertion.

The description need not be specified for a particular General_item_definition_instance_relationship (see 4.2.222).

If present, there shall be exactly one object that defines the description for a General_item_definition_-instance_relationship.

4.2.222.2 relation_type

The relation_type specifies the meaning of the relationship.

4.2.223 General_item_definition_relationship

A General_item_definition_relationship is a relationship between two Design_discipline_item_definition (see 4.2.142) objects whose meaning is defined by the attribute 'relation_type'.

> EXAMPLE The functional and shape dependencies between a part of a door lock mounted on the door and the corresponding part mounted on the car body, is an example for a General_item_definition_relationship.

A General_item_definition_relationship is a type of Item_definition_relationship (see 4.2.269).

The data associated with a General_item_definition_relationship are the following:

— description;

— relation_type.

4.2.223.1 description

The description specifies additional information about the General_item_definition_relationship.

See 4.3.908 for the application assertion.

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The description need not be specified for a particular General_item_definition_relationship (see 4.2.223).

If present, there shall be exactly one object that defines the description for a General_item_definition_-relationship.

4.2.223.2 relation_type

The relation_type specifies the meaning of the relationship.

4.2.224 General_item_instance_relationship

A General_item_instance_relationship is a relationship between two Item_instance (see 4.2.271) objects whose meaning is defined by the attribute 'relation_type'.

> EXAMPLE The relationship between a door and the adjacent parts of the car body (like A-column or roof) that defines the actual gap, is an example for a General_item_instance_relationship.

A General_item_instance_relationship is a type of Item_instance_relationship (see 4.2.272).

The data associated with a General_item_instance_relationship are the following:

— description;

— relation_type.

4.2.224.1 description

The description specifies additional information about the General_item_instance_relationship.

See 4.3.909 for the application assertion.

The description need not be specified for a particular General_item_instance_relationship (see 4.2.224).

If present, there shall be exactly one object that defines the description for a General_item_instance_-relationship.

4.2.224.2 relation_type

The relation_type specifies the meaning of the relationship.

4.2.225 General_open_profile

A General_open_profile is a planar profile defined by an arbitrary Curve (see 4.2.108). The area of interest is on the convex side of the General_open_profile; in the case of a removal feature the convex side is removed; in the case of a protrusion feature the convex side is added.

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The x-axis of the inherited Axis_placement (see 4.2.33) is tangent to the curve in its start point, the y-axis is oriented such that the convex area lies in its positive direction in the start point of the curve outlining the profile. Axis_placement is located in the start point of that curve. The Curve shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the General_open_profile.

EXAMPLE Figure 37 illustrates a General_open_profile.

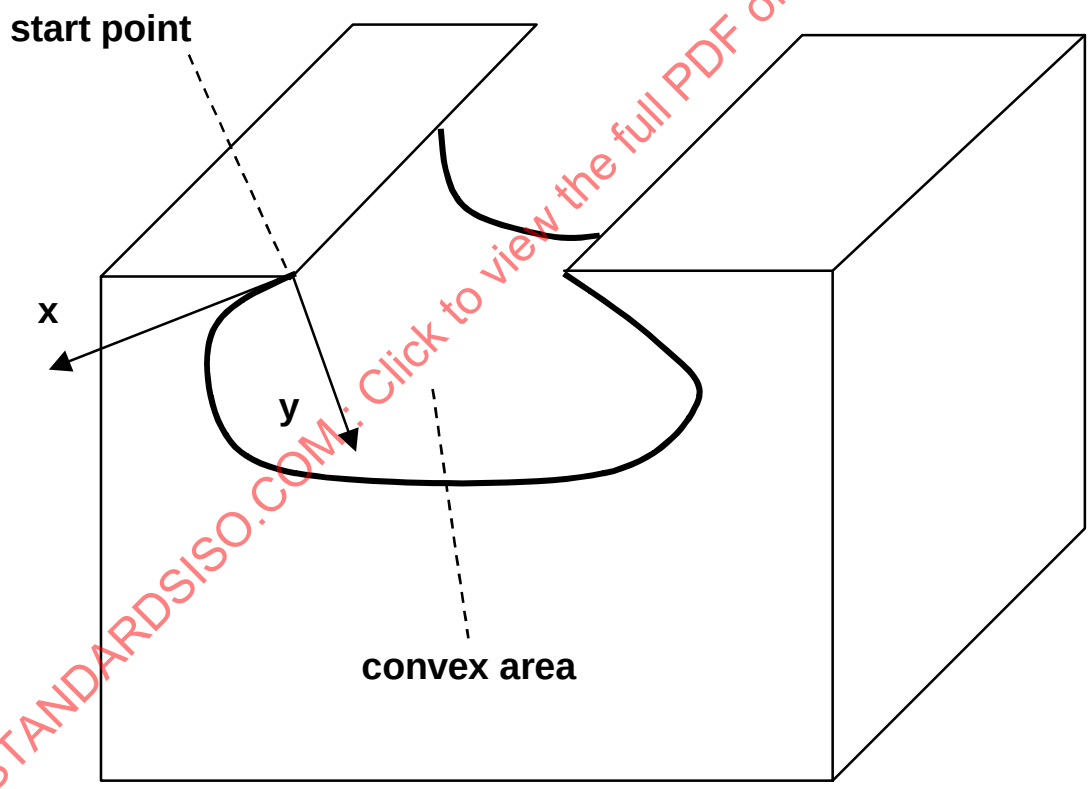
A General_open_profile is a type of Open_profile (see 4.2.328).

The data associated with a General_open_profile are the following:

— profile_shape

The profile_shape specifies the Curve that defines the open profile shape.

See 4.3.910 for the application assertion.



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Figure 37 – Definition of a General_open_profile

4.2.226 General_parameter

A General_parameter is the association of a Feature_parameter (see 4.2.201) with a General_feature (see 4.2.221) in a particular role.

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The data associated with a General_parameter are the following:

— parameter_role;

— parameter_value.

4.2.226.1 parameter_role

The parameter_role specifies the kind of parameter that is represented by the General_parameter.

EXAMPLE ’width’, ’diameter’, or ’font size’ are examples for the parameter_role.

4.2.226.2 parameter_value

The parameter_value specifies the Feature_parameter (see 4.2.201) that has the value and possibly a name of the General_parameter.

See 4.3.911 for the application assertion.

4.2.227 General_path

A General_path is a path that is specified by an arbitrary Curve (see 4.2.108). The x-y-plane of the inherited Axis_placement (see 4.2.33) is normal to the Curve in its start point, i.e., the z-axis is tangent to the curve in its start point. The Axis_placement is located in the start point of the Curve.

EXAMPLE Figure 38 illustrates a General_path.

A General_path is a type of Path (see 4.2.342).

The data associated with a General_path are the following:

— path_geometry

The path_geometry specifies the Curve that defines the General_path. This Curve shall not intersect or duplicate itself.

See 4.3.912 for the application assertion.

4.2.228 General_pattern

A General_pattern is a pattern that specifies a base component and a set of arbitrary placements to arrange identical copies of the base feature. The Axis_placement (see 4.2.33) referenced by the inherited attribute ’location_and_orientation’ shall coincide with the Axis_placement of the base feature.

EXAMPLE Figure 39 depicts a General_pattern with one base feature and 5 added instances.

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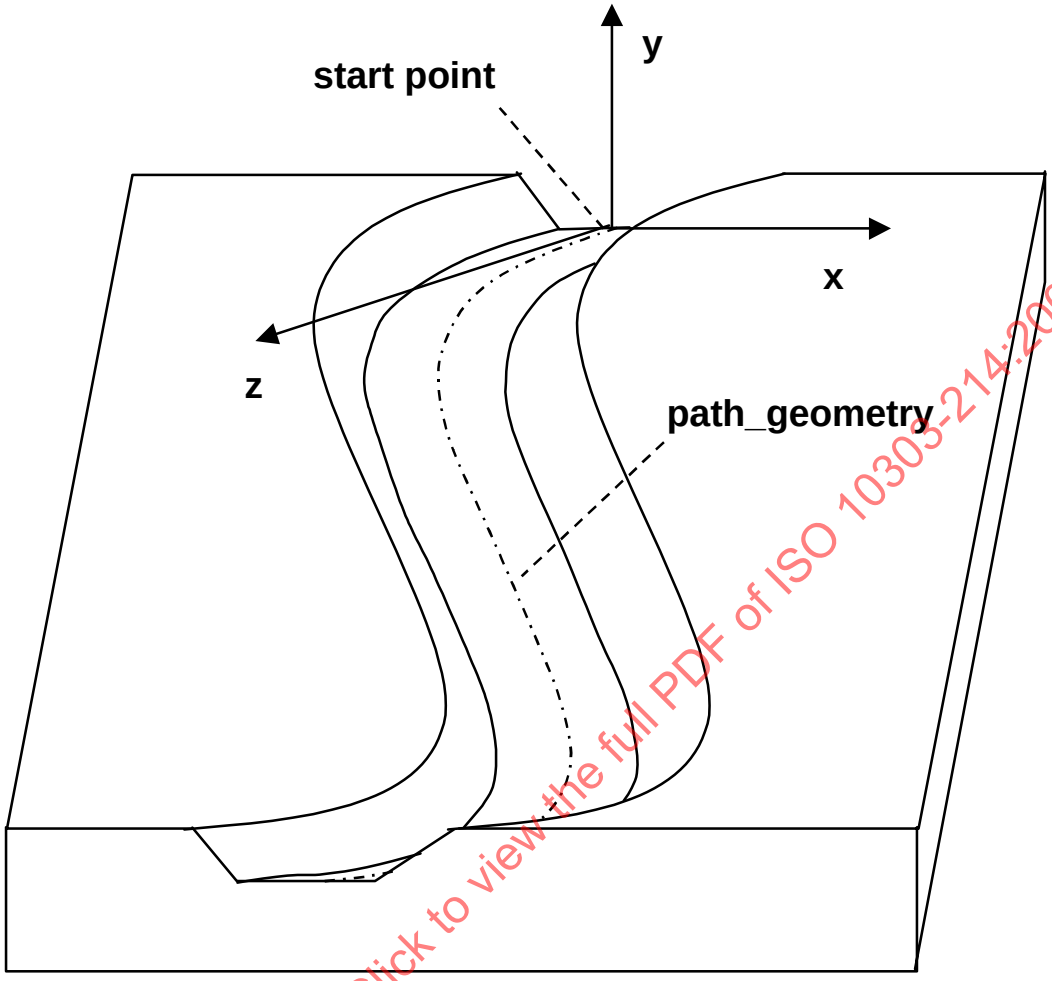


Figure 38 – Definition of a General_path

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A General_pattern is a type of Replicate_feature (see 4.2.433).

The data associated with a General_pattern are the following:

— added_instance

The added_instance specifies the set of Axis_placement objects that represent the locations and orientations of the additional instances of the base feature in the General_pattern.

NOTE - The base feature is the first instance in the pattern. In order to form a pattern, one or more additional instances have to be specified.

The placement of the additional instances is performed by matching either the Axis_placement that serves as location for the Feature_definition (see 4.2.199) of the base feature (in the case of an Included_-

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feature (see 4.2.261)) or its local coordinate system (in the case of a Placed_feature (see 4.2.356)) with the Axis_placement objects that identify the additional instances.

The Axis_placement objects are defined in the same Cartesian_coordinate_space (see 4.2.44) as the General_pattern.

See 4.3.913 for the application assertion.

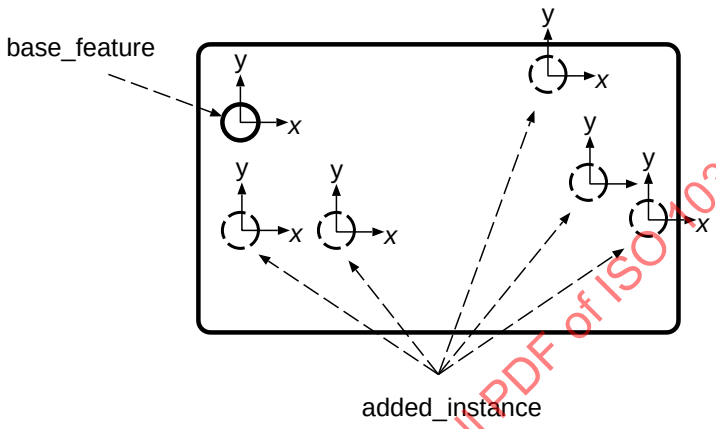


Figure 39 – Placement of additional instances in a General_pattern

4.2.229 General_pocket

A General_pocket is a pocket that is specified by a volume of arbitrary shape removed from the part.

A General_pocket is a type of Pocket_feature (see 4.2.366).

4.2.230 General_property

A General_property is the definition of a property that is specified by the attribute 'property_type'.

EXAMPLE 1 The noise emission of an engine, maintenance intervals, wheel base, and duration of parts, or electrical properties are examples for a General_property.

A General_property is a type of Property (see 4.2.409).

The data associated with a General_property are the following:

— property_type

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The property_type specifies the kind of property the General_property defines. Where applicable, the following values shall be used:

— 'overall axle distance': The overall axle distance is the distance between the first front axle and the rear most axle of the vehicle combination;

— 'positioning': The General_property is the definition of a Model_property_value (see 4.2.318) that provides an a geometric model for a Product_component (see 4.2.394) or an Item_instance (see 4.2.271) for the purpose of placement;

— 'theoretical wheelbase': The theoretical wheelbase is the distance between the resolved weight lines of front and rear axle combinations;

NOTE 1 - For a single axle either in the front or at the rear, the resolved weight line is identical to the axle centre line.

NOTE 2 - For a truck with one front axle and a combination of two rear axles, the theoretical axle distance is the distance between the front axle centre line and the resolved weight line of the rear axle combination. The resolved weight line is the calculated line, between two axles in a bogie, where the load from the axles is focused.

EXAMPLE 2 If the load distribution between two rear axles is 60% vs. 40%, then the resolved weight line is placed 40% of the total distance between the axles, from the first rear axle towards the second rear axle as shown in Figure 40.

— 'track': The track is the distance between the centre of the tyres mounted on an axle of a vehicle;

— 'wheel space': The wheel space is the distance between the perpendicular lines constructed to the longitudinal median plane of the vehicle from two points that represent the wheels situated at the same side of the axle that is of interest.

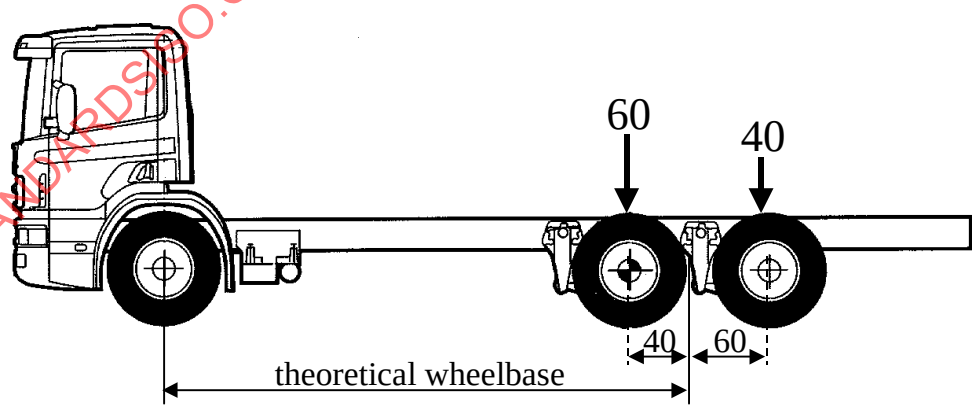


Figure 40 – Theoretical wheelbase of a truck

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4.2.231 General_shape_dependent_property

A General_shape_dependent_property is a user-defined characteristic of an object. The 'property_value' specified by a General_shape_dependent_property is derived from geometry.

NOTE - The General_shape_dependent_property may be used for the purpose of validation of geometric models.

EXAMPLE If a geometry model is exchanged between two partners, the calculation of various properties of the bodies, such as centre of mass, overall surface, or overall volume, is performed by originator and recipient. When comparing these set of values, the existence of deficiencies in the received model can be easily detected.

A General_shape_dependent_property is a type of Shape_dependent_property (see 4.2.447).

The data associated with a General_shape_dependent_property are the following:

— property_type;

— property_value.

4.2.231.1 property_type

The property_type defines the type of characteristic that is specified for an object. The following values shall be used:

— 'centroid': The 'property_value' identifies the centre point of the mass of a body. The relative position of this point within the body is an invariant datum relative to rotation and translation;

EXAMPLE An example, where the use of this General_shape_dependent_property with property_type 'centroid' is used instead of the object Centre_of_mass (see 4.2.49), is the following: sometimes the General_shape_dependent_property is calculated by some system at some point of time. But there are cases where the information, e.g., the General_shape_dependent_property of a die, is transferred into a following stage, e.g., in order to perform a feasibility check, where there is only a simplified shape representation that does not allow to calculate the exact General_shape_dependent_property. Yet, in this stage the information about the General_shape_dependent_property is needed in order to check whether the transport of a die with a crane is feasible.

— 'surface area': The 'property_value' specifies the overall surface of the bodies contained in the referenced shape;

— 'volume': The 'property_value' specifies the overall volume of the bodies contained in the referenced shape.

4.2.231.2 property_value

The property_value specifies the value that is given for a particular characteristic.

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4.2.232 General_size_dimension

A General_size_dimension is the definition of a dimension that characterizes the size of a Shape_element (see 4.2.449) or an Annotation_curve (see 4.2.16).

A General_size_dimension is a type of Size_dimension (see 4.2.456).

The data associated with a General_size_dimension are the following:

— dimension_type;

— used_path.

4.2.232.1 dimension_type

The dimension_type specifies the kind of size dimension that is represented by the General_size_dimension. Where applicable, the following values shall be used:

— 'curved dimension': The General_size_dimension specifies the size along a non linear curve. In this case the used path references a Measurement_path (see 4.2.314) that is defined as a non-linear curve;

— 'diameter': The General_size_dimension specifies the size of a diameter of a circle;

— 'radius': The General_size_dimension specifies the size of a radius of a circular arc;

— 'length': The General_size_dimension specifies the size along a straight line that is referred to as 'length' in the referenced shape;

— 'width': The General_size_dimension specifies the size along a straight line that is referred as 'width' by the referenced shape;

— 'height': The General_size_dimension specifies the size along a straight line that is referred as 'height' in the referenced shape.

NOTE For all predefined values except for 'curved dimension' the used path references a Measurement_path that is defined as a linear curve.

4.2.232.2 used_path

The used_path specifies the Measurement_path (see 4.2.314) along which the size is measured.

See 4.3.914 for the application assertion.

The used_path need not be specified for a particular General_size_dimension (see 4.2.232).

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4.2.233 General_symbol

A General_symbol is the definition of a symbol that is either user-defined or externally defined.

4.2.234 General_tolerance_table

A General_tolerance_table is a table containing information about General_tolerances (see 4.2.235).

The data associated with a General_tolerance_table are the following:

— tolerance_type

The tolerance_type specifies the kind of the tolerance.

EXAMPLE Examples for tolerance_type are 'length dimensional tolerance', 'angular dimensional tolerance', or 'rectangularity'.

4.2.235 General_tolerances

A General_tolerances is a set of default values for dimension or geometric tolerances.

The default values are specified in a table where the correct tolerance type and values are provided per range of dimension or according to the number of significant digits of the dimension. These default values are overwritten by tolerances that are assigned explicitly to particular aspects of the shape. The concept of General_tolerances is defined in ISO 2768.

EXAMPLE The General_tolerances specifies, e.g., that for the tolerance class 'f' the tolerance value '± 0.15' is applicable for length dimensions between 30 mm and 120 mm. Figure 41 depicts an example for General_tolerances.

The data associated with a General_tolerances are the following:

— table_definition;

— tolerance_class.

4.2.235.1 table_definition

The table_definition specifies the contents of the General_tolerances that is defined either explicitly in a General_tolerance_table (see 4.2.234) or in a document.

See 4.3.915 and 4.3.916 for the application assertions.

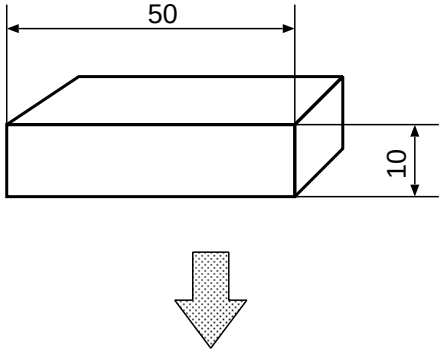
There shall be exactly one object that defines the table_definition for a General_tolerances (see 4.2.235).

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4.2.235.2 tolerance_class

The tolerance_class specifies the class as defined in the tolerance table that applies in the given context.



standard source: ISO 2768

length dimensional tolerance:

tolerance class	length nominal 0.5-3	3-6	6-30	30-120	120-400	etc.
f	0.05	0.05	0.1	0.15	0.2	
m	0.1	0.1	0.2	0.3	0.5	
c	0.2	0.3	0.5	0.8	1.2	
v	-	0.5	1.0	1.5	2.5	

tolerance ± mm

angular dimensional tolerance:

tolerance class	short angle length nominal 0-10	10-50	50-120	120-400	>400
f	1°	30'	20'	10'	5'
m	1°	30'	20'	10'	5'
c	1°30'	1°	30'	15'	10'
v	3°	2°	1°	30'	20'

tolerance ± °

rectangularity:

tolerance class	short angle length nominal 0-100	100-300	300-1000	1000-3000
H	0.2	0.3	0.4	0.5
K	0.4	0.6	0.8	1
L	0.6	1	1.5	2

tolerance ± mm

•
•
•

Figure 41 – General_tolerances

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4.2.236 General_top_condition

A General_top_condition is a top condition for a Boss_feature (see 4.2.42). This top condition is an arbitrary non-planar shape.

A General_top_condition is a type of Boss_top_condition (see 4.2.43).

The data associated with a General_top_condition are the following:

— top_face

The top_face specifies the Surface (see 4.2.489) or the Shell (see 4.2.451) that defines the top of the boss. The geometric elements representing the top shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the concerned Boss_feature.

See 4.3.917 and 4.3.918 for the application assertions.

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There shall be exactly one object that defines the top_face for a General_top_condition.

4.2.237 Geometric_dimension

A Geometric_dimension is the definition of the size of an element or of the distance between two elements.

NOTE - A Geometric_dimension may be presented by a Dimension_callout (see 4.2.150) showing the dimension value and its relationship to the drafted geometry or annotation.

Each Geometric_dimension is a Size_dimension (see 4.2.456) or a Location_dimension (see 4.2.301).

The data associated with a Geometric_dimension are the following:

— dimension_value;

— id.

4.2.237.1 dimension_value

The dimension_value specifies a positive value that is the value of size of the element or of the distance between the two elements.

See 4.3.919 for the application assertion.

4.2.237.2 id

The id specifies the identifier of the Geometric_dimension.

4.2.238 Geometric_model

A Geometric_model is a representation of geometry. A Geometric_model that does not reference any Detailed_geometric_model_element (see 4.2.144) objects through one of the subtypes directly shall either reference at least one Template_instance (see 4.2.512) as 'additional_element' or shall reference Axis_placement (see 4.2.33) objects exclusively.

NOTE 1 - The case, where the Geometric_model is used without creating a subtype and without referencing additional elements, is used for creating intermediate assembly models in the context of product data management systems that manage CAD models as files.

NOTE 2 - Each Geometric_model may be a Geometric_model_version (see 4.2.241) and one of the other types of Geometric_model.

Each Geometric_model may be a Geometric_model_version (see 4.2.241).

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Each Geometric_model may be one of the following: a Wireframe_model_3d (see 4.2.562), a Point_-direction_model (see 4.2.370), a Wireframe_model_2d (see 4.2.561), a Hybrid_geometric_model_3d (see 4.2.259), a Geometrically_bounded_surface_model (see 4.2.248), a Surface_model (see 4.2.496), a Compound_model (see 4.2.92), a Csg_model (see 4.2.106), a B_rep_model (see 4.2.35), or a Faceted_-b_rep_model (see 4.2.196).

The data associated with a Geometric_model are the following:

— additional_element;

— description;

— is_defined_in;

— model_extent;

— model_id.

4.2.238.1 additional_element

The additional_element specifies the Template_instance (see 4.2.512) objects that are additionally imported into the Geometric_model using a Transformation (see 4.2.533). The additional_element shall be of the same type as the referring Geometric_model.

See 4.3.922 for the application assertion.

4.2.238.2 description

The description specifies additional information about the Geometric_model.

See 4.3.921 for the application assertion.

The description need not be specified for a particular Geometric_model (see 4.2.238).

If present, there shall be exactly one object that defines the description for a Geometric_model.

4.2.238.3 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the Geometric_model is defined. The specified Cartesian_coordinate_space serves also as the reference coordinate space for the transformation of Template_instance (see 4.2.512) objects used as additional elements in the Geometric_-model.

See 4.3.920 for the application assertion.

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4.2.238.4 model_extent

The model_extent specifies the radius of a sphere that contains all elements of the model and whose centre is at the origin of the Cartesian_coordinate_space (see 4.2.44) of the Geometric_model. The model_extent is specified using a length unit.

The model_extent need not be specified for a particular Geometric_model (see 4.2.238).

4.2.238.5 model_id

The model_id specifies the identifier of the Geometric_model.

4.2.239 Geometric_model_relationship

A Geometric_model_relationship is a relationship between two models. The models may be either of type Geometric_model (see 4.2.238) or of type External_model (see 4.2.189).

Each Geometric_model_relationship may be a Geometric_model_relationship_with_transformation (see 4.2.240).

The data associated with a Geometric_model_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.239.1 description

The description specifies additional information about the Geometric_model_relationship.

See 4.3.925 for the application assertion.

The description need not be specified for a particular Geometric_model_relationship (see 4.2.239).

If present, there shall be exactly one object that defines the description for a Geometric_model_relationship.

4.2.239.2 related

The related specifies the second of the two model objects related by the Geometric_model_relationship.

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NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.923 and 4.3.924 for the application assertions.

There shall be exactly one object that the Geometric_model_relationship (see 4.2.239) is related to.

4.2.239.3 relating

The relating specifies the first of the two model objects related by the Geometric_model_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.923 and 4.3.924 for the application assertions.

There shall be exactly one object that the Geometric_model_relationship (see 4.2.239) is relating to.

4.2.239.4 relation_type

The relation_type specifies the meaning of the relationship.

EXAMPLE The relation_type may be, e.g., 'basis for' if the relating Geometric_model (see 4.2.238) provides a detailed representation of the shape of an object and if the related Geometric_model provides an idealized representation of the shape of the same object.

4.2.240 Geometric_model_relationship_with_transformation

A Geometric_model_relationship_with_transformation is a relationship between two model objects with the additional information about a geometric Transformation (see 4.2.533). This Transformation defines the location and orientation of the related model relative to the relating model.

A Geometric_model_relationship_with_transformation is a type of Geometric_model_relationship (see 4.2.239).

The data associated with a Geometric_model_relationship_with_transformation are the following:

— model_placement

The model_placement specifies the geometric Transformation that places and orients the related model relative to the relating model.

See 4.3.926 for the application assertion.

4.2.241 Geometric_model_version

A Geometric_model_version is a particular version of a Geometric_model (see 4.2.238).

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A Geometric_model_version is a type of Geometric_model (see 4.2.238).

The data associated with a Geometric_model_version are the following:

— version_id

The version_id specifies the identification of a particular version of a Geometric_model.

4.2.242 Geometric_set_3d

A Geometric_set_3d is a set of Curve (see 4.2.108), Point (see 4.2.367), or Surface (see 4.2.489) objects that are part of a Geometrically_bounded_surface_model (see 4.2.248).

A Geometric_set_3d is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Geometric_set_3d are the following:

— element

The element specifies the set of geometric elements that are included in the Geometric_set_3d.

See 4.3.927, 4.3.928, and 4.3.929 for the application assertions.

There shall be at least one object that defines the element for a Geometric_set_3d.

4.2.243 Geometric_tolerance

A Geometric_tolerance is the allowable deviation of shape characteristics as defined in ISO 1101.

Each Geometric_tolerance is a Cylindricity_tolerance (see 4.2.115), a Line_profile_tolerance (see 4.2.297), a Symmetry_tolerance (see 4.2.503), a Straightness_tolerance (see 4.2.477), a Flatness_tolerance (see 4.2.211), a Position_tolerance (see 4.2.378), a Circular_runout_tolerance (see 4.2.63), a Surface_profile_tolerance (see 4.2.499), a Total_runout_tolerance (see 4.2.532), a Perpendicularity_tolerance (see 4.2.345), a Parallelism_tolerance (see 4.2.338), a Concentricity_tolerance (see 4.2.93), an Angularity_tolerance (see 4.2.15), a Coaxiality_tolerance (see 4.2.76), or a Roundness_tolerance (see 4.2.441).

The data associated with a Geometric_tolerance are the following:

— is_applied_to;

— modification;

— name;

— qualifying_note;

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— segment_size;

— significant_digits;

— tolerance_value;

— value_determination.

4.2.243.1 is_applied_to

The is_applied_to specifies the shape that the Geometric_tolerance is associated to.

See 4.3.930, 4.3.931, 4.3.932, and 4.3.934 for the application assertions.

There shall be exactly one object that the Geometric_tolerance (see 4.2.243) is_applied_to.

4.2.243.2 modification

The modification specifies the Tolerance_condition (see 4.2.522) that is associated with the application or the Geometric_tolerance.

See 4.3.935 for the application assertion.

The modification need not be specified for a particular Geometric_tolerance (see 4.2.243).

4.2.243.3 name

The name specifies the word or group of words by which the Geometric_tolerance is referred to.

See 4.3.933 for the application assertion.

The name need not be specified for a particular Geometric_tolerance (see 4.2.243).

If present, there shall be exactly one object that defines the name for a Geometric_tolerance.

4.2.243.4 qualifying_note

The qualifying_note specifies additional constraints on the Geometric_tolerance.

EXAMPLE 'not concave' is an example for the qualifying_note.

See 4.3.933 for the application assertion.

The qualifying_note need not be specified for a particular Geometric_tolerance (see 4.2.243).

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If present, there shall be exactly one object that defines the qualifying_note for a Geometric_tolerance.

4.2.243.5 segment_size

The segment_size specifies the length of a segment. All along any segment of this size, taken on the toleranced element, the toleranced element shall conform to the tolerance.

The segment_size need not be specified for a particular Geometric_tolerance (see 4.2.243).

4.2.243.6 significant_digits

The significant_digits specify the number of decimal digits indicating the accuracy of the tolerance value.

The significant_digits need not be specified for a particular Geometric_tolerance (see 4.2.243).

4.2.243.7 tolerance_value

The tolerance_value specifies the tolerance magnitude expressed by a length measure with unit.

4.2.243.8 value_determination

The value_determination specifies information on how the Geometric_tolerance shall be interpreted. Where applicable, the following values shall be used:

— 'calculated': The value has been calculated from a particular representation;

— 'designed': The value represents a value intended by the design;

— 'estimated': The value has been estimated;

— 'measured': The value has been measured;

— 'required': The value represents a requirement.

NOTE - A Geometric_tolerance may be specified in the design stage of a product but it may also be documented as measured on a prototype.

The value_determination need not be specified for a particular Geometric_tolerance (see 4.2.243).

4.2.244 Geometric_tolerance_callout

A Geometric_tolerance_callout is a combination of annotation elements that represents information about a geometric tolerance.

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For this particular type of callout, the inherited attribute 'contents' shall refer to Annotation_curve (see 4.2.16), Geometric_tolerance_symbol (see 4.2.246), or Text (see 4.2.514) objects only.

A Geometric_tolerance_callout is a type of Draughting_callout (see 4.2.169).

4.2.245 Geometric_tolerance_relationship

A Geometric_tolerance_relationship is a relationship between two Geometric_tolerance (see 4.2.243) objects.

The data associated with a Geometric_tolerance_relationship are the following:

— related;

— relating;

— relation_type.

4.2.245.1 related

The related specifies the second of the two objects related by the Geometric_tolerance_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.936 for the application assertion.

4.2.245.2 relating

The relating specifies the first of the two objects related by the Geometric_tolerance_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.936 for the application assertion.

4.2.245.3 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'precedence': The relating Geometric_tolerance (see 4.2.243) is of higher priority than the related;

EXAMPLE A part may have a Shape_element (see 4.2.449) that has a Geometric_tolerance and that may serve as the basic shape for a pattern that may also have a Geometric_tolerance. In this case, the tolerance for the base shape usually has precedence over the tolerance for the pattern.

— 'simultaneity': The relating and the related Geometric_tolerance shall be met simultaneously.

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4.2.246 Geometric_tolerance_symbol

A Geometric_tolerance_symbol is a predefined annotation symbol used to present information about a geometric tolerance.

This AP supports the geometric tolerance symbols defined in ISO 7083, i.e., 'angularity', 'basic dimension', 'blanked datum reference', 'circular runout', 'circularity', 'concentricity', 'cylindricity', 'datum target identification', 'filled datum reference', 'flatness', 'maximum material condition', 'parallelism', 'perpendicularity', 'position', 'profile of a line', 'profile of a surface', 'projected tolerance zone', 'straightness', 'symmetry', and 'total runout'.

Additionally, symbols for 'diameter', 'least material condition', 'regardless of feature size', and 'target point' are supported.

The dimensions of the symbols are presented in figure 42.

4.2.247 Geometrical_relationship

A Geometrical_relationship is the relationship between two Design_discipline_item_definition (see 4.2.142) objects specifying two parts that are geometrically related. Therefore, the shape of the related parts shall be represented only once and can be reused for the geometrically related situation.

The two Design_discipline_item_definition objects that are related by this relationship shall belong to different Item_version (see 4.2.275) objects. Other properties except shape are not subject to this relationship and therefore not 'inherited' from the relating Design_discipline_item_definition to the related Design_discipline_item_definition.

> EXAMPLE Figure 43 shows an example for a Geometrical_relationship: in this case the left mudguard of a car is symmetrical to the right mudguard. A given plane mirroring transformation specifies the location of the left mudguard regarding the location of the right mudguard.

A Geometrical_relationship is a type of Item_definition_relationship (see 4.2.269).

The data associated with a Geometrical_relationship are the following:

— definition_placement;

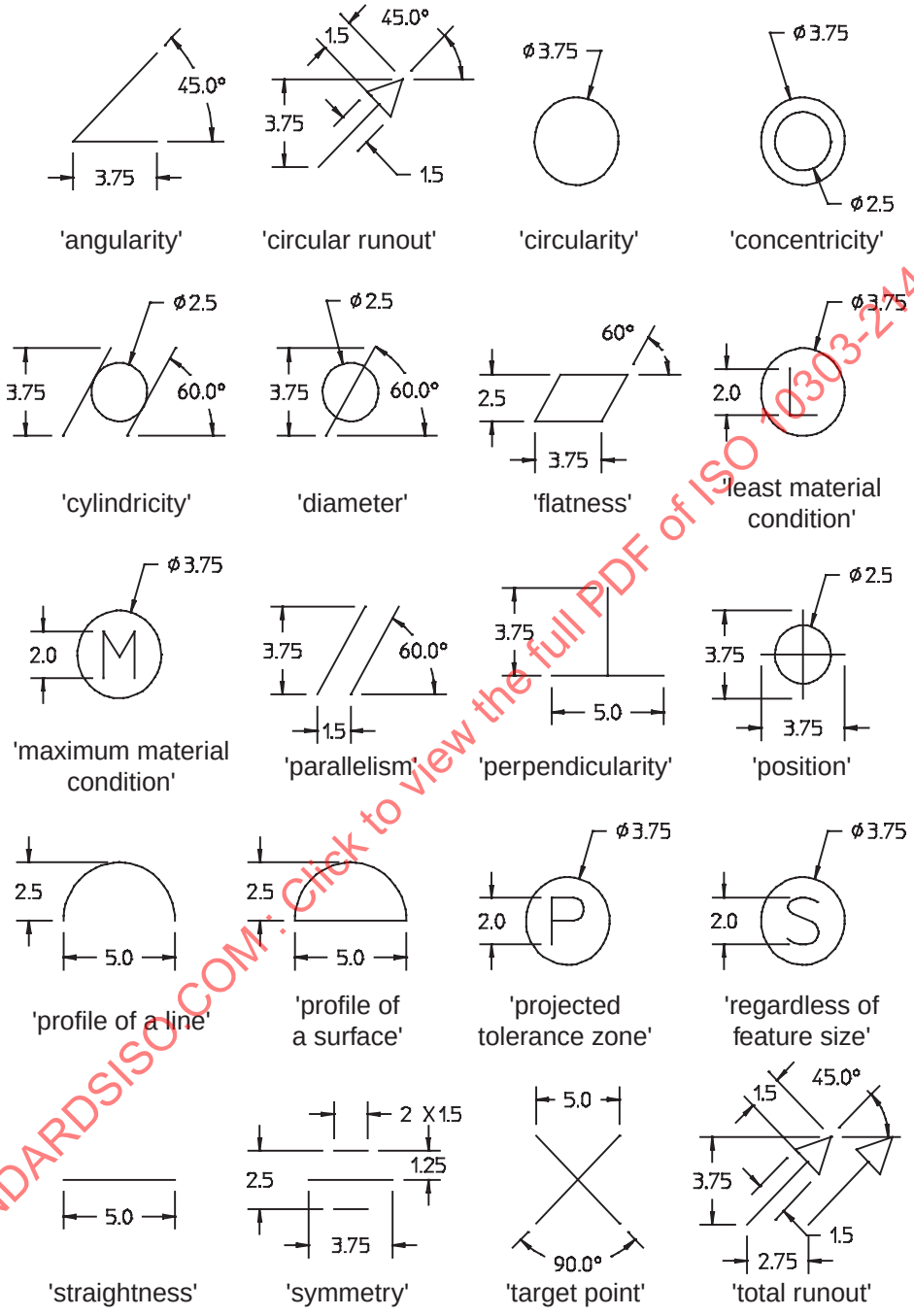
— description.

4.2.247.1 definition_placement

The definition_placement specifies the Geometric_model_relationship_with_transformation (see 4.2.240) or the Template_instance (see 4.2.512) that has the Transformation (see 4.2.533) to be applied to the relating Design_discipline_item_definition (see 4.2.142) in order to define the location and the orientation of the related Design_discipline_item_definition. Translation, rotation, and mirroring, i.e., inversion, is

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Dimensions shown are in mm and prior to scaling

Figure 42 – Predefined geometrical tolerance symbols

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included; scaling is not included. In the case of a Template_instance, the scale factor shall be omitted or set to 1.0.

See 4.3.937 and 4.3.939 for the application assertions.

There shall be exactly one object that defines the definition_placement for a Geometrical_relationship (see 4.2.247).

4.2.247.2 description

The description specifies additional information about the Geometrical_relationship.

See 4.3.938 for the application assertion.

The description need not be specified for a particular Geometrical_relationship (see 4.2.247).

If present, there shall be exactly one object that defines the description for a Geometrical_relationship.

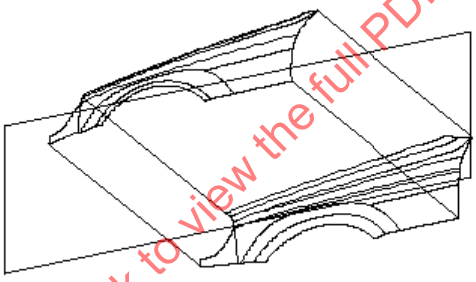


Figure 43 – Application of a Geometrical_relationship

4.2.248 Geometrically_bounded_surface_model

A Geometrically_bounded_surface_model is a surface model without topology. This model is formed by the use of points, curves and surfaces only. All unbounded curves and surfaces shall be explicitly trimmed.

A Geometrically_bounded_surface_model is a type of Geometric_model (see 4.2.238).

The data associated with a Geometrically_bounded_surface_model are the following:

— element

The element specifies the set of Geometric_set_3d (see 4.2.242) objects that form the Geometrically_-bounded_surface_model.

See 4.3.940 for the application assertion.

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4.2.249 Ground_representation

A Ground_representation is the geometric representation of that part of the kinematic model that shall never move.

The data associated with a Ground_representation are the following:

— shape_description

The shape_description specifies the Geometric_model (see 4.2.238) of the Ground_representation.

See 4.3.941 for the application assertion.

4.2.250 Group

A Group is a collection of elements. A group may contain zero or more Detailed_element (see 4.2.143) or Shape_element (see 4.2.449) objects. If a group is referred to as 'relating' by an instance of Structuring_-method_hierarchy (see 4.2.480), it includes, by means of this instance, the Group that is referred to as 'related' by it. The nesting shall be acyclic. In case of nesting, a Group need not contain elements.

EXAMPLE 1 In a B-rep model, several drilling holes are included. The objects defining the drilling holes including the two intersection curves and the faces of the hole may be grouped together with the purpose 'drilling hole'.

EXAMPLE 2 Features can be grouped for organizational purposes, e.g., in order to identify all portions of shape that are created using features.

NOTE - For the purpose of grouping of features for process operations the use of Process_operation_-input_or_output (see 4.2.383) is appropriate.

The data associated with a Group are the following:

— element;

— name;

— purpose.

4.2.250.1 element

The element specifies the Detailed_element (see 4.2.143) or Shape_element (see 4.2.449) objects included in the Group. All elements shall be of the same type.

See 4.3.942 and 4.3.944 for the application assertions.

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4.2.250.2 name

The name specifies the word or group of words by which the Group is referred to.

See 4.3.943 for the application assertion.

There shall be exactly one object that defines the name for a Group (see 4.2.250).

4.2.250.3 purpose

The purpose specifies the rationale behind the grouping mechanism.

See 4.3.943 for the application assertion.

The purpose need not be specified for a particular Group (see 4.2.250).

If present, there shall be exactly one object that defines the purpose for a Group.

4.2.251 Group_relationship

A Group_relationship is a relationship between two Group (see 4.2.250) objects. Group_relationship shall not be used to convey the information that the related Group is an element of the relating Group.

NOTE - In order to convey such information, the use of Structuring_method_hierarchy (see 4.2.480) is appropriate.

The data associated with a Group_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.251.1 description

The description specifies additional information about the Group_relationship.

See 4.3.946 for the application assertion.

The description need not be specified for a particular Group_relationship (see 4.2.251).

If present, there shall be exactly one object that defines the description for a Group_relationship.

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4.2.251.2 related

The related specifies the second of the two Group (see 4.2.250) objects that are related by the Group_-relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.945 for the application assertion.

4.2.251.3 relating

The relating specifies the first of the two Group (see 4.2.250) objects that are related by the Group_-relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.945 for the application assertion.

4.2.251.4 relation_type

The relation_type specifies the meaning of the relationship.

4.2.252 Half_space_solid

A Half_space_solid is the half space that is the regular subset of the domain that lies on one side of an unbounded surface. A Boolean flag shall be set to indicate whether the Half_space_solid is selected according to the normal direction of the surface. A Half_space_solid may participate in Boolean operations of the type 'intersection' or 'difference' as the second Boolean operand.

NOTE - Boxed half space solids are out of scope of this part of ISO 10303.

A Half_space_solid is a type of Detailed_geometric_model_element (see 4.2.144).

4.2.253 Hardcopy

A Hardcopy is the actual stack of paper consisting of one or more sheets, on which some product data is written, printed or plotted.

A Hardcopy is a type of Document_file (see 4.2.159).

4.2.254 Hardness

A Hardness is the hardness of a material on its surface. The hardness represents the resistance of a surface to deformation by external forces.

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EXAMPLE Figure 44 gives examples for the specification of surface hardness on technical drawings. On the left side a surface hardness with the measuring method 'Vickers HV30' according to ISO 4516 [13], the hardness value '620', the hardness value tolerance '+160', the treatment type 'Rht' (surface layer hardening), the hardness limit '500', the hardening depth '0,8 mm', and the hardening depth tolerance '+0,8 mm' is specified. On the right side a surface hardness with the measuring method 'Rockwell HRC' according to ISO 6508 [16], the hardness value '57', the hardness value tolerance '+6', the treatment type 'Eht' (case hardening), the hardening depth '1,2 mm', and the hardening depth tolerance '+0,7 mm' is specified.

A Hardness is a type of Surface_condition (see 4.2.492).

The data associated with a Hardness are the following:

— depth;

— description;

— environment_condition;

— hardness_value;

— measuring_method;

— measuring_position.

4.2.254.1 depth

The depth specifies the depth measured from the surface into the material where the specified hardness applies.

EXAMPLE The depth of the hardened material after a high-frequency quenching process is an example for depth.

See 4.3.948 for the application assertion.

The depth need not be specified for a particular Hardness (see 4.2.254).

4.2.254.2 description

The description specifies additional information about the Hardness.

EXAMPLE 'depth is describing the total effective case depth' is an example for description.

See 4.3.947 for the application assertion.

The description need not be specified for a particular Hardness (see 4.2.254).

If present, there shall be exactly one object that defines the description for a Hardness.

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4.2.254.3 environment_condition

The environment_condition specifies the conditions under that the specified hardness_value is valid.

There may be more than zero environment_condition for a Hardness (see 4.2.254).

4.2.254.4 hardness_value

The hardness_value specifies the value of the hardness.

See 4.3.948 for the application assertion.

4.2.254.5 measuring_method

The measuring_method specifies the method for measuring hardness values. Where applicable, the following values shall be used:

— 'brinell': The Hardness is measured according to the Brinell method;

— 'rockwell': The Hardness is measured according to the Rockwell method;

— 'vickers': The Hardness is measured according to the Vickers method.

4.2.254.6 measuring_position

The measuring_position specifies the position where the hardness is measured with respect to the part of interest.

> EXAMPLE 'core' or 'surface' are examples for measuring_position where 'core' is inside the hardened part, i.e., it is measured before a quenching process, and 'surface' is on the surface of a hardened part, i.e., it is measured after a quenching process.

The measuring_position need not be specified for a particular Hardness (see 4.2.254).

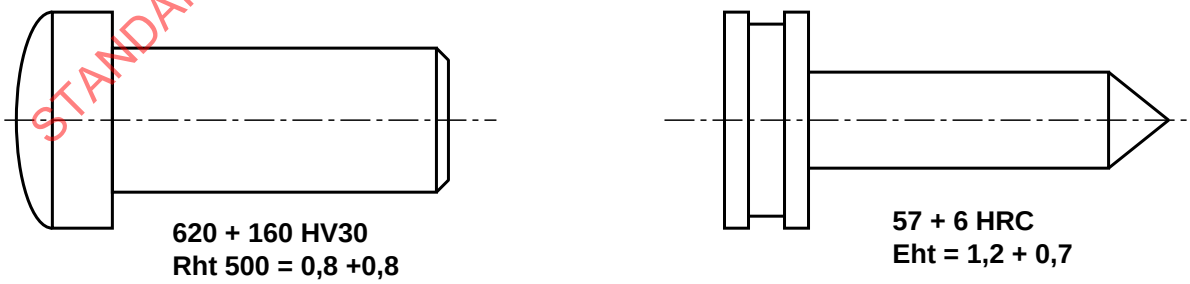


Figure 44 – Hardness

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4.2.255 Hatching

A Hatching is a list of hatch patterns that are presented by a single and uniformly spaced geometric pattern of lines. The basis of the hatching pattern is an infinite straight line that is repeated across the fill area and clipped to the boundaries of the fill area.

NOTE - The Hatching may be defined by the user or may be externally defined.

4.2.256 Hidden_element_handling

A Hidden_element_handling is the definition of how hidden elements are handled in a Model_image (see 4.2.316).

The element types which may hide other elements, are solid and surface type geometric elements. The element types which may be hidden by these solids and surfaces, are all geometric and annotation type elements.

The data associated with a Hidden_element_handling are the following:

— hidden_element_appearance;

— is_defined_for;

— switch.

4.2.256.1 hidden_element_appearance

The hidden_element_appearance specifies the appearance characteristics of hidden elements.

EXAMPLE A curve appearance with a dashed line type shows lines that are hidden in a dashed style instead of not showing them at all.

See 4.3.949 for the application assertion.

The hidden_element_appearance need not be specified for a particular Hidden_element_handling (see 4.2.256).

4.2.256.2 is_defined_for

The is_defined_for specifies the Model_image (see 4.2.316) to which the Hidden_element_handling is applied.

See 4.3.950 for the application assertion.

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4.2.256.3 switch

The switch specifies the status of hiding for the hidden element handling. The following values shall be used:

— 'active': The hidden elements are either not shown or visualized with a specialized appearance, defined by the attribute hidden_element_appearance;

— 'inactive': All elements are displayed as usual.

4.2.257 Hole_bottom_condition

A Hole_bottom_condition is the definition of a kind of end that characterizes a Round_hole (see 4.2.439).

EXAMPLE Figure 45 illustrates the various hole bottom conditions.

Each Hole_bottom_condition is a Flat_with_radius_bottom (see 4.2.209), a Flat_bottom (see 4.2.207), a Spherical_bottom (see 4.2.474), a Flat_with_taper_bottom (see 4.2.210), or a Conical_bottom (see 4.2.95).

The data associated with a Hole_bottom_condition are the following:

— is_applied_to

The is_applied_to specifies to which end of the path the Hole_bottom_condition applies. The following values shall be used:

— 'end': The Hole_bottom_condition is applied to that end of the Round_hole that corresponds to the end of the defining Linear_path (see 4.2.300);

— 'start': The Hole_bottom_condition is applied to that end of the Round_hole that corresponds to the start of the defining Linear_path.

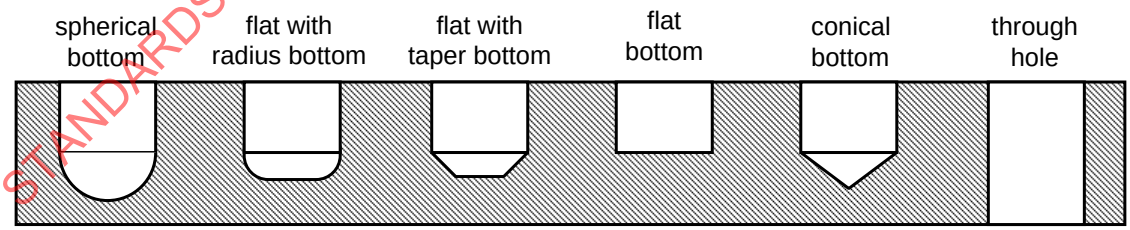


Figure 45 – Cross sections of holes

4.2.258 Hole_feature_in_panel

A Hole_feature_in_panel is a hole that is applied to a sheet like formed part.

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A Hole_feature_in_panel is a type of Process_feature_in_panel (see 4.2.379).

Each Hole_feature_in_panel may be a Panel_hole_with_barring (see 4.2.336).

The data associated with a Hole_feature_in_panel are the following:

— hole_profile;

— hole_type.

4.2.258.1 hole_profile

The hole_profile specifies a closed profile defining the shape of the Hole_feature_in_panel.

See 4.3.951 for the application assertion.

4.2.258.2 hole_type

The hole_type specifies the kind or shape of hole.

EXAMPLE 'circular' and 'rectangular' are examples for the hole_type.

The hole_type need not be specified for a particular Hole_feature_in_panel (see 4.2.258).

4.2.259 Hybrid_geometric_model_3d

A Hybrid_geometric_model_3d is a representation of geometry that consists of a set of Detailed_geometric_model_element (see 4.2.144) objects.

A Hybrid_geometric_model_3d is a type of Geometric_model (see 4.2.238).

The data associated with a Hybrid_geometric_model_3d are the following:

— element.

The element specifies a set of Detailed_geometric_model_element objects that are part of the Hybrid_geometric_model_3d; elements of type Shell (see 4.2.451) are not allowed. In case this set is empty, the Hybrid_geometric_model_3d shall reference at least one Template_instance (see 4.2.512) as 'additional_element'.

See 4.3.952 for the application assertion.

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4.2.260 Hyperbola

A Hyperbola is one branch of an open conic section defined by its radius, imaginary radius, the centre point and the direction of the line joining the centre to the focus.

A Hyperbola is a type of Curve (see 4.2.108).

4.2.261 Included_feature

An Included_feature is the identification of a feature as an element of a shape. All geometric data defining the feature are defined in the coordinate space of the part.

An Included_feature is a type of Feature_occurrence (see 4.2.200).

The data associated with an Included_feature are the following:

— definition

The definition specifies the Feature_definition (see 4.2.199), the General_feature (see 4.2.221), the Transition_feature (see 4.2.537), or the Thread_feature (see 4.2.517) that has the information concerning the type of feature and parameters that describe the feature.

See 4.3.953, 4.3.954, 4.3.955, and 4.3.956 for the application assertions.

There shall be exactly one object that defines the definition for an Included_feature.

4.2.262 Incremental_model_change

An Incremental_model_change is a mechanism to describe the differences between two Geometric_model (see 4.2.238) or Styled_model (see 4.2.484) objects with respect to geometry, style, or presentation. An Incremental_model_change states the fact that a base model has been modified and that the modifications have been included in the base model.

NOTE - Incremental_model_change objects may be chained resulting in a hierarchical description of modifications over time.

An Incremental_model_change is a type of Model_change (see 4.2.315).

The data associated with an Incremental_model_change are the following:

— added_element;

— basis_model.

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4.2.262.1 added_element

The added_element specifies the elements that have been added during the change in a container providing the coordinate space for these distinct elements.

See 4.3.957 and 4.3.959 for the application assertions.

4.2.262.2 basis_model

The basis_model specifies the Geometric_model (see 4.2.238), Styled_model (see 4.2.484), or Incremental_model_change that is subject to the changes.

See 4.3.957, 4.3.958, and 4.3.959 for the application assertions.

There shall be exactly one object that defines the basis_model for an Incremental_model_change (see 4.2.262).

4.2.263 Initial_configuration

An Initial_configuration represents the initial values of the pair parameters of a Kinematic_mechanism (see 4.2.286).

> NOTE - Some types of kinematic structures, e.g., four bar linkages, can not be uniquely based on shape parameters, such as lengths, only to determine a unique configuration of the mechanism. In those cases an Initial_configuration object provides pair parameter information that makes the configuration unique.

The data associated with an Initial_configuration are the following:

— initial_pair_values;

— is_applied_to.

4.2.263.1 initial_pair_values

The initial_pair_values specifies the initial value of the pair parameters of one or more Kinematic_pair (see 4.2.287) objects in a Kinematic_mechanism (see 4.2.286).

See 4.3.961 for the application assertion.

4.2.263.2 is_applied_to

The is_applied_to specifies the Kinematic_mechanism (see 4.2.286) that an Initial_configuration applies to.

See 4.3.960 for the application assertion.

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4.2.264 Instance_placement

An Instance_placement is the information pertaining to the placement of a Single_instance (see 4.2.455), which is defined in its own Cartesian_coordinate_space (see 4.2.44), in the coordinate space of a reference Product_component (see 4.2.394).

NOTE - A Product_component may be placed by a transformation, using Model_property_association (see 4.2.317).

The data associated with an Instance_placement are the following:

— placed_instance;

— placement;

— reference_product_component.

4.2.264.1 placed_instance

The placed_instance specifies the Single_instance (see 4.2.455) that is placed. The coordinate system that serves as a reference for the placement shall be specified by a Model_property_association (see 4.2.317). the 'definition' of the Model_property_value (see 4.2.318) shall be a General_property (see 4.2.230) with a 'property_type' of 'positioning'.

See 4.3.964 for the application assertion.

4.2.264.2 placement

The placement specifies the Geometric_model_relationship_with_transformation (see 4.2.240) or the Template_instance (see 4.2.512) that defines the position of the 'placed_instance' relatively to the 'reference_product_component'. In the case of Template_instance, the scale shall be omitted or set to 1.0.

See 4.3.962 and 4.3.965 for the application assertions.

There shall be exactly one object that defines the placement for an Instance_placement (see 4.2.264).

4.2.264.3 reference_product_component

The reference_product_component specifies the Product_component (see 4.2.394) that specifies indirectly the reference coordinate space. A Model_property_association (see 4.2.317) shall be assigned to the reference_product_component to define this reference coordinate space.

See 4.3.963 for the application assertion.

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4.2.265 Interpolated_configuration_sequence

An Interpolated_configuration_sequence is the motion (forward analysis) of a kinematic structure, defined by a set of configuration interpolations.

The data associated with an Interpolated_configuration_sequence are the following:

— interpolation

The interpolation specifies the Kinematic_configuration_interpolation (see 4.2.280) for the Interpolated_configuration_sequence. It defines the sequence of configuration definitions and the interpolation among them.

See 4.3.966 for the application assertion.

4.2.266 Interval_of_time

An Interval_of_time specifies a period of time.

The data associated with an Interval_of_time are the following:

— end_definition;

— start_definition.

4.2.266.1 end_definition

The end_definition defines the end of the Interval_of_time, either by referring to a bound, or specifying the extend of the Interval_of_time by a Duration (see 4.2.174). If the end_definition refers to an Event_reference (see 4.2.184) or Date_time (see 4.2.119), this particular bound of the resulting interval is excluded from it.

See 4.3.967, 4.3.968, and 4.3.969 for the application assertions.

There shall be exactly one object that defines the end_definition for an Interval_of_time (see 4.2.266).

4.2.266.2 start_definition

The start_definition defines the beginning of the Interval_of_time. The bound specified by the start_definition is included in the resulting interval.

See 4.3.967 and 4.3.969 for the application assertions.

There shall be exactly one object that defines the start_definition for an Interval_of_time (see 4.2.266).

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4.2.267 Item

An Item is either a single object or a unit in a group of objects. It collects the information that is common to all versions of the object. An Item shall always be classified as 'part', 'tool', or 'raw material' using a Specific_item_classification (see 4.2.465). Additionally, if an Assembly_definition (see 4.2.27) exists for at least one version of the Item, the Item shall be classified as being an 'assembly' using Specific_-item_classification.

NOTE - An Item may be either a single piece part, an assembly of arbitrary complexity, a raw material, or a tool.

EXAMPLE In the context of cars, an Item may be the car as a whole, the assembly of the engine, the car body, a fender, the side window glass, grease, or a stamping die.

The data associated with an Item are the following:

— description;

— id;

— name.

4.2.267.1 description

The description specifies additional information about the Item.

See 4.3.970 for the application assertion.

The description need not be specified for a particular Item (see 4.2.267).

If present, there shall be exactly one object that defines the description for an Item.

4.2.267.2 id

The id specifies the identifier of the Item. For the id, an owner shall be specified by a Person_organization_assignment (see 4.2.349) with role 'id owner'. The id shall be unique within the scope of the organization that is specified by the Person_organization_assignment with the role 'id owner'.

NOTE - The scope of uniqueness is usually dependent on the form of implementation; it may be a physical file or a data base.

4.2.267.3 name

The name specifies the word or group of words used to refer to the Item.

See 4.3.970 for the application assertion.

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There shall be exactly one object that defines the name for an Item (see 4.2.267).

4.2.268 Item_definition_instance_relationship

An Item_definition_instance_relationship is a relationship between a Design_discipline_item_definition (see 4.2.142) and an Item_instance (see 4.2.271).

Except if specified in a specialization of this object, this relationship does not involve inheritance of data between the two related objects.

Each Item_definition_instance_relationship is a Collected_item_association (see 4.2.77), a Mated_item_-association (see 4.2.307), an Assembly_component_relationship (see 4.2.26), or a General_item_definition_instance_relationship (see 4.2.222).

The data associated with an Item_definition_instance_relationship are the following:

— related;

— relating.

4.2.268.1 related

The related specifies the Item_instance (see 4.2.271) that is part of the Item_definition_instance_relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_definition_instance_-relationship.

See 4.3.972 for the application assertion.

4.2.268.2 relating

The relating specifies the Design_discipline_item_definition (see 4.2.142) that is part of the Item_definition_instance_relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_definition_instance_-relationship.

See 4.3.971 for the application assertion.

4.2.269 Item_definition_relationship

An Item_definition_relationship is a relationship between two Design_discipline_item_definition (see 4.2.142) objects.

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Except if specified in a specialization of this object, this relationship does not involve inheritance of data between the two related objects.

Each Item_definition_relationship is a Tool_part_relationship (see 4.2.528), a Replaced_definition_-relationship (see 4.2.430), a Geometrical_relationship (see 4.2.247), a Make_from_relationship (see 4.2.304), or a General_item_definition_relationship (see 4.2.223).

The data associated with an Item_definition_relationship are the following:

— related;

— relating.

4.2.269.1 related

The related specifies the second of the Design_discipline_item_definition (see 4.2.142) objects that are part of the relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_definition_relationship.

See 4.3.973 for the application assertion.

4.2.269.2 relating

The relating specifies the first of the Design_discipline_item_definition (see 4.2.142) objects that are part of the relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_definition_relationship.

See 4.3.973 for the application assertion.

4.2.270 Item_function_association

An Item_function_association is a mechanism to relate a Product_function (see 4.2.397) and a Design_-discipline_item_definition (see 4.2.142).

The data associated with an Item_function_association are the following:

— associated_function;

— associated_item;

— association_type;

— description.

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4.2.270.1 associated_function

The associated_function specifies the associated Product_function (see 4.2.397).

NOTE - The semantics of this attribute are defined by the attribute association_type.

See 4.3.976 for the application assertion.

4.2.270.2 associated_item

The associated_item specifies the Design_discipline_item_definition (see 4.2.142) that is associated with the Product_function (see 4.2.397).

See 4.3.974 for the application assertion.

4.2.270.3 association_type

The association_type specifies the kind of association. Where applicable, the following values shall be used:

— 'realization': the Product_function (see 4.2.397) is the primary function of the Design_discipline_-item_definition (see 4.2.142);

— 'additional functionality': the Product_function is an additional function of the Design_discipline_-item_definition. This Design_discipline_item_definition shall have at least one primary function associated by an Item_function_association with association_type 'realization'.

4.2.270.4 description

The description specifies additional information about the Item_function_association.

See 4.3.975 for the application assertion.

The description need not be specified for a particular Item_function_association (see 4.2.270).

If present, there shall be exactly one object that defines the description for an Item_function_association.

4.2.271 Item_instance

An Item_instance is the occurrence of an object in a product structure that is defined either by a Design_-discipline_item_definition (see 4.2.142) or by a Product_identification (see 4.2.398).

An Item_instance shall be used, at least once, in a Product_structure_relationship (see 4.2.400) or in an Assembly_component_relationship (see 4.2.26).

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EXAMPLE In the case of a car, the Item (see 4.2.267) 'wheel' is defined once. Its Design_discipline_item_definition carries all the information necessary to define the wheel (e.g., its shape) independent of its usage. Additionally, there are 5 Item_instance objects for this wheel since there are 5 equal wheels used in a car: Front-left, front-right, rear-left, rear-right, and spare wheel. Each of these instances may carry additional information such as placement or function.

An Item_instance is a type of Product_constituent (see 4.2.395).

Each Item_instance is a Single_instance (see 4.2.455), a Quantified_instance (see 4.2.417), a Selected_instance (see 4.2.445), or a Specified_instance (see 4.2.472).

The data associated with an Item_instance are the following:

— definition;

— description;

— id.

4.2.271.1 definition

The definition specifies the Design_discipline_item_definition (see 4.2.142) or the Product_identification (see 4.2.398) that serves as a definition for this particular occurrence. If an appropriate Design_discipline_item_definition is available, this Design_discipline_item_definition shall be used as definition, otherwise a Product_identification shall be referenced.

See 4.3.977 and 4.3.979 for the application assertions.

There shall be exactly one object that defines the definition for an Item_instance (see 4.2.271).

4.2.271.2 description

The description specifies additional information about the Item_instance.

See 4.3.978 for the application assertion.

The description need not be specified for a particular Item_instance (see 4.2.271).

If present, there shall be exactly one object that defines the description for an Item_instance.

4.2.271.3 id

The id specifies the identifier of the Item_instance.

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4.2.272 Item_instance_relationship

An Item_instance_relationship is a relationship between two Item_instance (see 4.2.271) objects.

Except if specified in a specialization of this object, this relationship does not involve inheritance of data between the two related objects.

Each Item_instance_relationship is a General_item_instance_relationship (see 4.2.224), a Same_time_-machining_relationship (see 4.2.442), or a Replaced_usage_relationship (see 4.2.431).

The data associated with an Item_instance_relationship are the following:

— related;

— relating.

4.2.272.1 related

The related specifies the second of the two objects related by the Item_instance_relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_instance_relationship.

See 4.3.980 for the application assertion.

4.2.272.2 relating

The relating specifies the first of the two objects related by the Item_instance_relationship.

NOTE - The semantics of this attribute are defined by the specializations of Item_instance_relationship.

See 4.3.980 for the application assertion.

4.2.273 Item_property_association

An Item_property_association is a mechanism to associate a property value with an object.

An Item_property_association is a type of Property_value_association (see 4.2.413).

The data associated with an Item_property_association are the following:

— definitional;

— described_element.

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4.2.273.1 definitional

The definitional specifies whether the associated Property_value_representation (see 4.2.414) object may be used to distinguish the described_element from others of the same kind. A value of 'true' indicates that the associated Property_value_representation distinguishes it from others.

The definitional is only meaningful, if the described_element is of type Catalogue_thread (see 4.2.48) or of type Design_discipline_item_definition (see 4.2.142).

The definitional need not be specified for a particular Item_property_association (see 4.2.273).

4.2.273.2 described_element

The described_element specifies the object that is characterized by the Property_value (see 4.2.412).

See 4.3.981, 4.3.982, 4.3.983, 4.3.984, 4.3.985, 4.3.986, 4.3.987, 4.3.988, 4.3.989, 4.3.990, 4.3.991, 4.3.992, 4.3.993, 4.3.994, 4.3.995, 4.3.996, 4.3.997, 4.3.998, 4.3.999, and 4.3.1000 for the application assertions.

There shall be exactly one object that defines the described_element for an Item_property_association (see 4.2.273).

4.2.274 Item_shape

An Item_shape is the definition of the shape of a Design_discipline_item_definition (see 4.2.142), an Item_instance (see 4.2.271) or of a Physical_instance (see 4.2.352).

> EXAMPLE An Item_shape may define the shape of an Item_instance in a given usage context, e.g., in order to define the shape of a flexible pipe when placed in a car.

Each Item_shape may be a Featured_shape (see 4.2.203).

The data associated with an Item_shape are the following:

— described_object;

— description.

4.2.274.1 described_object

The described_object specifies the object whose shape the Item_shape defines.

See 4.3.1001, 4.3.1002, and 4.3.1004 for the application assertions.

There shall be exactly one object that defines the described_object for an Item_shape (see 4.2.274).

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4.2.274.2 description

The description specifies additional information about the Item_shape.

See 4.3.1003 for the application assertion.

The description need not be specified for a particular Item_shape (see 4.2.274).

If present, there shall be exactly one object that defines the description for an Item_shape.

4.2.275 Item_version

An Item_version is a version of an Item (see 4.2.267) and serves as the collector of the data characterizing a physically realizable object in various application contexts.

NOTE 1 - An Item_version may be produced, consumed, used to produce other Item_version objects, or offered to the market.

NOTE 2 - The collection of defining information may be incomplete, i.e., not all of the Design_discipline_item_definition (see 4.2.142) objects needed to define an Item_version are associated with the Item_version.

NOTE 3 - The set of Item_version objects of an Item represents the history of the Item within a particular life cycle stage or over its complete life cycle.

NOTE 4 - An Item_version does not have to be referenced by any Design_discipline_item_definition.

NOTE 5 - In the case, where two Item_version objects are related to each other by an Item_version_relationship (see 4.2.276) with a relation_type of value 'supplied part', the relating Item_version is the version carrying the necessary information, e.g., shape and properties, and the related is the version either supplied by or supplied for another company.

The data associated with an Item_version are the following:

— associated_item;

— description;

— id.

4.2.275.1 associated_item

The associated_item specifies the Item (see 4.2.267) with which the Item_version is associated.

See 4.3.1005 for the application assertion.

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4.2.275.2 description

The description specifies additional information about the Item_version.

See 4.3.1006 for the application assertion.

The description need not be specified for a particular Item_version (see 4.2.275).

If present, there shall be exactly one object that defines the description for an Item_version.

4.2.275.3 id

The id specifies the identifier of the Item_version. The id shall be unique within the scope of the associated Item (see 4.2.267).

NOTE - A particular object is identified by the id of Item_version that serves to identify the particular version coupled with the id of the associated Item that serves to identify the generic object.

4.2.276 Item_version_relationship

An Item_version_relationship is a relationship between two Item_version (see 4.2.275) objects.

Except if specified in a specialization of this object, this relationship does not involve inheritance of data between the two related objects.

The data associated with an Item_version_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.276.1 description

The description specifies additional information about the Item_version_relationship (see 4.2.276).

See 4.3.1008 for the application assertion.

The description need not be specified for a particular Item_version_relationship.

If present, there shall be exactly one object that defines the description for an Item_version_relationship.

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4.2.276.2 related

The related specifies the second of the two Item_version (see 4.2.275) objects related by the Item_version_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1007 for the application assertion.

4.2.276.3 relating

The relating specifies the first of the two Item_version (see 4.2.275) objects related by the Item_version_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1007 for the application assertion.

4.2.276.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'derivation': The application object defines a deriving relationship where the related Item_version (see 4.2.275) is based on the relating Item_version which is an earlier version of the same or of a different Item (see 4.2.267);

— 'hierarchy': The application object defines a hierarchical relationship where the related Item_version is a subordinate version of the relating Item_version;

EXAMPLE 1 'Rev. 1.1' and 'rev. 1.2' are subordinates of 'version 1'.

— 'sequence': The application object defines a version sequence where the relating Item_version is the preceding version of the related Item_version that is the following version. For a given Item_version there shall be at most one Item_version_relationship of this relation_type referring to this Item_version as 'relating' and at most one Item_version_relationship of this relation_type referring as 'related';

— 'supplied item': The application object defines a relationship between two Item_version objects representing the same object in different organizational contexts.

NOTE 1 - The different organizational contexts can be represented by different general organizational data associations.

NOTE 2 - The concept of Alias_identification (see 4.2.8) may also be used for Item_version. However, Item_version_relationship shall be used if the related Item_version corresponds to an item at the supplier's site and if a distinction of additional information such as name or organizational information is needed.

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EXAMPLE 2 Usually, items that are provided by suppliers have at the supplier's site an id different from the one at the contractor's site: an item that is identified in a company by the identifier 'C425' and the version id 'V2.0' may correspond to the item that the supplier identifies as '2X45' with the version id 'V3.2'.

4.2.277 Joggle_feature

A Joggle_feature is a change in elevation of a face along a rim designed to accommodate either clearance for the insertion of another part or a contact point for attachment of another part.

EXAMPLE Figure 46 illustrates the meaning of the various parameters defining a Joggle_feature.

A Joggle_feature is a type of Process_feature_in_panel (see 4.2.379).

The data associated with a Joggle_feature are the following:

— base_radius_1;

— base_radius_2;

— defining_path;

— direction_angle_1;

— direction_angle_2;

— height;

— slope_angle_1;

— slope_angle_2;

— termination;

— top_radius_1;

— top_radius_2.

4.2.277.1 base_radius_1

The base_radius_1 specifies the radius of the blending between the base surface and that wall of the Joggle_feature that is specified by the start point of the defining path.

See 4.3.1009 for the application assertion.

The base_radius_1 need not be specified for a particular Joggle_feature (see 4.2.277).

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4.2.277.2 base_radius_2

The base_radius_2 specifies the radius of the blending between the base surface and that wall of the Joggle_feature that is specified by the end point of the defining path.

See 4.3.1009 for the application assertion.

The base_radius_2 need not be specified for a particular Joggle_feature (see 4.2.277).

4.2.277.3 defining_path

The defining_path specifies the Linear_path (see 4.2.300) whose start and end point in combination with the angles at path start and path end define the location and orientation of the side walls of the Joggle_-feature.

The Linear_path is be defined in the same Cartesian_coordinate_space (see 4.2.44) as the Joggle_feature and shall be coplanar with the panel.

See 4.3.1011 for the application assertion.

4.2.277.4 direction_angle_1

The direction_angle_1 specifies an angle between 0 degrees and 90 degrees that is measured between the Linear_path (see 4.2.300) and a line starting at the start point of the Linear_path. This line is being directed towards the rim of the panel that shall have the Joggle_feature. This line shall be coplanar with the panel, with the Linear_path and with one side wall of the Joggle_feature.

See 4.3.1009 for the application assertion.

4.2.277.5 direction_angle_2

The direction_angle_2 specifies an angle between 0 degrees and 90 degrees that is measured between the Linear_path (see 4.2.300) and a line starting at the end point of the Linear_path. This line is being directed towards the rim of the panel that shall have the Joggle_feature. This line shall be coplanar with the panel, with the Linear_path and with one side wall of the Joggle_feature.

See 4.3.1009 for the application assertion.

4.2.277.6 height

The height specifies the distance between the panel surface and the top face of the Joggle_feature.

See 4.3.1009 for the application assertion.

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4.2.277.7 slope_angle_1

The slope_angle_1 specifies the slope angle of that side wall of the Joggle_feature that is defined by the line starting at the start of the Linear_path (see 4.2.300).

See 4.3.1009 for the application assertion.

4.2.277.8 slope_angle_2

The slope_angle_2 specifies the slope angle of that side wall of the Joggle_feature that is defined by the line starting at the end of the Linear_path (see 4.2.300).

See 4.3.1009 for the application assertion.

4.2.277.9 termination

The termination specifies the type of Joggle_termination (see 4.2.278) that defines the end condition of the Joggle_feature.

See 4.3.1010 for the application assertion.

4.2.277.10 top_radius_1

The top_radius_1 specifies the radius of the blending between the top surface and that wall of the Joggle_-feature that is specified by the start point of the defining path.

See 4.3.1009 for the application assertion.

The top_radius_1 need not be specified for a particular Joggle_feature (see 4.2.277).

4.2.277.11 top_radius_2

The top_radius_2 specifies the radius of the blending between the top surface and that wall of the Joggle_-feature that is specified by the end point of the defining path.

See 4.3.1009 for the application assertion.

The top_radius_2 need not be specified for a particular Joggle_feature (see 4.2.277).

4.2.278 Joggle_termination

A Joggle_termination is the end condition specifying the termination of a Joggle_feature (see 4.2.277).

Each Joggle_termination is a Face_termination (see 4.2.193) or a Value_termination (see 4.2.548).

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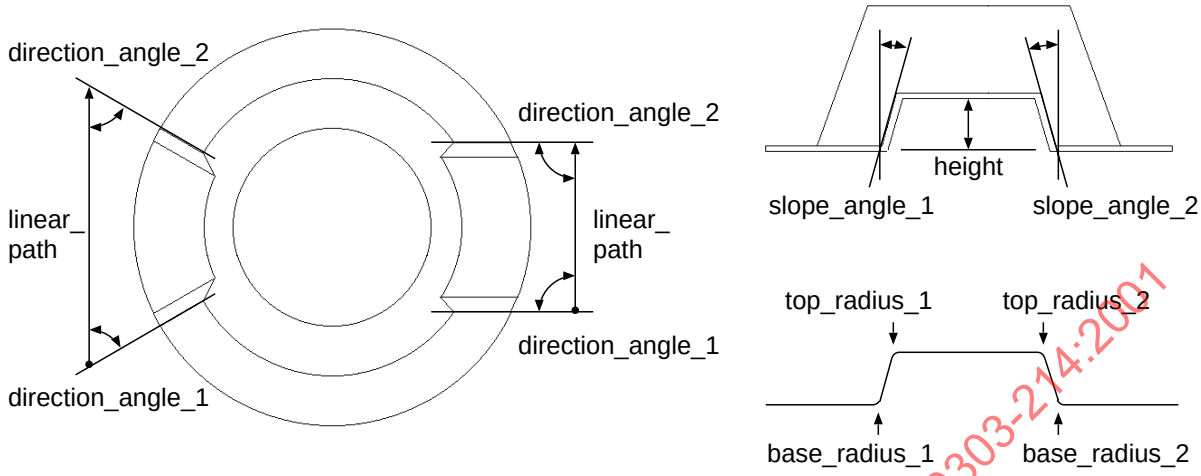


Figure 46 – Parameters defining a Joggle_feature

4.2.279 Kinematic_configuration_definition

A Kinematic_configuration_definition is a configuration of a kinematic structure. It is defined by a set of values assigned to the kinematic pairs and by the value of a parameter that enables to locate the configuration in the parameter range that is studied in the kinematic simulation.

The data associated with a Kinematic_configuration_definition are the following:

— pair_values;

— t_parameter.

4.2.279.1 pair_values

The pair_values specifies the set of values applied to the pairs.

See 4.3.1012 for the application assertion.

4.2.279.2 t_parameter

The t_parameter specifies the Path_approximation (see 4.2.343) associated to the Kinematic_configuration_definition.

See 4.3.1013 for the application assertion.

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4.2.280 Kinematic_configuration_interpolation

A Kinematic_configuration_interpolation is the specification of the interpolation of the configurations between two configuration definitions.

The data associated with a Kinematic_configuration_interpolation are the following:

— interpolation_type;

— next_definition;

— previous_definition.

4.2.280.1 interpolation_type

The interpolation_type specifies the type of interpolation from the previous configuration definition to the next.

4.2.280.2 next_definition

The next_definition specifies the Kinematic_configuration_definition (see 4.2.279) at which the interpolation ends.

See 4.3.1014 for the application assertion.

4.2.280.3 previous_definition

The previous_definition specifies the Kinematic_configuration_definition (see 4.2.279) from which the interpolation starts.

See 4.3.1014 for the application assertion.

4.2.281 Kinematic_control

A Kinematic_control is the control information that is necessary for the analysis of a Kinematic_transformation_result (see 4.2.290).

The data associated with a Kinematic_control are the following:

— is_controlling;

— program;

— related_result.

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4.2.281.1 is_controlling

The is_controlling specifies the Kinematic_mechanism (see 4.2.286) to which the control information applies.

See 4.3.1016 for the application assertion.

4.2.281.2 program

The program specifies the set of motion definitions, i.e., the list of pre-defined states of the kinematic structure and the allowed interpolations between each state.

See 4.3.1015 for the application assertion.

4.2.281.3 related_result

The related_result specifies the set of Kinematic_transformation_result (see 4.2.290) objects for which the Kinematic_control serves as input.

See 4.3.1017 for the application assertion.

4.2.282 Kinematic_element

A Kinematic_element is a basic element used for a Kinematic_mechanism (see 4.2.286).

Each Kinematic_element is a Kinematic_link (see 4.2.284), a Kinematic_structure (see 4.2.289), a Kinematic_joint (see 4.2.283), or a Kinematic_pair (see 4.2.287).

The data associated with a Kinematic_element are the following:

— name

The name specifies the word or group of words by which the Kinematic_element is referred to.

See 4.3.1018 for the application assertion.

The name need not be specified for a particular Kinematic_element.

If present, there shall be exactly one object that defines the name for a Kinematic_element.

4.2.283 Kinematic_joint

A Kinematic_joint is the topological aspect of an ordered connection between exactly two links. The orientation is always implicitly associated with a joint. This orientation points from the first link to the second link.

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EXAMPLE In the case of a rack and pinion pair, the orientation of the Kinematic_joint would reflect the transformation to a link representing the pinion.

A Kinematic_joint is a type of Kinematic_element (see 4.2.282).

The data associated with a Kinematic_joint are the following:

— first_link;

— pair;

— second_link.

4.2.283.1 first_link

The first_link specifies the first link of the ordered connection at the Kinematic_joint.

See 4.3.1019 for the application assertion.

4.2.283.2 pair

The pair specifies the geometric constraints of the Kinematic_joint (see 4.2.283).

See 4.3.1020 for the application assertion.

4.2.283.3 second_link

The second_link specifies the second link of the ordered connection at the Kinematic_joint.

See 4.3.1019 for the application assertion.

4.2.284 Kinematic_link

A Kinematic_link is the topological information associated with a rigid part of a Kinematic_mechanism (see 4.2.286).

A Kinematic_link is a type of Kinematic_element (see 4.2.282).

The data associated with a Kinematic_link are the following:

— representation

The representation specifies the geometric representation and the implicit link frame of the Kinematic_-link.

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See 4.3.1021 for the application assertion.

4.2.285 Kinematic_link_representation

A Kinematic_link_representation is the description of the geometry of a Kinematic_link (see 4.2.284).

The data associated with a Kinematic_link_representation are the following:

— additional_reference_frame;

— physical_description.

4.2.285.1 additional_reference_frame

The additional_reference_frame specifies additional frames that are attached to the Kinematic_link_-representation.

See 4.3.1023 for the application assertion.

4.2.285.2 physical_description

The physical_description specifies the representation of the shape of the Kinematic_link_representation (see 4.2.285).

See 4.3.1022 for the application assertion.

4.2.286 Kinematic_mechanism

A Kinematic_mechanism is an association of a Kinematic_structure (see 4.2.289) and the position of this Kinematic_structure relative to the reference coordinate system of the parent object. A Kinematic_-mechanism describes a mechanical product whose motion is constrained by joints.

The data associated with a Kinematic_mechanism are the following:

— base_link;

— base_placement;

— structure_definition.

4.2.286.1 base_link

The base_link specifies the Kinematic_link (see 4.2.284) relative to that all the other Kinematic_link objects may move. The link may be a part of another Kinematic_mechanism.

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EXAMPLE 1 A gripping tool attached to the end of a robot arm is an example for base_link.

This does not mean that Kinematic_mechanism objects are limited to those which have the same base at all times.

EXAMPLE 2 In space applications, e.g., worm-like mechanisms have been designed that grab to a space-structure with one end, move on with the other end, fix themselves with an end-effector, and then loosen the original grip.

See 4.3.1024 for the application assertion.

4.2.286.2 base_placement

The base_placement describes the rigid placement of the link frame of the base relative to the reference coordinate system of the parent object of the mechanism.

See 4.3.1026 for the application assertion.

4.2.286.3 structure_definition

The structure_definition specifies the Kinematic_structure (see 4.2.289) that makes up the Kinematic_-mechanism.

See 4.3.1025 for the application assertion.

4.2.287 Kinematic_pair

A Kinematic_pair represents the kinematic restriction between two adjacent Kinematic_link (see 4.2.284) objects coinciding in a Kinematic_joint (see 4.2.283).

EXAMPLE Figure 47 shows an example for placement relationships between kinematic pair frames and mating links.

A Kinematic_pair is a type of Kinematic_element (see 4.2.282).

The data associated with a Kinematic_pair are the following:

— pair_type;

— transformation_item_1;

— transformation_item_2.

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4.2.287.1 pair_type

The pair_type specifies the kind of Kinematic_pair. Where applicable, the following values shall be used:

— ’cylindrical pair’: A cylindrical pair constrains the motion between two adjacent links to a translation along a common axis and a rotation about it;

— ’fully constrained pair’: A fully constrained pair prevents any relative motion between two adjacent links;

— ’gear pair’: A gear pair constrains the motion between two adjacent links to a rolling (and potentially sliding) motion of the second link along the first link;

— ’homokinetic pair’: A homokinetic pair constrains the motion between two adjacent links to two rotations about two intersecting axes. The first rotation is split into two rotations of the half-angle, one being performed before the second rotation and the remaining one after.

NOTE 1 - Three successive rotations are actually performed, but the first one and the third one being coupled, there are only two degrees of freedom.

NOTE 2 - If compared to a universal pair, a homokinetic pair differs by the fact that no reference to a ’skew angle’ is needed.

NOTE 3 - The arbitrary orientation of axes Z and X about Y is another difference with a universal pair for which the orientation of Z and X axes about the Y axes of each of the links is imposed by the physical joint. The reason for this difference is that, while a universal pair transmits a rotation movement with a modulation depending on the angular misalignment of the Y-axes of the links and on the current orientation of the Z- and X- axes about the Y-axes, a homokinetic pair transmits the rotation movement without any modulation. Thus, the description of the homokinetic_pair needs no information about the orientation of any ’physical’ Z- or X- axis.

The orientation of the Z and X axes about the Y axis is arbitrary;

— ’planar curve pair’: A planar curve pair constrains the motion of two links along a planar curve on each of the links;

— ’planar pair’: A planar pair constrains the motion between two adjacent links to a translation along the x-axis and y-axis and a rotation about the z-axis;

— ’point on planar curve pair’: A point on planar curve pair specifies the lower bound and the upper bound of the parameter range for the point on planar curve pair;

— ’point on surface pair’: A point on surface pair constrains the motion of two links such that a point defined on the second link always lies on a surface defined on the first link;

— ’prismatic pair’: A prismatic pair constrains the motion between two adjacent links to a translation along a common axis;

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— 'rack and pinion pair': A rack and pinion pair describes a pinion rolling on a rack where the rotation axis of the pinion is perpendicular to the direction of the rack;

— 'revolute pair': A revolute pair constrains the motion between two adjacent links to a rotation about a common axis;

— 'rolling curve pair': A rolling curve pair specifies the rolling motion between the curves on the two links of a planar curve pair;

— 'rolling surface pair': A rolling surface pair specifies the rolling motion between the two contact surfaces of a surface pair;

— 'screw pair': A screw pair constrains the motion between two adjacent links to a rotation about, and translation along, a common axis, where the translation is proportional to the rotation;

— 'sliding curve pair': A sliding curve pair specifies the sliding motion between the curves on the two links of a planar curve pair;

— 'sliding surface pair': A sliding surface pair specifies the sliding motion between the two contact surfaces of a surface pair;

— 'spherical pair': A spherical pair constrains the motion between two adjacent links to the rotation about three independent axes that intersect in a common point;

— 'surface pair': A surface pair constrains the motion of two links along a surface on each of the links such that they always have contact in at least one common point (contact point);

— 'unconstrained pair': An unconstrained pair does not constrain the relative motion between two adjacent links;

— 'universal pair': An universal pair constrains the motion between two adjacent links to two rotations about two intersecting axes.

4.2.287.2 transformation_item_1

The transformation_item_1 specifies the rigid placement of the pair frame on the first Kinematic_link (see 4.2.284) referenced by the Kinematic_joint (see 4.2.283) associated with the Kinematic_pair.

See 4.3.1027 for the application assertion.

4.2.287.3 transformation_item_2

The transformation_item_2 specifies the rigid placement of the pair frame on the second Kinematic_link (see 4.2.284) referenced by the Kinematic_joint (see 4.2.283) associated with the Kinematic_pair.

See 4.3.1027 for the application assertion.

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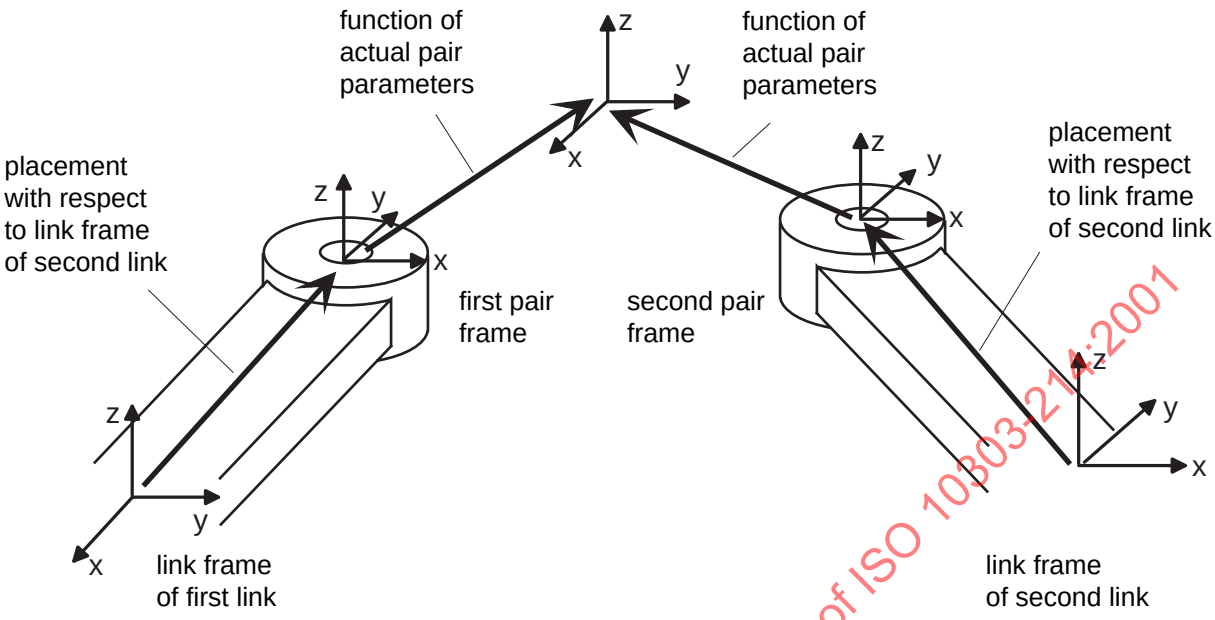


Figure 47 – Placement relationships kinematic pair frames and mating links

4.2.288 Kinematic_simulation_information

A Kinematic_simulation_information is the set of information describing the properties of an object that are related to kinematics.

The data associated with a Kinematic_simulation_information are the following:

— described_element;

— description;

— ground;

— mechanism.

4.2.288.1 described_element

The described_element specifies the set of objects to which the Kinematic_simulation_information belongs.

See 4.3.1028, 4.3.1029, 4.3.1031, 4.3.1032, 4.3.1033, 4.3.1034, 4.3.1037, and 4.3.1038 for the application assertions.

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There shall be at least one object that defines the described_element for a Kinematic_simulation_information (see 4.2.288).

4.2.288.2 description

The description specifies additional information about the Kinematic_simulation_information.

See 4.3.1036 for the application assertion.

The description need not be specified for a particular Kinematic_simulation_information (see 4.2.288).

If present, there shall be exactly one object that defines the description for a Kinematic_simulation_information.

4.2.288.3 ground

The ground specifies the environment with the coordinate space that is the reference for the kinematic data.

NOTE - A geometric description of those parts of a kinematic structure that are immobile may also be part of the ground representation.

See 4.3.1030 for the application assertion.

4.2.288.4 mechanism

The mechanism specifies the Kinematic_mechanism (see 4.2.286) objects that are part of the Kinematic_simulation_information.

See 4.3.1035 for the application assertion.

4.2.289 Kinematic_structure

A Kinematic_structure specifies the topological aspects of a kinematic representation. The topology of the Kinematic_structure is represented by means of kinematic joints, which in turn, establish a relationship between pairs of kinematic links.

A Kinematic_structure is a type of Kinematic_element (see 4.2.282).

The data associated with a Kinematic_structure are the following:

— joint

The joint specifies the set of Kinematic_joint (see 4.2.283) objects that participate in the Kinematic_structure.

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See 4.3.1039 for the application assertion.

4.2.290 Kinematic_transformation_result

A Kinematic_transformation_result is the result information of a kinematic simulation of a kinematic mechanism.

The data associated with a Kinematic_transformation_result are the following:

— is_applied_to;

— result.

4.2.290.1 is_applied_to

The is_applied_to specifies the mechanism whose motion produced the results.

See 4.3.1041 for the application assertion.

4.2.290.2 result

The result specifies the result information of the Kinematic_transformation_result. The result is represented by a set of Interpolated_configuration_sequence (see 4.2.265) objects that define the motion of a kinematic structure through interpolations.

See 4.3.1040 for the application assertion.

4.2.291 Language

A Language is a specification of the language in which an information is given.

The data associated with a Language are the following:

— country_code;

— language_code.

4.2.291.1 country_code

The country_code specifies the country, as addition to the language, according to the alpha-2 code specified in ISO 3166-1.

EXAMPLE Possible values for country_code are, e.g., 'GB' for the United Kingdom or 'US' for the United States of America.

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The country_code need not be specified for a particular Language (see 4.2.291).

4.2.291.2 language_code

The language_code specifies the language of the text information in the Alpha-3 bibliographic code specified in ISO 639-2.

EXAMPLE Possible values for language_code are, e.g., 'eng' for English, 'fre' for French, 'rus' for Russian, or 'ger' for German.

4.2.292 Layer

A Layer is a general structure for the collection of geometric and annotation elements. Layers shall not be nested, i.e., a layer shall not be an element of another layer.

EXAMPLE The design of a mechanical part as a B_rep_model (see 4.2.35) is performed in several steps:

— creation of wireframe elements;

— use the wireframe elements to design the surfaces;

— use the surfaces to design the B_rep_model.

The elements created in each stage are put on separate layers. After the creation of the B_rep_model, the wireframe elements can be looked at as 'auxiliary geometry'. This is then the purpose of its layer. The visibility control of the layer is usually used to display only the B_rep_model or to display the auxiliary wireframe elements in addition, e.g., for design changes.

The data associated with a Layer are the following:

— description;

— element;

— id.

4.2.292.1 description

The description specifies additional information about the Layer.

See 4.3.1043 for the application assertion.

The description need not be specified for a particular Layer (see 4.2.292).

If present, there shall be exactly one object that defines the description for a Layer.

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4.2.292.2 element

The element specifies a piece of product data that is collected by a Layer.

NOTE - Although not explicitly modelled in the ARM, the element can be on various levels of granularity, e.g., a whole B-rep-model or a single Cartesian point.

See 4.3.1042 for the application assertion.

4.2.292.3 id

The id specifies the identifier of the Layer.

4.2.293 Leader

A Leader directs a dimension, a note, or a symbol to the intended place on an element of geometry or annotation.

A Leader is a type of Annotation_curve (see 4.2.16).

Each Leader may be an Associated_leader (see 4.2.31).

The data associated with a Leader are the following:

— terminator

The terminator specifies a list of annotation symbols that are applied to a leader and used to identify the end point or point of application of the directed annotation.

See 4.3.1044 for the application assertion.

The terminator need not be specified for a particular Leader.

4.2.294 Light_source

A Light_source is a luminous source that affects the display of surfaces within a defined Model_image (see 4.2.316).

The position of the Light_source, if specified, is defined in the coordinate space of the presented model.

The data associated with a Light_source are the following:

— colour;

— is_defined_for;

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— light_type.

4.2.294.1 colour

The colour specifies the colour of a light source that is defined by the intensities of red, green, and blue proportions. The colour is either user-defined or pre-defined. Figure 24 shows the pre-defined colours.

The colour need not be specified for a particular Light_source (see 4.2.294).

4.2.294.2 is_defined_for

The is_defined_for specifies the set of Model_image (see 4.2.316) objects that the Light_source is applied to.

See 4.3.1045 for the application assertion.

4.2.294.3 light_type

The light_type specifies the kind of Light_source.

NOTE - Position and attenuation as well as additional characteristics of the Light_source are specified dependent on the kind of Light_source.

EXAMPLE 'directional', 'positional', 'spot light', or 'ambient' are examples of the light_type.

4.2.295 Limits_and_fits

A Limits_and_fits contains the necessary information to express a tolerance of the limits-and-fits system standardized by ISO 286.

The data associated with a Limits_and_fits are the following:

— deviation;

— fitting_type;

— grade.

4.2.295.1 deviation

The deviation specifies the enumeration of limits and fits class descriptors by characters.

NOTE - The characters 'A' to 'ZC' for holes or 'a' to 'zc' for shafts may be used for deviation.

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4.2.295.2 fitting_type

The fitting_type specifies whether the tolerance declaration applies to a shaft or to a hole.

The fitting_type need not be specified for a particular Limits_and_fits (see 4.2.295).

4.2.295.3 grade

The grade specifies the quality or the accuracy grade of a tolerance.

NOTE - The grade is based on the international standard tolerance grades IT01 to IT18.

4.2.296 Line

A Line is an unbounded curve that is defined by a point and a vector. The positive direction of the line is in the direction of the vector and the magnitude of the vector controls the parametrization.

A Line is a type of Curve (see 4.2.108).

4.2.297 Line_profile_tolerance

A Line_profile_tolerance is the definition of a uniform boundary along the true profile within which the elements of the surface must lie. The tolerance zone established by a Line_profile_tolerance is two dimensional.

A Line_profile_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Line_profile_tolerance are the following:

— affected_plane;

— reference_datum.

4.2.297.1 affected_plane

The affected_plane specifies the plane in which the tolerance applies.

This attribute covers information that is given on drawings implicitly by the drawing plane. If the affected_plane is not specified, the tolerance applies in all directions (on drawings indicated by the diameter symbol).

See 4.3.1047 for the application assertion.

The affected_plane need not be specified for a particular Line_profile_tolerance (see 4.2.297).

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4.2.297.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1046 for the application assertion.

4.2.298 Linear_bead_end_type

A Linear_bead_end_type is an end condition of a Bead_feature (see 4.2.39) that shall follow a linear path out of the material.

A Linear_bead_end_type is a type of Bead_end_type (see 4.2.38).

The data associated with a Linear_bead_end_type are the following:

— end_length;

— end_shape.

4.2.298.1 end_length

The end_length specifies the length of the Linear_bead_end_type.

4.2.298.2 end_shape

The end_shape specifies the shape of the Linear_bead_end_type. The following values shall be used:

— 'straight': The linear bead end is straight on the panel surface;

— 'tapered': The linear bead end is tapered towards the end point.

4.2.299 Linear_distance_dimension

A Linear_distance_dimension is the dimension of a distance calculated between two elements along a straight line.

A Linear_distance_dimension is a type of Location_dimension (see 4.2.301).

The data associated with a Linear_distance_dimension are the following:

— directed;

— orientation.

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4.2.299.1 directed

The directed specifies a Boolean value designating the importance of direction for measuring a Linear_distance_dimension. If the value is 'true' the Linear_distance_dimension is measured from origin to target. A value of 'false' indicates that the direction for measuring Linear_distance_dimension is inconsequential.

NOTE - This value may be used to indicate the sense of measurement of the distance to be privileged during metrology checks.

4.2.299.2 orientation

The orientation specifies a point and a direction along which the Linear_distance_dimension is measured.

The orientation need not be specified for a particular Linear_distance_dimension (see 4.2.299).

4.2.300 Linear_path

A Linear_path is a direction of travel along a line. The x-y-plane of the inherited Axis_placement (see 4.2.33) is normal to the line, and the Axis_placement is located in the start point of the line.

EXAMPLE Figure 48 illustrates a Linear_path.

A Linear_path is a type of Path (see 4.2.342).

The data associated with a Linear_path are the following:

— distance

The distance specifies the length of the Linear_path.

See 4.3.1048 for the application assertion.

4.2.301 Location_dimension

A Location_dimension is the dimension of the distance between two elements (origin and target).

A Location_dimension is a type of Geometric_dimension (see 4.2.237).

Each Location_dimension is a Curved_distance_dimension (see 4.2.113), a Linear_distance_dimension (see 4.2.299), or an Angular_location_dimension (see 4.2.13).

The data associated with a Location_dimension are the following:

— description;

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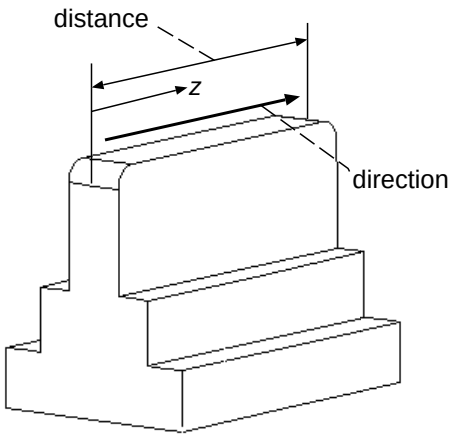


Figure 48 – Definition of a Linear_path

— origin;

— target.

4.2.301.1 description

The description specifies additional information about the Location_dimension.

See 4.3.1052 for the application assertion.

The description need not be specified for a particular Location_dimension (see 4.2.301).

If present, there shall be exactly one object that defines the description for a Location_dimension.

4.2.301.2 origin

The origin specifies the geometric or annotation element that is the origin for the Location_dimension.

See 4.3.1049, 4.3.1050, 4.3.1051, and 4.3.1053 for the application assertions.

There shall be exactly one object that defines the origin for a Location_dimension (see 4.2.301).

4.2.301.3 target

The target specifies the geometric or annotation element that is the target for the Location_dimension.

See 4.3.1049, 4.3.1050, 4.3.1051, and 4.3.1053 for the application assertions.

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There shall be exactly one object that defines the target for a Location_dimension (see 4.2.301).

4.2.302 Locator_feature

A Locator_feature is a conical impression in a panel as shown in figure 49 used to locate the panel in the tooling.

NOTE - Locator_feature objects are usually created in early die strikes for further stamping.

A Locator_feature is a type of Process_feature_in_panel (see 4.2.379).

The data associated with a Locator_feature are the following:

— base_radius;

— diameter;

— tip_angle;

— tip_radius.

4.2.302.1 base_radius

The base_radius specifies the radius of the blending between the panel surface and the wall of the Locator_feature.

See 4.3.1054 for the application assertion.

The base_radius need not be specified for a particular Locator_feature (see 4.2.302).

4.2.302.2 diameter

The diameter specifies the diameter of the cone on the panel's surface.

See 4.3.1054 for the application assertion.

4.2.302.3 tip_angle

The tip_angle specifies the opening angle of the cone.

See 4.3.1054 for the application assertion.

4.2.302.4 tip_radius

The tip_radius specifies the radius of the rounded cone tip.

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See 4.3.1054 for the application assertion.

The tip_radius need not be specified for a particular Locator_feature (see 4.2.302).

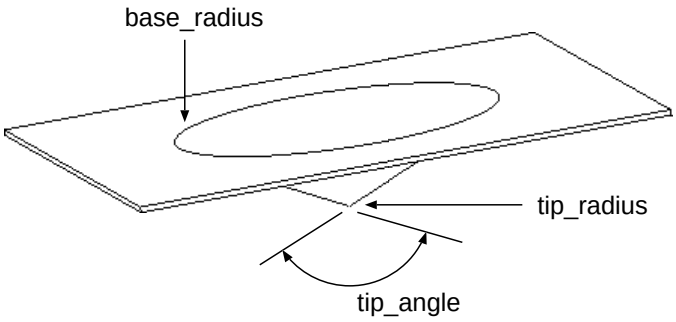


Figure 49 – Parameters defining a Locator_feature

4.2.303 Lot_configuration

A Lot_configuration is a Manufacturing_configuration (see 4.2.305) that applies to a given production batch of the product that is related with the object referred to as 'is_solution_for'.

A Lot_configuration is a type of Manufacturing_configuration (see 4.2.305).

The data associated with a Lot_configuration are the following:

— lot_id;

— lot_size.

4.2.303.1 lot_id

The lot_id specifies the identification of the batch for which the Lot_configuration applies.

4.2.303.2 lot_size

The lot_size specifies the size of the batch for which the Lot_configuration applies.

4.2.304 Make_from_relationship

A Make_from_relationship is a relationship between a Design_discipline_item_definition (see 4.2.142) which provides the definition of a raw material, or of a semi-finished item and a Design_discipline_-item_definition which provides the definition of an object manufactured out of that material, or semi-finished item. The inherited attribute 'related' specifies the raw material or the semi-finished item, and the inherited attribute 'relating' specifies the manufactured item.

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A Make_from_relationship is a type of Item_definition_relationship (see 4.2.269).

The data associated with a Make_from_relationship are the following:

— description

The description specifies additional information about the Make_from_relationship.

See 4.3.1055 for the application assertion.

The description need not be specified for a particular Make_from_relationship.

If present, there shall be exactly one object that defines the description for a Make_from_relationship.

4.2.305 Manufacturing_configuration

A Manufacturing_configuration is the association of a Product_design (see 4.2.396) with an Item_instance (see 4.2.271).

Each Manufacturing_configuration is a Serial_configuration (see 4.2.446), a Dated_configuration (see 4.2.122), or a Lot_configuration (see 4.2.303).

The data associated with a Manufacturing_configuration are the following:

— concerned_organization;

— configured_element;

— is_solution_for.

4.2.305.1 concerned_organization

The concerned_organization specifies the Organization (see 4.2.331) in which the Manufacturing_configuration is valid. The case where the concerned_organization is an empty set means that the Manufacturing_configuration regards any organization that may consider the 'configured_element'.

See 4.3.1057 for the application assertion.

4.2.305.2 configured_element

The configured_element specifies an Item_instance (see 4.2.271) that is controlled by a Manufacturing_configuration.

See 4.3.1056 for the application assertion.

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4.2.305.3 is_solution_for

The is_solution_for specifies the design for which an Item_instance (see 4.2.271) is configured.

See 4.3.1058 for the application assertion.

4.2.306 Mass_property

A Mass_property is a quantity of matter that an object consists of.

A Mass_property is a type of Property (see 4.2.409).

4.2.307 Mated_item_association

A Mated_item_association is a relationship between a Mating_definition (see 4.2.313) and an Item_instance (see 4.2.271) that is used within the Mating_definition.

A Mated_item_association is a type of Item_definition_instance_relationship (see 4.2.268).

The data associated with a Mated_item_association are the following:

— placement;

— relating.

4.2.307.1 placement

The placement specifies the Geometric_model_relationship_with_transformation (see 4.2.240) or the Template_instance (see 4.2.512) that conveys the Transformation (see 4.2.533) information. This Transformation is used to locate and to orient the constituent in the coordinate space of the Mating_definition (see 4.2.313). In the case of a Template_instance, the scale factor shall be omitted or set to 1.0.

See 4.3.1059 and 4.3.1061 for the application assertions.

The placement need not be specified for a particular Mated_item_association (see 4.2.307).

If present, there shall be exactly one object that defines the placement for a Mated_item_association.

4.2.307.2 relating

The relating specifies the Mating_definition (see 4.2.313) that is the result of the mating operation.

See 4.3.1060 for the application assertion.

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4.2.308 Mated_item_relationship

A Mated_item_relationship is a relationship between two Mated_item_association (see 4.2.307) objects.

This relationship specifies additional information about the mating of two particular items that go into a Mating_definition (see 4.2.313). The two Mated_item_association objects that are referenced by the Mated_item_relationship shall refer to the same Mating_definition.

The data associated with a Mated_item_relationship are the following:

— mated_shape;

— mating_material;

— related;

— relating.

4.2.308.1 mated_shape

The mated_shape specifies the Shape_element_relationship (see 4.2.450) that relates the two Shape_-element (see 4.2.449) objects that form the area of mating contact prior to mating.

See 4.3.1064 for the application assertion.

The mated_shape need not be specified for a particular Mated_item_relationship (see 4.2.308).

4.2.308.2 mating_material

The mating_material specifies the set of Quantified_instance (see 4.2.417) objects used as material for the mating.

See 4.3.1063 for the application assertion.

4.2.308.3 related

The related specifies the second of the two Mated_item_association (see 4.2.307) objects related by the Mated_item_relationship.

See 4.3.1062 for the application assertion.

4.2.308.4 relating

The relating specifies the first of the two Mated_item_association (see 4.2.307) objects related by the Mated_item_relationship.

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See 4.3.1062 for the application assertion.

4.2.309 Material

A Material is the substance out of which an item is or can be made.

NOTE - For the specification of the raw material from which an item is made, the object Item (see 4.2.267) is used with an attached Specific_item_classification (see 4.2.465) with classification type 'raw material'. That object represents the material item with possibly additional information, like identification of supplier, quantity, size of the raw stock etc. and it can be used in corresponding relationships such as Make_from_-relationship (see 4.2.304) or for a Process_operation_definition (see 4.2.381).

The data associated with a Material are the following:

— described_element;

— material_name.

4.2.309.1 described_element

The described_element specifies the objects the material information is provided for.

See 4.3.1065, 4.3.1066, 4.3.1067, 4.3.1068, 4.3.1069, 4.3.1070, 4.3.1071, 4.3.1072, 4.3.1073, 4.3.1074, 4.3.1075, 4.3.1076, 4.3.1077, 4.3.1078, 4.3.1079, 4.3.1080, 4.3.1081, 4.3.1082, 4.3.1083, and 4.3.1084 for the application assertions.

There shall be at least one object that defines the described_element for a Material (see 4.2.309).

4.2.309.2 material_name

The material_name specifies the word or group of words by which the Material is referred to.

4.2.310 Material_property

A Material_property is a characteristic that depends on material aspects.

A Material_property is a type of Property (see 4.2.409).

The data associated with a Material_property are the following:

— property_name

The property_name specifies the kind of Material_property.

EXAMPLE 'EM1' is an example for a 'property_name' that may be associated with a Material_property that is described as 'elastic modulus'.

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4.2.311 Material_property_association

A Material_property_association is an object that associates a Material (see 4.2.309) object with a Material_property_value_representation (see 4.2.312) object.

The data associated with a Material_property_association are the following:

— associated_property_value;

— definitional;

— described_material.

4.2.311.1 associated_property_value

The associated_property_value specifies the associated Material_property_value_representation (see 4.2.312).

See 4.3.1086 for the application assertion.

4.2.311.2 definitional

The definitional specifies whether the associated_property_value may be used to distinguish the described_material from others of the same kind. A value of 'true' indicates that the Material_property_value_representation (see 4.2.312) distinguishes the 'described_element' from others.

The definitional need not be specified for a particular Material_property_association (see 4.2.311).

4.2.311.3 described_material

The described_material specifies the Material (see 4.2.309) a property value is assigned to.

See 4.3.1085 for the application assertion.

4.2.312 Material_property_value_representation

A Material_property_value_representation is the representation of a characteristic of a material.

A Material_property_value_representation is a type of Property_value_representation (see 4.2.414).

The data associated with a Material_property_value_representation are the following:

— definition;

— environment_condition.

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4.2.312.1 definition

The definition specifies the Material_property (see 4.2.310) that defines the Material_property_value_representation.

See 4.3.1088 for the application assertion.

4.2.312.2 environment_condition

The environment_condition specifies the environmental conditions in which the defined Material_property_value_representation is applicable.

See 4.3.1087 for the application assertion.

4.2.313 Mating_definition

A Mating_definition is a view of an Item_version (see 4.2.275), defining the physical connection of two or more Item_instance (see 4.2.271) objects. It includes technical information about the kind of connection. This information is independent from the hierarchical assembly structure.

A Mating_definition is a type of Design_discipline_item_definition (see 4.2.142).

The data associated with a Mating_definition are the following:

— mating_type

The mating_type specifies the kind of mating, i.e., how the items shall be mated together. Where applicable, the following values shall be used:

— 'bolted joint': Attachment of two or more items that are screwed together using screws, bolt nuts, and washers;

— 'brazing': Attachment of two or more items established by soldering or brazing;

— 'clasping': Attachment of two or more items established by using a clamp at one common outer border;

— 'clinching': Attachment of two or more items established by pressing these items together and stamping texture at the point of contact;

— 'clipping': Attachment of two or more items established by a clip (e.g. fixing the inner door panel at the inner door plate);

— 'doweling': Attachment of two or more items using a pin that is fit into each of each part by pressing;

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— ’flanging’: Attachment of two or more items by crimping a projected length of one part over the edge of the other part;

— ’foam injection’: Attachment of two or more items where foam is injected into a cavity to establish the connection;

— ’gluing’: Attachment of two items established by adhesion material;

— ’laser-welding’: Attachment of two or more items that are welded together using a laser technique;

— ’press fit’: Attachment of two or more items obtained by forces resulting from the selected size tolerances;

— ’riveting’: Attachment of two or more items that are riveted together at a certain spot using a rivet;

— ’sewing’: Attachment of two or more items that are sewn together;

EXAMPLE Upholstering cloth is sewn together to form a seat pillow.

— ’spot welding’: Attachment of two or more items that are welded together at a certain welding spot;

— ’stapling’: Attachment of two or more items at a certain spot using a nail or a wire stitch to establish the connection;

— ’welding’: Attachment of two or more items by welding together with one weld bead.

4.2.314 Measurement_path

A Measurement_path is a mechanism to identify a Curve (see 4.2.108) along which a given geometric dimension or surface texture shall be fulfilled.

The data associated with a Measurement_path are the following:

— is_defined_as;

— is_defined_in.

4.2.314.1 is_defined_as

The is_defined_as specifies the Curve (see 4.2.108) along which the measurement takes place.

See 4.3.1090 for the application assertion.

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4.2.314.2 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) for the Curve (see 4.2.108) that defines the measurement path.

See 4.3.1089 for the application assertion.

4.2.315 Model_change

A Model_change is a mechanism to describe the differences between two objects concerning the models describing these objects.

Each Model_change is an Incremental_model_change (see 4.2.262) or a Full_model_change (see 4.2.213).

The data associated with a Model_change are the following:

— deleted_element;

— description;

— id;

— is_describing.

4.2.315.1 deleted_element

The deleted_element specifies the elements belonging to the model or view area representing the situation before the change that have been deleted during the change.

See 4.3.1092 for the application assertion.

4.2.315.2 description

The description specifies additional information about the Model_change.

See 4.3.1093 for the application assertion.

There shall be exactly one object that defines the description for a Model_change (see 4.2.315).

4.2.315.3 id

The id specifies the identifier of the Model_change.

The id need not be specified for a particular Model_change (see 4.2.315).

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4.2.315.4 is_describing

The is_describing specifies the Change (see 4.2.55) that collects the Model_change objects and the Property_change (see 4.2.410) objects.

See 4.3.1091 for the application assertion.

4.2.316 Model_image

A Model_image is a mechanism to generate a two-dimensional picture from two-dimensional or three-dimensional geometric or annotation elements. The mechanism is defined by clipping, scaling, and projecting information.

The data associated with a Model_image are the following:

— clipping;

— is_displaying;

— is_presented_in;

— name;

— scale;

— view_projection;

— view_volume_placement.

4.2.316.1 clipping

The clipping specifies the mathematical information necessary to define a two-dimensional area (clipping box) or a three-dimensional volume (clipping volume) that encloses all viewable geometric or annotation elements of a Styled_model (see 4.2.484) or of an External_model (see 4.2.189). Only those elements, or portions of elements, that fall within this two-dimensional area or three-dimensional volume shall be displayed.

The clipping need not be specified for a particular Model_image (see 4.2.316).

4.2.316.2 is_displaying

The is_displaying specifies the model that contains the information to be processed for display.

See 4.3.1094 and 4.3.1096 for the application assertions.

There shall be exactly one object that the Model_image (see 4.2.316) is_displaying.

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4.2.316.3 is_presented_in

The is_presented_in specifies the set of View (see 4.2.554) objects in which the picture defined by the Model_image is presented.

See 4.3.1097 for the application assertion.

4.2.316.4 name

The name specifies the word or group of words by which the Model_image is referred to.

See 4.3.1095 for the application assertion.

The name need not be specified for a particular Model_image (see 4.2.316).

If present, there shall be exactly one object that defines the name for a Model_image.

4.2.316.5 scale

The scale specifies the ratio between the size of the elements as defined in the shape model and the size of the elements as presented in the view. The default value for scale is 1.0.

4.2.316.6 view_projection

The view_projection specifies the type of projection. The following values shall be used:

— 'central': Central projection is used;

— 'parallel': Parallel projection is used.

4.2.316.7 view_volume_placement

The view_volume_placement specifies the coordinate space in which the viewing parameters are defined.

4.2.317 Model_property_association

A Model_property_association is an association of a Model_property_value (see 4.2.318) with objects.

> EXAMPLE In the case of a welding operation, the welding points as a part of a wireframe model can be associated with a process operation to describe the locations where the robot has to weld for a welding process operation.

The data associated with a Model_property_association are the following:

— associated_property_value;

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— described_element;

— validity_context.

4.2.317.1 associated_property_value

The associated_property_value specifies the Model_property_value (see 4.2.318) that is associated to an application object.

See 4.3.1113 for the application assertion.

4.2.317.2 described_element

The described_element specifies the application object for which a Model_property_value (see 4.2.318) is provided.

See 4.3.1098, 4.3.1099, 4.3.1100, 4.3.1101, 4.3.1102, 4.3.1103, 4.3.1104, 4.3.1105, 4.3.1106, 4.3.1107, 4.3.1108, 4.3.1109, 4.3.1110, 4.3.1111, 4.3.1112, 4.3.1115, 4.3.1116, 4.3.1117, 4.3.1118, 4.3.1119, 4.3.1120, 4.3.1121, 4.3.1122, 4.3.1123, 4.3.1124, and 4.3.1125 for the application assertions.

There shall be exactly one object that defines the described_element for a Model_property_association (see 4.2.317).

4.2.317.3 validity_context

The validity_context specifies an Organization (see 4.2.331) that provides a context for the Model_-property_association.

See 4.3.1114 for the application assertion.

The validity_context need not be specified for a particular Model_property_association (see 4.2.317).

4.2.318 Model_property_value

A Model_property_value is a mechanism to assign a General_property (see 4.2.230) to an External_-model (see 4.2.189), a Geometric_model (see 4.2.238), or a Styled_model (see 4.2.484).

The data associated with a Model_property_value are the following:

— definition;

— describing_model.

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4.2.318.1 definition

The definition specifies the General_property (see 4.2.230) that is assigned to an External_model (see 4.2.189), a Geometric_model (see 4.2.238), or a Styled_model (see 4.2.484).

See 4.3.1127 for the application assertion.

4.2.318.2 describing_model

The describing_model specifies the model to which a General_property (see 4.2.230) is assigned.

See 4.3.1126, 4.3.1128, and 4.3.1129 for the application assertions.

There shall be exactly one object that defines the describing_model for a Model_property_value (see 4.2.318).

4.2.319 Moments_of_inertia

A Moments_of_inertia describes the matrix of inertia of a rigid body. The moments of inertia I are described as follows:

$$I = \begin{pmatrix} I_{xx} & -I_{xy} & -I_{xz} \\ -I_{yx} & I_{yy} & -I_{yz} \\ -I_{zx} & -I_{zy} & I_{zz} \end{pmatrix}$$

A Moments_of_inertia is a type of Shape_dependent_property (see 4.2.447).

The data associated with a Moments_of_inertia are the following:

— inertia_value;

— is_defined_in;

— reference_axis_placement.

4.2.319.1 inertia_value

The inertia_value specifies the 9 inertia coefficients.

NOTE - The matrix defined by the 'inertia_value' is symmetric with respect to the main diagonal. For that reason, the values of the coefficients are equal, if mirrored along this diagonal. As a consequence, there are 6 different values in the 'inertia_value'.

See 4.3.1132 for the application assertion.

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4.2.319.2 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the property is applicable.

NOTE - The values of geometry related properties are specified relative to a Cartesian_coordinate_space.

EXAMPLE A Centre_of_mass (see 4.2.49) may be specified in different coordinate spaces for different dimensioning applications.

See 4.3.1131 for the application assertion.

4.2.319.3 reference_axis_placement

The reference_axis_placement specifies the Axis_placement (see 4.2.33) which was used to calculate the 'inertia_value'.

See 4.3.1130 for the application assertion.

4.2.320 Multi_language_string

A Multi_language_string represents text information, expressed in one or more languages, that is associated with objects.

The data associated with a Multi_language_string are the following:

— additional_language_dependent_string;

— primary_language_dependent_string.

4.2.320.1 additional_language_dependent_string

The additional_language_dependent_string specifies the String_with_language (see 4.2.479) objects that represent the text information in a particular language.

See 4.3.1133 for the application assertion.

4.2.320.2 primary_language_dependent_string

The primary_language_dependent_string specifies the String_with_language (see 4.2.479) that represents the text information in the original language.

See 4.3.1133 for the application assertion.

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4.2.321 Named_size

A Named_size is the definition of the size of a Document_file (see 4.2.159) or of a Document_representation (see 4.2.163) where the size is specified by a standardized identifier.

A Named_size is a type of Rectangular_size (see 4.2.427).

The data associated with a Named_size are the following:

— referenced_standard;

— size.

4.2.321.1 referenced_standard

The referenced_standard specifies a standard according to which the size is specified.

See 4.3.1134 for the application assertion.

The referenced_standard need not be specified for a particular Named_size (see 4.2.321).

4.2.321.2 size

The size specifies the size of the object. If the size differs from the dimensions specified by the inherited 'width' and 'height' attributes the size is overridden.

4.2.322 Next_higher_assembly

A Next_higher_assembly is a relationship where the attribute 'related' specifies a constituent of an assembly and the attribute 'relating' specifies the immediate parent assembly of the constituent.

NOTE - A constituent may be a single part or an assembly.

EXAMPLE The assembly carburettor may be assembled from single parts. The power train assembly is assembled from other assemblies.

A Next_higher_assembly is a type of Assembly_component_relationship (see 4.2.26).

4.2.323 Ngon_profile

A Ngon_profile is a profile that is composed of 3 or more connected straight and co-planar lines. One side of the Ngon_profile is parallel to the x-axis of the inherited Axis_placement (see 4.2.33) of the profile. This side intersects the y-axis at a negative value as shown in figure 50. The centre of the Ngon_profile coincides with the centre of the circle defining the extent of the ngon outlining the profile.

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A Ngon_profile is a type of Closed_profile (see 4.2.72).

The data associated with a Ngon_profile are the following:

— circumscribed_or_across_flats;

— corner_radius;

— diameter;

— number_of_sides.

4.2.323.1 circumscribed_or_across_flats

The circumscribed_or_across_flats specifies whether the diameter defining the Ngon_profile is the circumscribing diameter or tangent to the sides. The following values shall be used:

— 'circumscribed diameter': The circle specified by the 'diameter' is circumscribing the Ngon_profile and the corners of the Ngon_profile lay on the resulting circle;

— 'diameter across flats': The sides of the Ngon_profile are tangent to the circle specified by the 'diameter'.

4.2.323.2 corner_radius

The corner_radius specifies the size of an arc blend between any two sides of the Ngon_profile. The corner_radius shall be smaller than

$$r \cdot cos(\frac{\pi}{n})$$

where r is the circumscribed_radius and n is the number_of_sides.

See 4.3.1135 for the application assertion.

The corner_radius need not be specified for a particular Ngon_profile (see 4.2.323).

4.2.323.3 diameter

The diameter specifies the diameter of the circle used to define the Ngon_profile.

See 4.3.1135 for the application assertion.

4.2.323.4 number_of_sides

The number_of_sides specifies how many sides are needed for the Ngon_profile.

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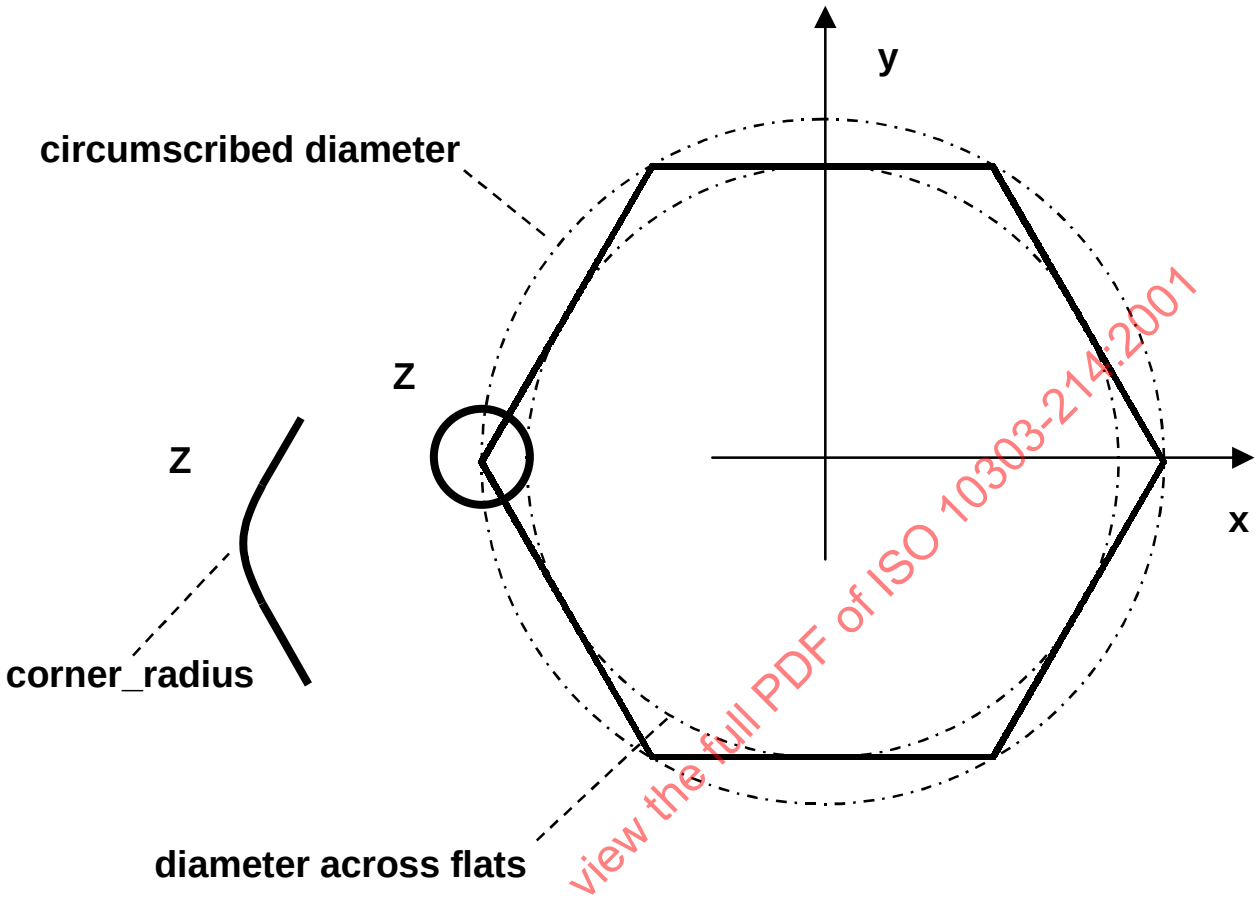


Figure 50 – Definition of a Ngon_profile

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4.2.324 Numerical_value

A Numerical_value is a quantity expressed with a numerical value and a unit.

A Numerical_value is a type of Value_with_unit (see 4.2.549).

The data associated with a Numerical_value are the following:

— value_component

The value_component specifies the quantity of the Numerical_value.

4.2.325 Offset_curve

An Offset_curve is a curve in 2D or 3D space that is defined as a set of points for which there is at least one point on the basis curve that is at the offset distance of the considered point. At a given point of the

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basis curve, the distance is measured along a vector that is the normalized cross product of the tangent of the basis curve at this point, and of a reference direction vector.

The reference direction of the offset shall be defined. An Offset_curve shall not self-intersect and may reference any type of curve except another Offset_curve.

An Offset_curve is a type of Curve (see 4.2.108).

4.2.326 Offset_surface

An Offset_surface is a surface that is defined by offsetting a base surface by a distance along the surface normal of the basis surface.

The offset distance shall not exceed the radius of curvature in any direction at any point of the basis surface.

NOTE - This constraint ensures that the offset surface does not contain any ridge or singular point.

The basis surface shall not be a rectangular composite surface or another offset surface.

An Offset_surface is a type of Surface (see 4.2.489).

4.2.327 Open_bead_end_type

An Open_bead_end_type is an end condition of a bead that passes through the end of the part.

An Open_bead_end_type is a type of Bead_end_type (see 4.2.38).

4.2.328 Open_profile

An Open_profile is characterized by two open ends.

An Open_profile is a type of Profile (see 4.2.401).

Each Open_profile is a General_open_profile (see 4.2.225), a Tee_profile (see 4.2.511), a Partial_circular_profile (see 4.2.340), a Vee_profile (see 4.2.551), a Rounded_u_profile (see 4.2.440), or a Square_u_profile (see 4.2.476).

4.2.329 Open_profile_usage

An Open_profile_usage is the identification of an Open_profile (see 4.2.328) and possibly of a geometric Transformation (see 4.2.533) used to place the Open_profile in a reference coordinate space.

An Open_profile_usage is a type of Profile_usage (see 4.2.403).

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The data associated with an Open_profile_usage are the following:

— profile_limit;

— used_profile.

4.2.329.1 profile_limit

The profile_limit specifies a Plane (see 4.2.360) which intersects the profile at the distance beyond which a feature that is created using this profile is considered to be cleared.

EXAMPLE The profile_limit may be used to specify the plane beyond which a cutter has to retract in order not to damage the profile.

See 4.3.1137 for the application assertion.

The profile_limit need not be specified for a particular Open_profile_usage (see 4.2.329).

4.2.329.2 used_profile

The used_profile specifies the Open_profile (see 4.2.328) that is being used.

See 4.3.1136 for the application assertion.

4.2.330 Open_slot_end_type

An Open_slot_end_type is an end condition of a slot specifying that the slot passes through the end of the shape of the part at this end.

An Open_slot_end_type is a type of Slot_end_type (see 4.2.457).

4.2.331 Organization

An Organization is a group of people involved in a particular business process.

The data associated with an Organization are the following:

— delivery_address;

— id;

— organization_name;

— organization_type;

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— postal_address;

— visitor_address.

4.2.331.1 delivery_address

The delivery_address specifies the address where goods are delivered.

The delivery_address need not be specified for a particular Organization (see 4.2.331).

4.2.331.2 id

The id specifies the identifier of the Organization.

NOTE - The assignment of this attribute is usually controlled by a registration authority. The registration authority may be a public organization that assigns identifiers to corporations, or it may be the parent corporation that assigns component identifiers to its components.

EXAMPLE The id may be the code assigned to the Organization for a stock market listing, or it may be a department number.

4.2.331.3 organization_name

The organization_name specifies the word or group of words used to refer to the Organization.

4.2.331.4 organization_type

The organization_type specifies the type of the Organization. Where applicable, the following values shall be used:

— 'company': The organization_type specifies that the Organization is a company;

— 'department': The organization_type specifies that the Organization is a department;

— 'plant': The organization_type specifies that the Organization is a plant.

The organization_type need not be specified for a particular Organization (see 4.2.331).

4.2.331.5 postal_address

The postal_address specifies the address where letter mail is delivered.

The postal_address need not be specified for a particular Organization (see 4.2.331).

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4.2.331.6 visitor_address

The visitor_address specifies the address where the organization receives visitors.

The visitor_address need not be specified for a particular Organization (see 4.2.331).

4.2.332 Organization_in_contract

An Organization_in_contract is a mechanism to associate the person who is signing a contract and the organization which the person is signing for, with a Contract (see 4.2.104).

The data associated with an Organization_in_contract are the following:

— contracted_organization;

— role_of_organization;

— signature;

— signed_contract.

4.2.332.1 contracted_organization

The contracted_organization specifies the organization that participates in the contract.

See 4.3.1140 for the application assertion.

4.2.332.2 role_of_organization

The role_of_organization specifies the function performed by the signing Organization (see 4.2.331) with respect to the contract. Where applicable, the following values shall be used:

— 'contractor': The referenced Organization assigns the tasks that are subject of the Contract (see 4.2.104);

— 'contractee': The tasks that are subject of the Contract are assigned to the referenced Organization.

4.2.332.3 signature

The signature specifies the set of Date_and_person_organization (see 4.2.118) objects representing the personnel that signed the contract on behalf of the contracted organization and the date of the signature.

See 4.3.1139 for the application assertion.

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4.2.332.4 signed_contract

The signed_contract specifies the set of Contract (see 4.2.104) objects the Organization_in_contract participates in.

See 4.3.1138 for the application assertion.

4.2.333 Organization_relationship

An Organization_relationship is a relationship between two Organization (see 4.2.331) objects.

EXAMPLE A team belongs to a department which itself belongs to a company. This organizational structure may be built up using the Organization_relationship mechanism.

The data associated with an Organization_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.333.1 description

The description specifies additional information about the Organization_relationship.

See 4.3.1141 for the application assertion.

The description need not be specified for a particular Organization_relationship (see 4.2.333).

If present, there shall be exactly one object that defines the description for an Organization_relationship.

4.2.333.2 related

The related specifies the second Organization (see 4.2.331) in an Organization_relationship.

NOTE - The semantics of this attribute are defined by the attribute 'relation_type'.

See 4.3.1142 for the application assertion.

4.2.333.3 relating

The relating specifies the first of the two Organization (see 4.2.331) objects in an Organization_relationship.

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NOTE - The semantics of this attribute are defined by the attribute 'relation_type'.

See 4.3.1142 for the application assertion.

4.2.333.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'hierarchy': The related Organization (see 4.2.331) is a sub organization of the relating Organization;

— 'legal succession': The related Organization is the legal successor of the relating Organization;

NOTE - An additional Date_time_assignment (see 4.2.120) may be applied to the Organization_relationship (see 4.2.333) in order to specify the time when the succession takes place.

— 'reorganization': The related Organization is the successor of the relating Organization due to an organizational transfer of responsibility.

EXAMPLE The name of a department changes due to reorganization.

4.2.334 Oriented_edge_curve

An Oriented_edge_curve is a bounded segment of a curve. An Oriented_edge_curve is of finite length and is defined from the edge_start vertex to the edge_end vertex along the curve defined by the edge_geometry. Additionally, an Oriented_edge_curve has an associated orientation that specifies the mathematical sense of an Oriented_edge_curve. An Oriented_edge_curve shall not self-intersect.

The data associated with an Oriented_edge_curve are the following:

— edge_end;

— edge_geometry;

— edge_start.

4.2.334.1 edge_end

The edge_end specifies the second and last vertex of the edge.

NOTE - In the case of an edge that forms a closed loop the edge_end will be identical to the edge_start.

See 4.3.1151 for the application assertion.

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4.2.334.2 edge_geometry

The edge_geometry specifies a curve that represents the shape of an edge. The extent of the edge is confined to that section of the curve between the start and end vertices.

See 4.3.1143, 4.3.1144, 4.3.1145, 4.3.1146, 4.3.1147, 4.3.1148, 4.3.1149, and 4.3.1150 for the application assertions.

There shall be exactly one object that defines the edge_geometry for an Oriented_edge_curve (see 4.2.334).

4.2.334.3 edge_start

The edge_start specifies the first vertex of an edge.

See 4.3.1151 for the application assertion.

4.2.335 Pair_value

A Pair_value is one particular value of the pair parameter of a Kinematic_pair (see 4.2.287).

A Pair_value shall represent either a cylindrical pair value, a gear pair value, a planar pair value, a prismatic pair value, a rack and pinion pair value, a revolute pair value, a rolling curve pair value, a rolling surface pair value, a screw pair value, a sliding curve pair value, a sliding surface pair value, a spherical pair value, or a universal pair value.

The data associated with a Pair_value are the following:

— is_applied_to

The is_applied_to specifies the Kinematic_pair that the Pair_value applies to.

See 4.3.1152 for the application assertion.

4.2.336 Panel_hole_with_barring

A Panel_hole_with_barring is a hole in a panel where the material is not completely punched out but partially bent in the punch direction.

EXAMPLE Figure 51 shows an example of a Panel_hole_with_barring.

A Panel_hole_with_barring is a type of Hole_feature_in_panel (see 4.2.258).

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The data associated with a Panel_hole_with_barring are the following:

— angle_defined_by;

— barring_profile;

— base_radius.

4.2.336.1 angle_defined_by

The angle_defined_by specifies the angle about which the material is bent.

See 4.3.1153 for the application assertion.

The angle_defined_by need not be specified for a particular Panel_hole_with_barring (see 4.2.336).

4.2.336.2 barring_profile

The barring_profile specifies the Closed_profile (see 4.2.72) that represents that portion of the panel that is actually punched out.

NOTE - The difference in area between the barring_profile and the hole_profile is that portion of the panel that is bended at 90 degrees in punch direction.

See 4.3.1154 for the application assertion.

4.2.336.3 base_radius

The base_radius specifies the radius of the blending between the panel and the bent material.

See 4.3.1155 for the application assertion.

The base_radius need not be specified for a particular Panel_hole_with_barring (see 4.2.336).

4.2.337 Parabola

A Parabola is an open conic curve defined by its focal length, apex and the direction of the line joining the apex and focus.

NOTE - The focal length is the distance between the focus and the apex.

A Parabola is a type of Curve (see 4.2.108).

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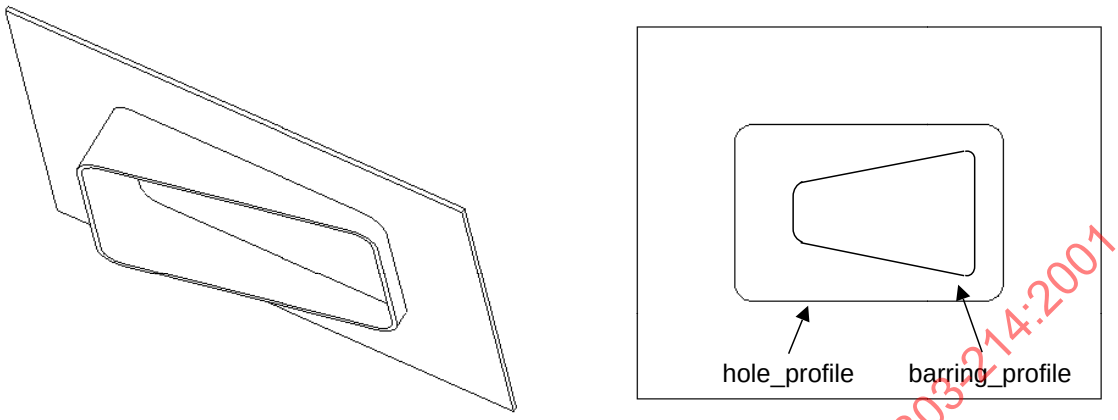


Figure 51 – Parameters defining a Panel_hole_with_barring

4.2.338 Parallelism_tolerance

A Parallelism_tolerance is a constraint that specifies that a surface or a curve shall be parallel to a reference datum, with an allowed amount of deviation. This reference datum is either a datum plane or a datum axis.

A Parallelism_tolerance specifies one of the following:

— a tolerance zone limited by two planes or two lines (if the attribute 'affected_plane' is specified) parallel to a datum plane, or axis, within which the line elements of the surface or the axis of the considered feature must lie;

— a cylindrical tolerance zone whose axis is parallel to a datum axis within which the axis of the considered feature must lie.

A Parallelism_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Parallelism_tolerance are the following:

— affected_plane;

— reference_datum.

4.2.338.1 affected_plane

The affected_plane specifies the plane in which the tolerance applies.

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This attribute covers information that is given on drawings implicitly by the drawing plane. If the affected_plane is not specified, the tolerance applies in all directions (on drawings indicated by the diameter symbol).

See 4.3.1157 for the application assertion.

The affected_plane need not be specified for a particular Parallelism_tolerance (see 4.2.338).

4.2.338.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1156 for the application assertion.

4.2.339 Partial_circular_path

A Partial_circular_path is a path that is specified by a direction of travel along an arc of constant radius around an axis. The x-axis of the inherited Axis_placement (see 4.2.33) is co-axial to the rotation axis, and the z-axis is tangent to the curve in its start point. The y-axis is oriented such, that the actual rotation axis has a y co-ordinate equal to the radius. The Axis_placement is located in the start point of the curve described by the path.

EXAMPLE Figure 52 illustrates a Partial_circular_path.

A Partial_circular_path is a type of Circular_path (see 4.2.61).

The data associated with a Partial_circular_path are the following:

— sweep_angle

The sweep_angle specifies the angle that defines the arc shaped path.

See 4.3.1158 for the application assertion.

4.2.340 Partial_circular_profile

A Partial_circular_profile is a profile that is specified by a circular arc. The Partial_circular_profile starts at the x-axis of the inherited Axis_placement (see 4.2.33) and travels around the z-axis in positive direction. The Axis_placement coincides with the centre point outlining this profile.

NOTE - The start point of the resulting arc has a y co-ordinate of zero.

EXAMPLE Figure 53 illustrates a Partial_circular_profile.

A Partial_circular_profile is a type of Open_profile (see 4.2.328).

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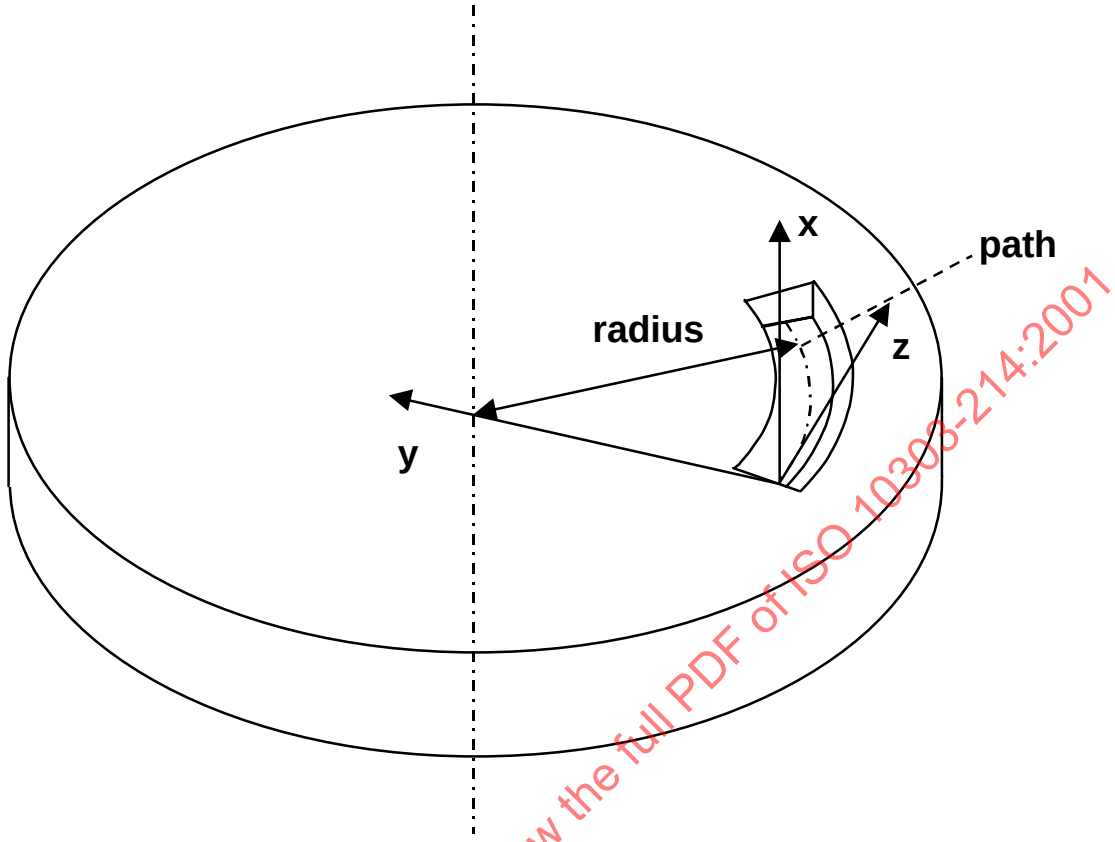


Figure 52 – Definition of a Partial_circular_path

The data associated with a Partial_circular_profile are the following:

— radius;

— sweep_angle.

4.2.340.1 radius

The radius specifies the radius of the arc to define a Partial_circular_profile.

See 4.3.1159 for the application assertion.

4.2.340.2 sweep_angle

The sweep_angle specifies the size of the angle to define a Partial_circular_profile.

See 4.3.1159 for the application assertion.

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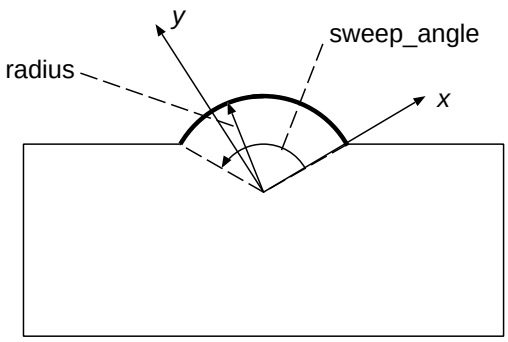


Figure 53 – Definition of a Partial_circular_profile

4.2.341 Partial_document_assignment

A Partial_document_assignment identifies a specific portion of the contents of a document. It assigns this portion to the product data for which it is relevant.

A Partial_document_assignment is a type of Document_assignment (see 4.2.156).

The data associated with a Partial_document_assignment are the following:

— document_portion

The document_portion specifies the word or group of words that convey the subject or sub contents of the Document (see 4.2.155).

> EXAMPLE If the assigned document is a service manual, the document_portion may specify that, in the given situation, only the information related to electric fuses is relevant among the overall contents of the document.

4.2.342 Path

A Path is the representation of a continuous direction of travel.

Each Path is a General_path (see 4.2.227), a Linear_path (see 4.2.300), or a Circular_path (see 4.2.61).

The data associated with a Path are the following:

— is_defined_by;

— is_defined_in.

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4.2.342.1 is_defined_by

The is_defined_by specifies the Axis_placement (see 4.2.33) to which the parameters of the Path refer. The is_defined_by is specified for the purpose of evaluation by manufacturing systems, which use the information in order to determine various machining parameters. For each type of Path it is specified, how the Axis_placement is located and oriented with respect to the curve that defines the path.

See 4.3.1160 for the application assertion.

4.2.342.2 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the Path is defined. This coordinate space shall be the same as the coordinate space of the Feature_definition (see 4.2.199) that uses this Path. The is_defined_in shall be specified when the Path is used in the context of a Placed_-feature (see 4.2.356), else it shall not be used.

See 4.3.1161 for the application assertion.

The is_defined_in need not be specified for a particular Path (see 4.2.342).

4.2.343 Path_approximation

A Path_approximation is a motion parameter measure with or without units by which different discrete poses in the course of a kinematics motion are distinguished.

NOTE - In order to introduce time aspects the motion parameter may be defined with time units.

4.2.344 Path_parameter

A Path_parameter specifies the role of a Path (see 4.2.342) in a General_feature (see 4.2.221). It is used to discriminate the members of the 'additional_path_usage' of the General_feature.

The data associated with a Path_parameter are the following:

— associated_path;

— parameter_context;

— parameter_role.

4.2.344.1 associated_path

The associated_path specifies the Path (see 4.2.342) for which a role is given.

See 4.3.1163 for the application assertion.

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4.2.344.2 parameter_context

The parameter_context specifies the General_feature (see 4.2.221) in which the associated Path (see 4.2.342) is identified.

See 4.3.1162 for the application assertion.

4.2.344.3 parameter_role

The parameter_role specifies the role of the Path (see 4.2.342) that is used as an additional Path in a General_feature (see 4.2.221).

EXAMPLE Examples for the parameter_role are 'height', 'depth', or combinations of the value of the 'feature_type' of the General_feature with such a denominator.

4.2.345 Perpendicularity_tolerance

A Perpendicularity_tolerance is a constraint that specifies that a surface or a curve shall be perpendicular to a reference datum with an allowed amount of deviation. The reference datum is either a datum plane or a datum axis.

A Perpendicularity_tolerance specifies one of the following:

— a tolerance zone limited by two parallel planes perpendicular to a datum plane, or axis, within which the surface or median plane of the considered feature must lie;

— a tolerance zone limited by two parallel planes perpendicular to a datum axis, within which the axis of the considered feature must lie;

— a cylindrical tolerance zone (if the attribute 'affected_plane' is not specified), perpendicular to a datum plane, within which the axis of the considered feature must lie;

— a tolerance zone defined by two parallel lines perpendicular to a datum plane, or axis, within which an element of the surface must lie.

A Perpendicularity_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Perpendicularity_tolerance are the following:

— affected_plane;

— reference_datum.

4.2.345.1 affected_plane

The affected_plane specifies the plane in which the tolerance applies.

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This attribute covers information that is given on drawings implicitly by the drawing plane. If the affected_plane is not specified, the tolerance applies in all directions (on drawings indicated by the diameter symbol).

See 4.3.1165 for the application assertion.

The affected_plane need not be specified for a particular Perpendicularity_tolerance (see 4.2.345).

4.2.345.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1164 for the application assertion.

4.2.346 Person

A Person is an individual human being who has some relationship to product data. The Person shall always be identified in the context of one or more organizations.

The data associated with a Person are the following:

— person_name;

— preferred_business_address.

4.2.346.1 person_name

The person_name specifies the word or group of words used to refer to the Person.

NOTE - The person_name includes the first, middle, and last names as well as titles, if applicable.

4.2.346.2 preferred_business_address

The preferred_business_address specifies the location of the office of the Person.

The preferred_business_address need not be specified for a particular Person (see 4.2.346).

4.2.347 Person_in_organization

A Person_in_organization is the specification of a Person (see 4.2.346) in the context of an Organization (see 4.2.331).

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The data associated with a Person_in_organization are the following:

— associated_organization;

— associated_person;

— id;

— location;

— role.

4.2.347.1 associated_organization

The associated_organization specifies the Organization (see 4.2.331) with which the Person (see 4.2.346) is associated.

See 4.3.1166 for the application assertion.

4.2.347.2 associated_person

The associated_person specifies the Person (see 4.2.346).

See 4.3.1167 for the application assertion.

4.2.347.3 id

The id specifies an identifier of the person. The identifier shall be unique within the scope of the 'associated_organization'.

EXAMPLE The id may be a staff number or a user id in a computer system.

The id need not be specified for a particular Person_in_organization (see 4.2.347).

4.2.347.4 location

The location specifies the relevant address of the Person_in_organization.

The location need not be specified for a particular Person_in_organization (see 4.2.347).

4.2.347.5 role

The role specifies the relationship between the Person (see 4.2.346) and the Organization (see 4.2.331).

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4.2.348 Person_in_organization_relationship

A Person_in_organization_relationship is an mechanism which allows to specify an relationship between two persons in an organization.

EXAMPLE The owner of important product data leaves a company and therefore has a successor. This relationship may be built up using the Person_in_organization_relationship mechanism.

The data associated with a Person_in_organization_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.348.1 description

The description specifies additional information about the Person_in_organization_relationship.

See 4.3.1168 for the application assertion.

The description need not be specified for a particular Person_in_organization_relationship (see 4.2.348).

If present, there shall be exactly one object that defines the description for a Person_in_organization_-relationship.

4.2.348.2 related

The related specifies the second of the two objects related by the Person_in_organization_relationship.

See 4.3.1169 for the application assertion.

4.2.348.3 relating

The relating specifies the first of the two objects related by the Person_in_organization_relationship.

See 4.3.1169 for the application assertion.

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4.2.348.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'successor': The related Person_in_organization (see 4.2.347) is the successor of the relating Person_in_organization;

4.2.349 Person_organization_assignment

A Person_organization_assignment is an object that associates an Organization (see 4.2.331) or a Person_in_organization (see 4.2.347) with product data.

This assignment provides additional information for the associated object. The provision of such data through this assignment has an organizational character whereas some objects require the same kind of data mandatorily in order to be semantically complete. This assignment shall not be used to associate the corresponding organizational data with an object whose attributes are referencing the organizational data directly.

The Person_organization_assignment shall not be used for the purpose of specifying a relationship between two Person_in_organization objects, e.g., a succession in organizational responsibility. For these purposes, Person_in_organization_relationship (see 4.2.348) shall be used.

The data associated with a Person_organization_assignment are the following:

— assigned_person_organization;

— description;

— is_applied_to;

— role.

4.2.349.1 assigned_person_organization

The assigned_person_organization specifies the concerned Organization (see 4.2.331) or the Person_in_organization (see 4.2.347).

See 4.3.1210 and 4.3.1212 for the application assertions.

There shall be exactly one object that defines the assigned_person_organization for a Person_organization_assignment (see 4.2.349).

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4.2.349.2 description

The description specifies additional information about the Person_organization_assignment.

See 4.3.1209 for the application assertion.

The description need not be specified for a particular Person_organization_assignment (see 4.2.349).

If present, there shall be exactly one object that defines the description for a Person_organization_-assignment.

4.2.349.3 is_applied_to

The is_applied_to specifies the object with which the Person_organization_assignment is associated.

See 4.3.1170, 4.3.1171, 4.3.1172, 4.3.1173, 4.3.1174, 4.3.1175, 4.3.1176, 4.3.1177, 4.3.1178, 4.3.1179, 4.3.1180, 4.3.1181, 4.3.1182, 4.3.1183, 4.3.1184, 4.3.1185, 4.3.1186, 4.3.1187, 4.3.1188, 4.3.1189, 4.3.1190, 4.3.1191, 4.3.1192, 4.3.1193, 4.3.1194, 4.3.1195, 4.3.1196, 4.3.1197, 4.3.1198, 4.3.1199, 4.3.1200, 4.3.1201, 4.3.1202, 4.3.1203, 4.3.1204, 4.3.1205, 4.3.1206, 4.3.1207, 4.3.1208, 4.3.1211, 4.3.1212, 4.3.1213, 4.3.1214, 4.3.1215, 4.3.1216, 4.3.1217, 4.3.1218, 4.3.1219, 4.3.1220, 4.3.1221, 4.3.1222, 4.3.1223, 4.3.1224, 4.3.1225, 4.3.1226, 4.3.1227, 4.3.1228, 4.3.1229, 4.3.1230, 4.3.1231, 4.3.1232, 4.3.1233, 4.3.1234, 4.3.1235, and 4.3.1236 for the application assertions.

There shall be at least one object that the Person_organization_assignment (see 4.2.349) is_applied_to.

4.2.349.4 role

The role specifies the responsibility of the assigned Person (see 4.2.346) or Organization (see 4.2.331) with respect to the object that it is applied to. Where applicable, the following values shall be used:

— 'author': The referenced object has been created by the assigned Person or Organization. The author holds the copyright;

— 'classification officer': The assigned Person or Organization is formally responsible for the classification of the referenced object;

— 'creator': The referenced object has been created by the assigned Person or Organization;

— 'custodian': The assigned Person or Organization is responsible for the existence and integrity of the referenced object;

— 'customer': The assigned Person or Organization acts as a purchaser or consumer of the referenced object;

— 'design supplier': The assigned Person or Organization is the one who delivers the data describing the referenced object;

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EXAMPLE The 'design supplier' may be a design by means of a 3D model or a drawing.

— 'editor': The assigned Person or Organization is responsible for making any changes to any attribute of the referenced object;

— 'id owner': The assigned Person or Organization is the one responsible for the designation of an identifier;

— 'location': The assigned Organization is the place where the referenced object can be found or where it takes place;

— 'manufacturer': The assigned Person or Organization is the one who produces the actual (physical) object;

— 'owner': The assigned Person or Organization owns the referenced object, and has final say over its disposition and any changes to it;

— 'supplier': The assigned Person or Organization is the one who delivers the actual (physical) object (e.g., a dealer);

— 'wholesaler': The assigned Person or Organization is the one who is in the sales chain between the manufacturer and the supplier.

4.2.350 Physical_assembly_relationship

A Physical_assembly_relationship is a mechanism to relate one Physical_instance (see 4.2.352) as a component to another Physical_instance that plays the role of an assembly.

The data associated with a Physical_assembly_relationship are the following:

— is_realization_of;

— physical_assembly;

— physical_component.

4.2.350.1 is_realization_of

The is_realization_of specifies the Item_instance (see 4.2.271) the physical component is the realization of.

See 4.3.1237 for the application assertion.

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4.2.350.2 physical_assembly

The physical_assembly specifies the Physical_instance (see 4.2.352) that serves as the assembly in the physical structure.

See 4.3.1238 for the application assertion.

4.2.350.3 physical_component

The physical_component specifies the Physical_instance (see 4.2.352) that serves as a component in the physical structure.

See 4.3.1238 for the application assertion.

4.2.351 Physical_document

A Physical_document is a piece of product data that is archived in a non-digital form.

> EXAMPLE Paper plots of technical drawings, micro fiche, or paper documents such as calculations or test reports are examples for a Physical_document.

A Physical_document is a type of Physical_representation (see 4.2.355).

The data associated with a Physical_document are the following:

— component

The component specifies the physical realization of the Physical_document.

See 4.3.1239 for the application assertion.

4.2.352 Physical_instance

A Physical_instance is the denomination of a physically realized object. A Physical_instance may be identified by a serial number. A lot id may be provided additionally to the serial number.

The data associated with a Physical_instance are the following:

— description;

— inventory_number;

— is_realization_of;

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— lot_id;

— serial_number.

4.2.352.1 description

The description specifies additional information about the Physical_instance.

See 4.3.1241 for the application assertion.

The description need not be specified for a particular Physical_instance (see 4.2.352).

If present, there shall be exactly one object that defines the description for a Physical_instance.

4.2.352.2 inventory_number

The inventory_number specifies an alphanumerical string to identify an item in the detailed list of articles, such as goods and chattels, found in the possession of a person or enterprise.

The inventory_number need not be specified for a particular Physical_instance (see 4.2.352).

4.2.352.3 is_realization_of

The is_realization_of specifies the Product_identification (see 4.2.398) or the Design_discipline_item_definition (see 4.2.142) that collects the information defining the Physical_instance.

NOTE - This kind of information is only necessary for the 'root' component in a physical assembly since for a physical component this information is already given through Physical_assembly_relationship (see 4.2.350) which references, through the corresponding Item_instance (see 4.2.271), the defining object.

See 4.3.1240 and 4.3.1242 for the application assertions.

The is_realization_of need not be specified for a particular Physical_instance (see 4.2.352).

If present, there shall be exactly one object that the Physical_instance is_realization_of.

4.2.352.4 lot_id

The lot_id specifies the identifier of the lot the Physical_instance is part of.

The lot_id need not be specified for a particular Physical_instance (see 4.2.352).

4.2.352.5 serial_number

The serial_number is an identifier that distinguishes one Physical_instance from another.

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The serial_number need not be specified for a particular Physical_instance (see 4.2.352).

4.2.353 Physical_instance_test_result

A Physical_instance_test_result is a mechanism to associate a Physical_instance (see 4.2.352) with measurements made on this Physical_instance.

NOTE - This object provides means to relate the characteristics of a real object with a design intent.

The data associated with a Physical_instance_test_result are the following:

— description;

— id;

— test_activity;

— test_result;

— tested_instance.

4.2.353.1 description

The description specifies additional information about the Physical_instance_test_result.

See 4.3.1244 for the application assertion.

The description need not be specified for a particular Physical_instance_test_result (see 4.2.353).

If present, there shall be exactly one object that defines the description for a Physical_instance_test_result.

4.2.353.2 id

The id specifies the identifier of the Physical_instance_test_result.

4.2.353.3 test_activity

The test_activity specifies the Activity (see 4.2.2) or the Process_operation_occurrence (see 4.2.384) that has lead to the test result.

EXAMPLE A measuring process on a prototype is an example for a 'test_activity'.

See 4.3.1243 and 4.3.1246 for the application assertions.

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The test_activity need not be specified for a particular Physical_instance_test_result (see 4.2.353).

If present, there shall be exactly one object that defines the test_activity for a Physical_instance_test_-result.

4.2.353.4 test_result

The test_result specifies the characteristics that were determined by the performed test.

See 4.3.1247 for the application assertion.

4.2.353.5 tested_instance

The tested_instance specifies the Physical_instance (see 4.2.352) that was the subject of the test activity.

See 4.3.1245 for the application assertion.

4.2.354 Physical_model

A Physical_model is a model of the shape of a part made from a certain material, e.g., clay or wood, at a certain scale. For a Physical_model, neither a Document_size_property (see 4.2.164), a Document_-format_property (see 4.2.161), nor a Document_creation_property (see 4.2.158) shall be specified.

EXAMPLE A Physical_model may be used to get an impression of the future appearance of, e.g., a car or to use it, e.g., in a wind-tunnel.

A Physical_model is a type of Physical_representation (see 4.2.355).

4.2.355 Physical_representation

A Physical_representation is a physically realizable representation of a Document_version (see 4.2.167).

A Physical_representation is a type of Document_representation (see 4.2.163).

Each Physical_representation is a Physical_document (see 4.2.351) or a Physical_model (see 4.2.354).

4.2.356 Placed_feature

A Placed_feature is the occurrence of a feature on a shape where the definition of the feature is given in its own coordinate space. A Placed_feature is the result of a Feature_placement (see 4.2.202).

NOTE 1 - A Placed_feature may or may not have shape representation.

NOTE 2 - A Placed_feature is supposed to have all information necessary to create the shape resulting from the application of the feature.

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A Placed_feature is a type of Feature_occurrence (see 4.2.200).

The data associated with a Placed_feature are the following:

— is_placed_by

The is_placed_by specifies the Feature_placement that places a Feature_definition (see 4.2.199) in a Geometric_model (see 4.2.238), and, as a consequence, results in this particular Placed_feature.

See 4.3.1248 for the application assertion.

4.2.357 Placed_target

A Placed_target is a datum target that is described implicitly by parameters with reference to its parameter_reference.

A Placed_target is a type of Datum_target (see 4.2.125).

Each Placed_target is a Target_circle (see 4.2.506), a Target_point (see 4.2.508), a Target_rectangle (see 4.2.509), or a Target_line (see 4.2.507).

The data associated with a Placed_target are the following:

— is_defined_in;

— parameter_reference.

4.2.357.1 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the Axis_placement (see 4.2.33) that serves as parameter_reference is defined.

NOTE - A Placed_target is not defined in its own local and independent coordinate space but in the coordinate space of the shape that provides the datum.

See 4.3.1250 for the application assertion.

4.2.357.2 parameter_reference

The parameter_reference specifies the Axis_placement (see 4.2.33) that the parameters or the Placed_target refer to.

See 4.3.1249 for the application assertion.

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4.2.358 Planar_bottom_condition

A Planar_bottom_condition is a bottom of a Pocket_feature (see 4.2.366) that is flat.

A Planar_bottom_condition is a type of Pocket_bottom_condition (see 4.2.365).

The data associated with a Planar_bottom_condition are the following:

— floor_location;

— floor_normal;

— floor_radius.

4.2.358.1 floor_location

The floor_location specifies a Cartesian point on the planar bottom; this point shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the concerned Pocket_feature (see 4.2.366).

4.2.358.2 floor_normal

The floor_normal specifies a direction vector that shall be defined in the same Cartesian_coordinate_-space (see 4.2.44) as the concerned Pocket_feature (see 4.2.366). The floor_normal indicates a direction normal to the planar bottom pointing away from material.

4.2.358.3 floor_radius

The floor_radius specifies the blend radius at the bottom and the side edges of the Pocket_feature (see 4.2.366).

See 4.3.1251 for the application assertion.

The floor_radius need not be specified for a particular Planar_bottom_condition (see 4.2.358).

4.2.359 Planar_top_condition

A Planar_top_condition is a top condition of a boss that is flat.

A Planar_top_condition is a type of Boss_top_condition (see 4.2.43).

The data associated with a Planar_top_condition are the following:

— top_location;

— top_normal.

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4.2.359.1 top_location

The top_location specifies a Cartesian point on the planar top; this point shall defined in the same Cartesian_coordinate_space (see 4.2.44) as the concerned Boss_feature (see 4.2.42).

4.2.359.2 top_normal

The top_normal specifies a direction vector that shall be defined in the same Cartesian_coordinate_space (see 4.2.44) as the concerned Boss_feature (see 4.2.42). The top_normal indicates a direction normal to the planar top pointing away from material.

4.2.360 Plane

A Plane is an unbounded surface with a constant normal.

NOTE - A Plane is trimmed to a finite extension by applying a Face (see 4.2.191).

A Plane is a type of Surface (see 4.2.489).

4.2.361 Plib_class_reference

A Plib_class_reference designates a class in a library compliant to ISO 13584 (Parts Library).

The data associated with a Plib_class_reference are the following:

— code;

— supplier_bsu;

— version.

4.2.361.1 code

The code specifies the class in the PLIB library. The format of this code is defined in ISO 13584-42.

4.2.361.2 supplier_bsu

The supplier_bsu (basic semantic unit) specifies the supplier of the class in a PLIB library, in which the class is defined. The format of this specification is defined in ISO 13584-26.

4.2.361.3 version

The version specifies the identification of a particular version of a class in a PLIB library. The format of this version is defined in ISO 13584-42.

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4.2.362 Plib_property_reference

A Plib_property_reference designates a property in a library compliant to ISO 13584.

The data associated with a Plib_property_reference are the following:

— code;

— name_scope;

— version.

4.2.362.1 code

The code specifies the property in the PLIB library. The format of this code is defined in ISO 13584-42.

4.2.362.2 name_scope

The name_scope specifies the Plib_class_reference (see 4.2.361) in which the property is visible.

See 4.3.1252 for the application assertion.

4.2.362.3 version

The version specifies the identification of a particular version of a property in a PLIB library. The format of this version is defined in ISO 13584-42.

4.2.363 Plus_minus_bounds

A Plus_minus_bounds is the specification of the allowable deviation from a numerical value.

The data associated with a Plus_minus_bounds are the following:

— lower_bound;

— significant_digits;

— upper_bound;

— value_determination.

4.2.363.1 lower_bound

The lower_bound specifies the value of the tolerance that shall be subtracted from the exact value to establish the minimum allowed value.

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4.2.363.2 significant_digits

The significant_digits specifies the number of decimal digits indicating the accuracy of the lower_bound and upper_bound values.

The significant_digits need not be specified for a particular Plus_minus_bounds (see 4.2.363).

4.2.363.3 upper_bound

The upper_bound specifies the value of the tolerance that shall be added to the exact value to establish the maximum allowed value.

4.2.363.4 value_determination

The value_determination specifies information on how the Plus_minus_bounds shall be interpreted. Where applicable, the following values shall be used:

— 'calculated': The value has been calculated;

— 'designed': The value represents a value intended by the design;

— 'estimated': The value has been estimated;

— 'measured': The value has been measured;

— 'required': The value represents a requirement.

NOTE - A Plus_minus_bounds may be specified in the design stage of a product but it may also be documented as measured on a prototype.

The value_determination need not be specified for a particular Plus_minus_bounds (see 4.2.363).

4.2.364 Plus_minus_toleranced_datum

A Plus_minus_toleranced_datum is an entry in a Tolerance_table_cell (see 4.2.523) that is a plus minus tolerance for a dimension.

The data associated with a Plus_minus_toleranced_datum are the following:

— tolerance_value

The tolerance_value specifies the value with unit that gives the tolerance range between the minus value and the plus value.

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4.2.365 Pocket_bottom_condition

A Pocket_bottom_condition is the definition of a kind of bottom that characterizes a Pocket_feature (see 4.2.366).

Each Pocket_bottom_condition is a General_bottom_condition (see 4.2.215) or a Planar_bottom_condition (see 4.2.358).

The data associated with a Pocket_bottom_condition are the following:

— is_applied_to

The is_applied_to specifies to which end of the path the Pocket_bottom_condition applies. The following values shall be used:

— 'end': The Pocket_bottom_condition is applied to that end of the Pocket_feature that corresponds to the end of the defining Linear_path (see 4.2.300);

— 'start': The Pocket_bottom_condition is applied to that end of the Pocket_feature that corresponds to the start of the defining Linear_path.

EXAMPLE Figure 54 illustrates the usage of the two cases.

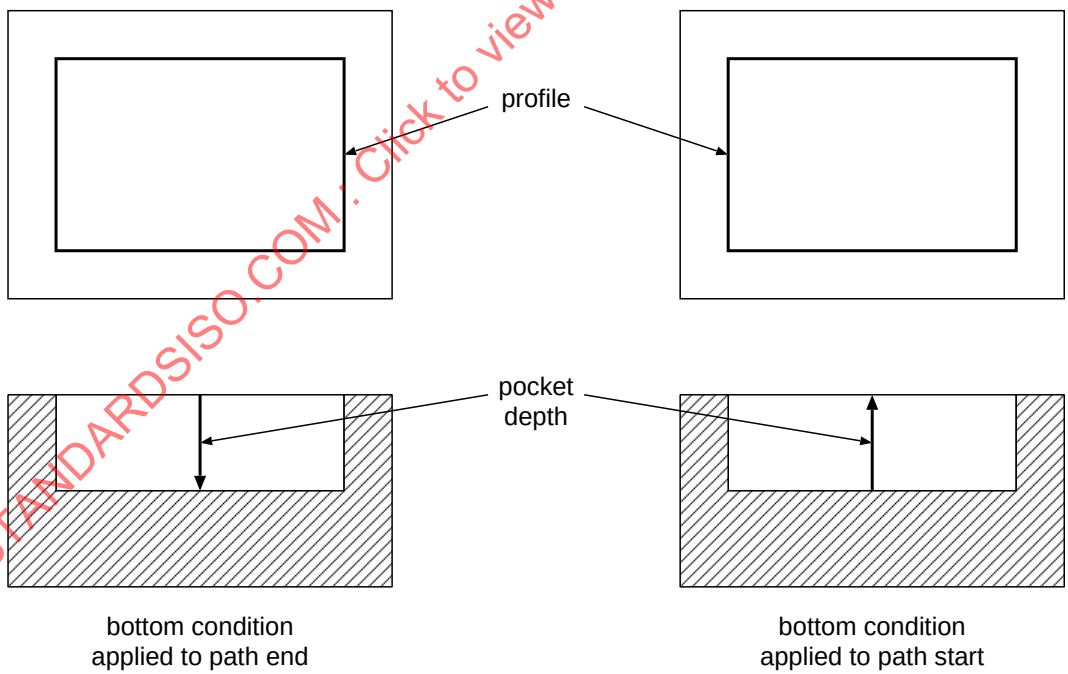


Figure 54 – Sweep path for pocket features

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4.2.366 Pocket_feature

A Pocket_feature is the result of the removal of a volume from a shape. The removed volume is defined by a profile that is swept along a path. Additional characteristics regarding the bottom of the pocket or the walls of the pocket may also be specified.

A Pocket_feature is a type of Process_feature_in_solid (see 4.2.380).

Each Pocket_feature is a General_pocket (see 4.2.229), a Rectangular_closed_pocket (see 4.2.421), or a Rectangular_open_pocket (see 4.2.425).

The data associated with a Pocket_feature are the following:

— base_radius;

— bottom_condition;

— boundary;

— pocket_depth;

— taper.

4.2.366.1 base_radius

The base_radius specifies a radius shape blend between a Pocket_feature and the surrounding surface at its base.

See 4.3.1256 for the application assertion.

The base_radius need not be specified for a particular Pocket_feature (see 4.2.366).

4.2.366.2 bottom_condition

The bottom_condition specifies the Pocket_bottom_condition (see 4.2.365) or the Through_pocket_-bottom_condition (see 4.2.520) object that defines the type of the pocket bottom.

See 4.3.1258 and 4.3.1260 for the application assertions.

There shall be exactly one object that defines the bottom_condition for a Pocket_feature (see 4.2.366).

4.2.366.3 boundary

The boundary specifies the Profile_usage (see 4.2.403) that provides the enclosing Profile (see 4.2.401) for the Pocket_feature.

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See 4.3.1259 for the application assertion.

4.2.366.4 pocket_depth

The pocket_depth specifies the Linear_path (see 4.2.300) that is used to sweep the Closed_profile (see 4.2.72).

See 4.3.1257 for the application assertion.

4.2.366.5 taper

The taper specifies an angular variation of the size of the Pocket_feature along the sweep path. The variation shall be specified either by an Angle_taper (see 4.2.12) or by a Directed_taper (see 4.2.154).

See 4.3.1253, 4.3.1254, and 4.3.1255 for the application assertions.

The taper need not be specified for a particular Pocket_feature (see 4.2.366).

If present, there shall be exactly one object that defines the taper for a Pocket_feature.

4.2.367 Point

A Point is a location in a Cartesian coordinate space.

A Point is a type of Detailed_geometric_model_element (see 4.2.144).

Each Point is a Point_on_surface (see 4.2.374), a Point_on_curve (see 4.2.373), or a Cartesian_point (see 4.2.47).

4.2.368 Point_appearance

A Point_appearance is the visual appearance of a point.

The data associated with a Point_appearance are the following:

— colour;

— marker.

4.2.368.1 colour

The colour specifies the colour of a point. The colour is either user-defined or pre-defined. Figure 24 shows the pre-defined colours.

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4.2.368.2 marker

The marker specifies the Point_marker_symbol (see 4.2.372) that shall be used to present a point.

See 4.3.1261 for the application assertion.

4.2.369 Point_direction

A Point_direction is the location in space of a single axis.

EXAMPLE The Point_direction may be used to describe the position and the orientation of a machining tool.

A Point_direction is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Point_direction are the following:

— location;

— vector.

4.2.369.1 location

The location specifies the position of the Point_direction (see 4.2.369) in space.

See 4.3.1262 for the application assertion.

4.2.369.2 vector

The vector specifies the direction of the Point_direction in space.

4.2.370 Point_direction_model

A Point_direction_model is a model in three dimensional space consisting only of ordered sequences of points or of points with associated directions.

EXAMPLE For scanned data along planar intersections of a part, or for a model of an item, several point direction sequences can be used to specify the measured points together with the measured normal direction on the surface of the object in their sequence along the planar intersection. Another example is the specification of a tool path where the sequence specifies the tool path as a polygon and the direction specifies the direction of the tool, e.g., a miller, in each point of the path.

A Point_direction_model is a type of Geometric_model (see 4.2.238).

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The data associated with a Point_direction_model are the following:

— point_direction_elements;

— point_elements.

4.2.370.1 point_direction_elements

The point_direction_elements specifies the Point_direction_sequence (see 4.2.371) elements of a Point_-direction_model.

See 4.3.1263 for the application assertion.

4.2.370.2 point_elements

The point_elements specifies the Point_sequence (see 4.2.375) elements of a Point_direction_model.

See 4.3.1264 for the application assertion.

4.2.371 Point_direction_sequence

A Point_direction_sequence is an ordered list of points and of associated directions.

> EXAMPLE A Point_direction_sequence may be used to represent the consecutive locations of a cutting tool during a machining operation.

A Point_direction_sequence is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Point_direction_sequence are the following:

— element

The element specifies the Point_direction (see 4.2.369) objects or the Point_on_surface (see 4.2.374) objects that define the consecutive points and the appropriate axis directions. In the case of a Point_on_-surface, the direction is the cross product of the principal tangent vectors u and v of the surface in this point.

See 4.3.1265 and 4.3.1266 for the application assertions.

There shall be at least one object that defines the element for a Point_direction_sequence.

4.2.372 Point_marker_symbol

A Point_marker_symbol is a predefined annotation symbol used to present a point.

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This AP supports the point marker symbols shown in figure 55 .

4.2.373 Point_on_curve

A Point_on_curve is a point that is defined by evaluating a given curve at a specified parameter value.

NOTE - A Point_on_curve implicitly represents the topological relation between a point and a curve.

A Point_on_curve is a type of Point (see 4.2.367).

4.2.374 Point_on_surface

A Point_on_surface is a point that is defined in the domain of a surface. Its actual location in 3D geometric space is obtained by evaluating the parametric equation of the surface with a particular pair of parameter values.

NOTE - The object implicitly represents the topological relation between a point and a surface.

A Point_on_surface is a type of Point (see 4.2.367).

4.2.375 Point_sequence

A Point_sequence is an ordered list of points.

A Point_sequence is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Point_sequence are the following:

— element

The element specifies the point elements that define the consecutive points.

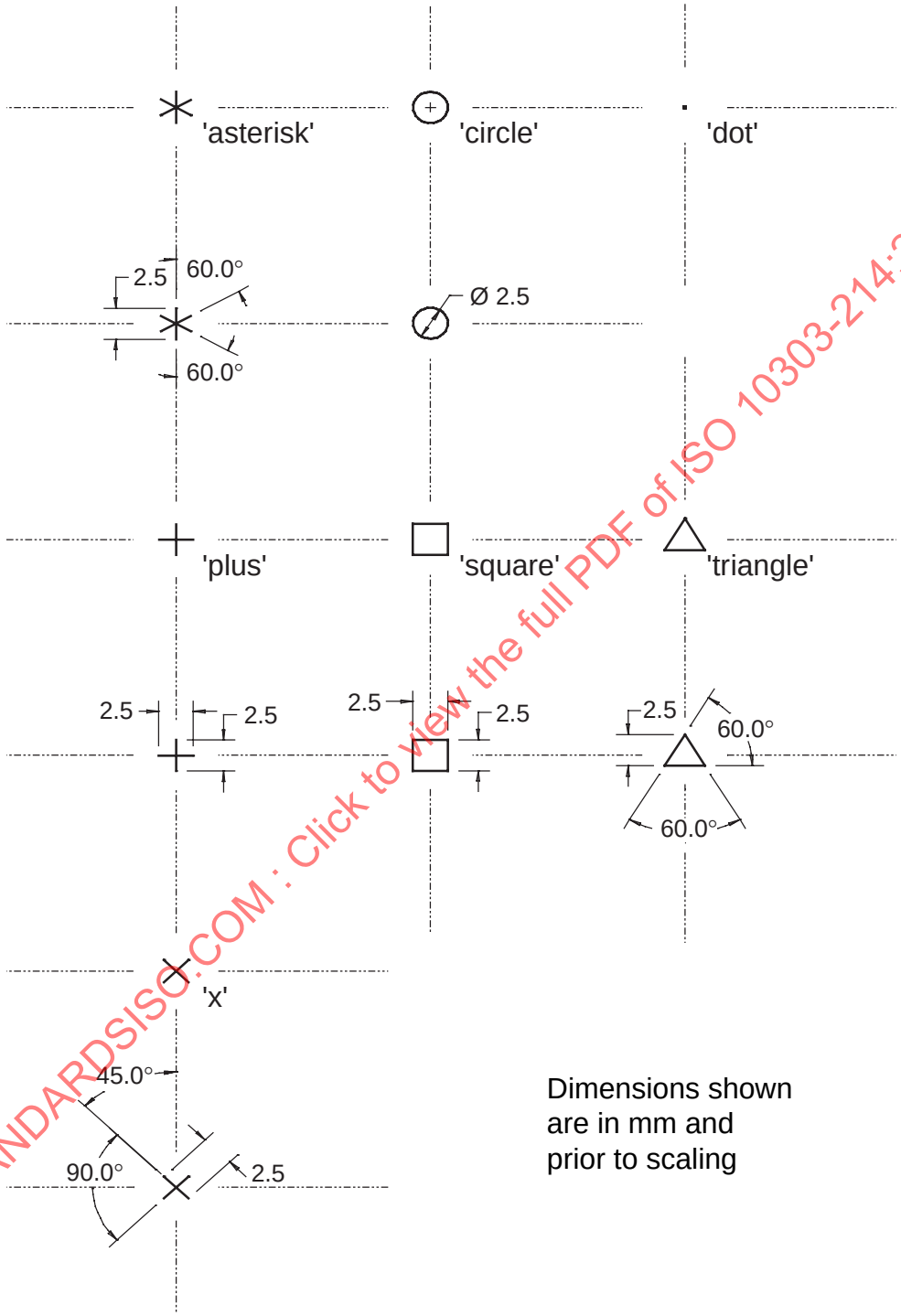
See 4.3.1267 for the application assertion.

4.2.376 Poly_loop

A Poly_loop is a polygon. It is represented by an ordered co-planar collection of Cartesian points forming the vertices of the Poly_loop. The loop is composed of straight line segments joining a point in the collection to the succeeding point in the collection. The closing segment is from the last to the first point in the collection. The direction of the Poly_loop is in the direction of the line segments.

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Figure 55 – Predefined point markers

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The data associated with a Poly_loop are the following:

— outer;

— polygon.

4.2.376.1 outer

The outer specifies whether the Poly_loop represents the outer boundary of the Faceted_face (see 4.2.198) or not.

4.2.376.2 polygon

The polygon specifies the points that are joined by line segments to form a Poly_loop (see 4.2.376).

See 4.3.1268 for the application assertion.

4.2.377 Polyline

A Polyline is a curve that is represented by n-1 linear segments, defined by a list of n points. A Polyline may be closed and may self-intersect.

A Polyline is a type of Curve (see 4.2.108).

4.2.378 Position_tolerance

A Position_tolerance is a constraint on the location of a Shape_element (see 4.2.449). It defines a zone within which the centre, axis, or centre plane of the considered Shape_element is permitted to lie.

NOTE 1 - Basic dimensions establish the true position from specified datum features and between interrelated features.

NOTE 2 - The concept of position tolerances is defined in ISO 5458 [14].

A Position_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Position_tolerance are the following:

— affected_plane;

— reference_datum.

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4.2.378.1 affected_plane

The affected_plane specifies the plane in which a certain type of geometric tolerance applies. This attribute covers information that corresponds to the drawing plane on drawings. If the affected_plane attribute is not specified, the tolerance applies in all directions which results in a cylindrical tolerance zone (on drawings indicated by the diameter symbol).

EXAMPLE Figure 56 illustrates the meaning of the affected_plane in the case of a Position_tolerance.

See 4.3.1270 for the application assertion.

The affected_plane need not be specified for a particular Position_tolerance (see 4.2.378).

4.2.378.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1269 for the application assertion.

4.2.379 Process_feature_in_panel

A Process_feature_in_panel is a feature that is defined to be applied to a sheet like part.

A Process_feature_in_panel is a type of Feature_definition (see 4.2.199).

Each Process_feature_in_panel is a Locator_feature (see 4.2.302), a Form_feature_in_panel (see 4.2.212), a Bead_feature (see 4.2.39), a Hole_feature_in_panel (see 4.2.258), a Compound_feature_in_panel (see 4.2.85), or a Joggle_feature (see 4.2.277).

The data associated with a Process_feature_in_panel are the following:

— punch_direction

The punch_direction specifies the stamping direction when manufacturing the Process_feature_in_panel.

NOTE - Usually, the punch_direction is the direction normal to the panel surface towards that side of the panel at which the resulting Process_feature_in_panel protrudes from the surface.

The punch_direction need not be specified for a particular Process_feature_in_panel.

4.2.380 Process_feature_in_solid

A Process_feature_in_solid is a feature that is defined to be applied to a solid part. Each single Process_-feature_in_solid (i.e. not a Compound_feature_in_solid (see 4.2.88)) is specified as a volume defined by

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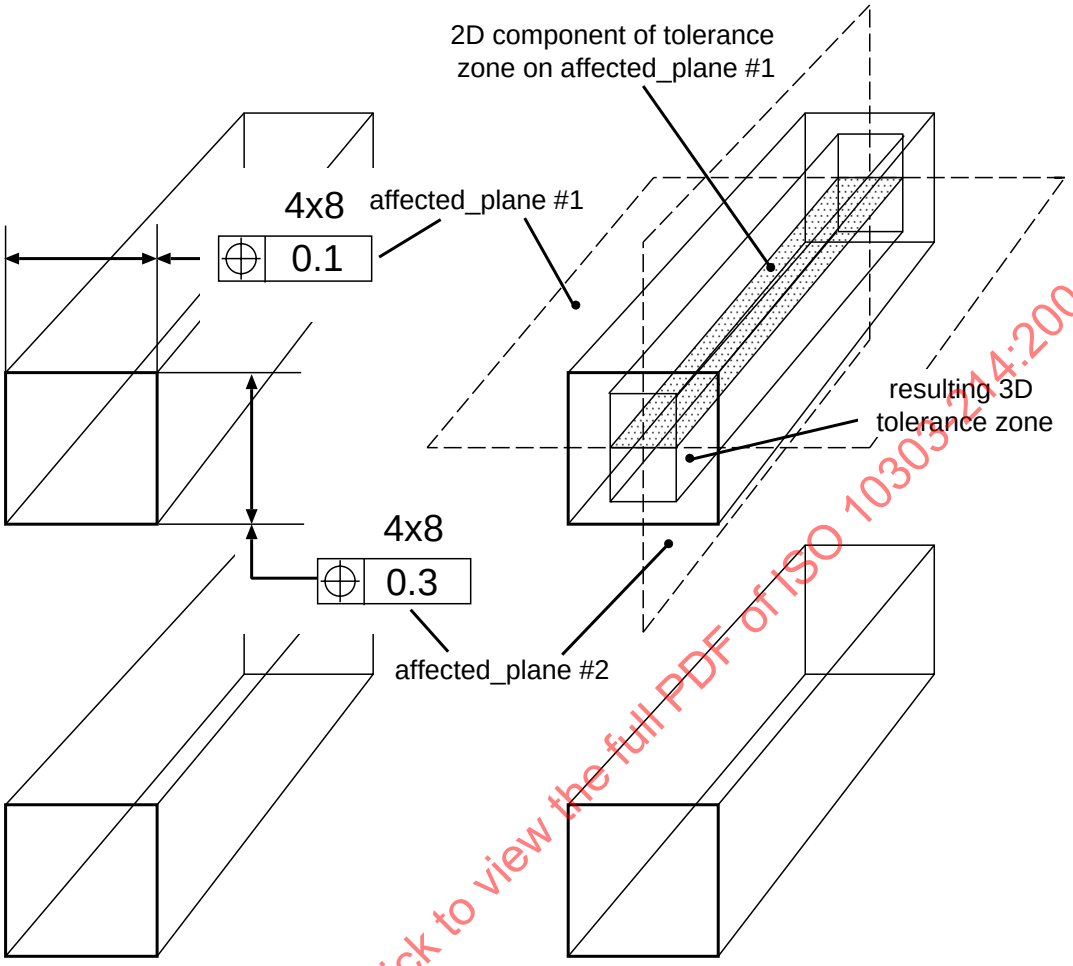


Figure 56 – Position tolerancing with affected planes

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a Profile (see 4.2.401) and a sweep Path (see 4.2.342); depending on the type of Process_feature_in_solid this volume is either added to or subtracted from the part.

In the case where the Process_feature_in_solid is defined to be applied as an Included_feature (see 4.2.261) the feature itself as well as the Path and the Profile shall be defined in the coordinate space of the part. In the case where the Process_feature_in_solid is defined to be applied as a Placed_feature (see 4.2.356) the Process_feature_in_solid as well as the Profile shall be defined in their own local coordinate spaces; the Path shall be defined in the feature coordinate space. The spatial constraints between profile, feature, and part shall be specified by geometric Transformation (see 4.2.533) objects.

NOTE 1 - The latter allows to re-use feature definitions for multiple occurrences of the feature.

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In the case, where the Process_feature_in_solid is defined by a profile that is swept along a path the following rules apply:

Profiles that are swept along a path shall be oriented normal to the path at any position along the path. The geometric transformation placing a profile shall be in a way that the profile plane coincides with the plane normal to the path at the path start or end respectively.

Profiles that are swept along a path shall not twist along the path; no twisting in this context means that the x-axis of the profile is always parallel to the plane that is the x-z-plane of the 'first occurrence' of the profile. The z-axis of the profile is always tangent to the sweep path.

If C_1 is the path, C_2 the profile, P any point on C_1, T the tangent of C_1 at P, N the normal of C_1 at P, V the axis defined by P and N, R_c the curvature radius of C_1 at P, C_3 the curve resulting from a) positioning of C_2 in the coordinate space of the feature, b) sweeping of the curve, resulting from the previous step, along C_1 up to P, c) projection of the curve, resulting from the previous step, on the plane defined by P, T, and N, and D_{max} the maximum coordinate of C_3 along V then

— N shall exist in any point P of C_1 where $R_c < \infty$;

— $D_{max} \leq R_c$ in any point P of C_1 where $R_c < \infty$.

A Process_feature_in_solid is a type of Feature_definition (see 4.2.199).

Each Process_feature_in_solid is a Pocket_feature (see 4.2.366), a Rib_feature (see 4.2.435), a Round_-hole (see 4.2.439), a Compound_feature_in_solid (see 4.2.88), a Boss_feature (see 4.2.42), or a Slot_-feature (see 4.2.458).

The data associated with a Process_feature_in_solid are the following:

— location_and_orientation

The location_and_orientation specifies the Axis_placement (see 4.2.33) that defines the location and orientation of the feature. The location_and_orientation is specified for the purpose of evaluation by manufacturing systems, which use the information in order to determine various machining parameters. For all types of Process_feature_in_solid, except for Compound_feature_in_solid, the location_and_-orientation shall reference the same instance of Axis_placement as the Profile it refers to as one of its parameters.

NOTE 2 - The use of the location_and_orientation for Compound_feature_in_solid is defined in that particular application object.

See 4.3.1271 for the application assertion.

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4.2.381 Process_operation_definition

A Process_operation_definition is the specification of an activity that may be included in a Process_plan (see 4.2.387). A Process_operation_definition characterizes a manufacturing or control operation.

NOTE 1 - Process_operation_definition as well as Process_operation_occurrence (see 4.2.384) may be associated with organizational data using, e.g., Person_organization_assignment (see 4.2.349). The reason for having these data available for both types of objects is the requirement to associate Process_operation_definition with organizational data in both a context independent and a context dependent way (the context is a particular Process_plan).

NOTE 2 - In the case where an instance of Process_operation_definition is associated with, e.g., two Organization (see 4.2.331) objects (e.g., as location), once context independent and once context dependent, the two locations need not be the same but should be related in a way that the context dependent location should be a specialization of the context independent location (e.g., a particular assembly line in a plant).

The data associated with a Process_operation_definition are the following:

— description;

— id;

— name;

— process_type;

— version_id.

4.2.381.1 description

The description specifies additional information about the Process_operation_definition.

See 4.3.1272 for the application assertion.

The description need not be specified for a particular Process_operation_definition (see 4.2.381).

If present, there shall be exactly one object that defines the description for a Process_operation_definition.

4.2.381.2 id

The id specifies the identifier of the Process_operation_definition that shall be unique within the scope of the associated Process_plan_version (see 4.2.389).

4.2.381.3 name

The name specifies the word or group of words by which the Process_operation_definition is referred to.

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EXAMPLE ’operation Z10.114’ is an example for name.

See 4.3.1272 for the application assertion.

The name need not be specified for a particular Process_operation_definition (see 4.2.381).

If present, there shall be exactly one object that defines the name for a Process_operation_definition.

4.2.381.4 process_type

The process_type specifies the type of the Process_operation_definition.

EXAMPLE ’stamping’, ’milling’, ’drilling’, ’welding’, ’casting’, and ’painting’ are examples for process_-type.

4.2.381.5 version_id

The version_id specifies the identification of a particular version of a Process_operation_definition.

The version_id need not be specified for a particular Process_operation_definition (see 4.2.381).

4.2.382 Process_operation_definition_relationship

A Process_operation_definition_relationship is a relationship between two Process_operation_definition (see 4.2.381) objects.

The data associated with a Process_operation_definition_relationship are the following:

— related;

— relating;

— relation_type.

4.2.382.1 related

The related specifies the second of the two objects related by the Process_operation_definition_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.1273 for the application assertion.

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4.2.382.2 relating

The relating specifies the first of the two objects related by the Process_operation_definition_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.1273 for the application assertion.

4.2.382.3 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'alternative': The application object defines a relationship where the related Process_operation_definition (see 4.2.381) may be used alternatively instead of the relating Process_operation_definition;

— 'substitution': The application object defines a relationship where the related Process_operation_definition replaces the relating Process_operation_definition;

— 'version association': The application object defines a relationship where the related Process_operation_definition is a version of the relating Process_operation_definition. In this case, only the related Process_operation_definition shall specify a version_id;

— 'version sequence': The application object defines a relationship where the relating Process_operation_definition is the preceding version and the related Process_operation_definition is the following version. In this case, both Process_operation_definition objects shall specify a version_id.

4.2.383 Process_operation_input_or_output

A Process_operation_input_or_output is the input or expected result of a Process_operation_definition (see 4.2.381).

The data associated with a Process_operation_input_or_output are the following:

— concerned_shape;

— description;

— element;

— operation;

— placement;

— role.

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4.2.383.1 concerned_shape

The concerned_shape specifies the set of Shape_element (see 4.2.449) objects that are affected by the Process_operation_occurrence (see 4.2.384).

See 4.3.1280 for the application assertion.

4.2.383.2 description

The description specifies additional information about the Process_operation_input_or_output.

See 4.3.1278 for the application assertion.

The description need not be specified for a particular Process_operation_input_or_output (see 4.2.383).

If present, there shall be exactly one object that defines the description for a Process_operation_input_-or_output.

4.2.383.3 element

The element specifies the element that plays the role of the input or the output for the operation.

See 4.3.1274, 4.3.1275, 4.3.1276, and 4.3.1277 for the application assertions.

There shall be exactly one object that defines the element for a Process_operation_input_or_output (see 4.2.383).

4.2.383.4 operation

The operation specifies the Process_operation_occurrence (see 4.2.384) that the Process_operation_-input_or_output is associated with.

See 4.3.1279 for the application assertion.

4.2.383.5 placement

The placement specifies the geometrical Transformation (see 4.2.533) between the local coordinate system of the element acting as Process_operation_input_or_output, and the reference coordinate system. The reference coordinate system is either the coordinate system of the reference tool, if present, for the concerned Process_operation_occurrence (see 4.2.384) or, if no reference tool is present, the coordinate system of the Process_operation_occurrence itself.

See 4.3.1281 for the application assertion.

The placement need not be specified for a particular Process_operation_input_or_output (see 4.2.383).

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4.2.383.6 role

The role specifies whether the identified element plays the role of an input or an output for the operation.

4.2.384 Process_operation_occurrence

A Process_operation_occurrence is the usage of a Process_operation_definition (see 4.2.381) in a Process_plan (see 4.2.387). This association states that the Process_operation_definition is part of the Process_plan.

NOTE - This mechanism enables the reuse of a Process_operation_definition in the context of more than one Process_plan.

The data associated with a Process_operation_occurrence are the following:

— id;

— is_defined_in;

— operation_definition;

— plan.

4.2.384.1 id

The id specifies the identifier of the Process_operation_occurrence.

4.2.384.2 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) of the Process_operation_occurrence for the case where none of the tools associated by Process_operation_input_or_output plays the role of a reference tool defining the reference coordinate space.

See 4.3.1282 for the application assertion.

The is_defined_in need not be specified for a particular Process_operation_occurrence (see 4.2.384).

4.2.384.3 operation_definition

The operation_definition specifies the Process_operation_definition (see 4.2.381) that defines the Process_operation_occurrence in a Process_plan (see 4.2.387).

See 4.3.1283 for the application assertion.

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4.2.384.4 plan

The plan specifies the Process_plan (see 4.2.387) to which the Process_operation_occurrence is assigning a Process_operation_definition (see 4.2.381).

See 4.3.1284 for the application assertion.

4.2.385 Process_operation_occurrence_relationship

A Process_operation_occurrence_relationship is a relationship between two Process_operation_occurrence (see 4.2.384) objects.

NOTE - The relating Process_operation_occurrence and the related Process_operation_occurrence need not belong to the same Process_plan_version (see 4.2.389).

The data associated with a Process_operation_occurrence_relationship are the following:

— cycle_time;

— description;

— related;

— relating;

— relation_type;

— waiting_time.

4.2.385.1 cycle_time

The cycle_time specifies the interval of time within which both Process_operation_occurrence (see 4.2.384) objects have to take place in order to be declared as simultaneous.

The cycle_time need not be specified for a particular Process_operation_occurrence_relationship (see 4.2.385).

4.2.385.2 description

The description specifies additional information about the Process_operation_occurrence_relationship.

See 4.3.1285 for the application assertion.

The description need not be specified for a particular Process_operation_occurrence_relationship (see 4.2.385).

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If present, there shall be exactly one object that defines the description for a Process_operation_occurrence_relationship.

4.2.385.3 related

The related specifies the second of the two Process_operation_occurrence (see 4.2.384) objects related by a Process_operation_occurrence_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1286 for the application assertion.

4.2.385.4 relating

The relating specifies the first of the two Process_operation_occurrence (see 4.2.384) objects related by a Process_operation_occurrence_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1286 for the application assertion.

4.2.385.5 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The application object defines a relationship where the related Process_operation_occurrence (see 4.2.384) is one of the components of the relating Process_operation_occurrence;

— 'exclusiveness': The application object defines a relationship where the relating and the related Process_operation_occurrence shall not have any overlap in time of execution;

— 'sequence': The application object defines a relationship where the relating Process_operation_occurrence shall be completed before the related Process_operation_occurrence starts;

— 'simultaneity': The application object defines a relationship where the relating and the related Process_operation_occurrence are considered as occurring during the same time period;

NOTE 1 - The criteria for 'simultaneity' and in particular the allowed delay between two Process_operation_occurrence objects declared simultaneous, are user-dependent.

NOTE 2 - See attribute 'cycle_time' for additional information.

— 'substitution': The application object defines a relationship where the related Process_operation_occurrence replaces of the relating Process_operation_occurrence.

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4.2.385.6 waiting_time

The waiting_time specifies the time which shall elapse, at least, between the completion of the relating Process_operation_occurrence (see 4.2.384) and the start of the related Process_operation_occurrence. The referenced shall have a definition that is a Duration_property (see 4.2.175).

EXAMPLE The Process_operation_occurrence 'polishing' must not be started less than 2 hours after the Process_operation_occurrence 'painting' ended.

See 4.3.1287 for the application assertion.

The waiting_time need not be specified for a particular Process_operation_occurrence_relationship (see 4.2.385).

4.2.386 Process_operation_resource_assignment

A Process_operation_resource_assignment is a mechanism to associate a resource with a Process_operation_occurrence (see 4.2.384).

The data associated with a Process_operation_resource_assignment are the following:

— operation;

— placement;

— reason;

— reference_tool;

— resource_definition.

4.2.386.1 operation

The operation specifies the Process_operation_occurrence (see 4.2.384) with which the resource is associated.

See 4.3.1293 for the application assertion.

4.2.386.2 placement

The placement specifies the geometrical Transformation (see 4.2.533) between the local coordinate system of the Process_operation_resource_assignment and the reference coordinate system.

NOTE - The reference coordinate system is either the coordinate system of the reference tool (if present) for the concerned Process_operation_definition (see 4.2.381) or (if no reference tool is present) the coordinate system of the Process_operation_definition itself.

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In the case where the value of the attribute reference_tool is 'true', no transformation shall be defined.

See 4.3.1295 for the application assertion.

The placement need not be specified for a particular Process_operation_resource_assignment (see 4.2.386).

4.2.386.3 reason

The reason specifies the rationale behind the use of the resource for a particular Process_operation_occurrence (see 4.2.384).

See 4.3.1291 for the application assertion.

The reason need not be specified for a particular Process_operation_resource_assignment (see 4.2.386).

If present, there shall be exactly one object that defines the reason for a Process_operation_resource_assignment.

4.2.386.4 reference_tool

The reference_tool specifies whether or not the resource identified by the Process_operation_resource_assignment plays the role of the reference tool for the occurrence of an operation.

In the case where the value of this attribute is 'true', all geometric transformations within the scope of the Process_operation_occurrence (see 4.2.384) are defined with respect to the local coordinate system of the resource identified by the Process_operation_resource_assignment. There must not be more than one resource playing the role of the reference tool for one Process_operation_occurrence.

In the case where the resource is not represented as a Design_discipline_item_definition (see 4.2.142) the value of the reference_tool shall be 'false'.

4.2.386.5 resource_definition

The resource_definition specifies the tool that is used to perform the operation.

See 4.3.1288, 4.3.1289, 4.3.1290, 4.3.1292, and 4.3.1294 for the application assertions.

There shall be exactly one object that defines the resource_definition for a Process_operation_resource_assignment (see 4.2.386).

4.2.387 Process_plan

A Process_plan is the manufacturing planning information, necessary to realize or produce a particular version of an Item (see 4.2.267).

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Each Process_plan may be a Process_plan_version (see 4.2.389).

The data associated with a Process_plan are the following:

— description;

— name;

— plan_id;

— produced_output.

4.2.387.1 description

The description specifies additional information about the Process_plan.

See 4.3.1297 for the application assertion.

The description need not be specified for a particular Process_plan (see 4.2.387).

If present, there shall be exactly one object that defines the description for a Process_plan.

4.2.387.2 name

The name specifies the word or group of words by which the Process_plan is referred to.

EXAMPLE ’ABO Engine Cylinder block machining line’ is an example for name.

See 4.3.1297 for the application assertion.

The name need not be specified for a particular Process_plan (see 4.2.387).

If present, there shall be exactly one object that defines the name for a Process_plan.

4.2.387.3 plan_id

The plan_id specifies the identifier of the Process_plan that shall be unique within the scope of an organization.

4.2.387.4 produced_output

The produced_output specifies the set of Item_version (see 4.2.275) objects that are produced by the operations of the Process_plan.

See 4.3.1296 for the application assertion.

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The produced_output need not be specified for a particular Process_plan (see 4.2.387).

4.2.388 Process_plan_relationship

A Process_plan_relationship is the relationship between two Process_plan (see 4.2.387) objects.

EXAMPLE If an item shall be manufactured at two different manufacturing sites, e.g., one at Paris and the other at Bordeaux, there will be two different process plans, that may be related by a Process_plan_-relationship.

The data associated with a Process_plan_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.388.1 description

The description specifies additional information about the Process_plan_relationship.

See 4.3.1298 for the application assertion.

The description need not be specified for a particular Process_plan_relationship (see 4.2.388).

If present, there shall be exactly one object that defines the description for a Process_plan_relationship.

4.2.388.2 related

The related specifies the second of the two Process_plan (see 4.2.387) objects related by a Process_-plan_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1299 for the application assertion.

4.2.388.3 relating

The relating specifies the first of the two Process_plan (see 4.2.387) objects related by a Process_plan_-relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

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See 4.3.1299 for the application assertion.

4.2.388.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'alternative': The application object defines a relationship where the related Process_plan (see 4.2.387) may be used alternatively to the relating Process_plan;

— 'version association': The application object defines a relationship where the related Process_plan is a version of the relating Process_plan. In this case, the related Process_plan shall be a Process_-plan_version (see 4.2.389);

— 'version sequence': The application object defines a relationship where the relating Process_plan is the preceding version and the related Process_plan is the following version. In this case, both Process_plan objects shall be of type Process_plan_version.

4.2.389 Process_plan_version

A Process_plan_version is a particular version of a Process_plan (see 4.2.387).

A Process_plan_version is a type of Process_plan (see 4.2.387).

The data associated with a Process_plan_version are the following:

— version_id

The version_id specifies the identification of a particular version of a Process_plan.

4.2.390 Process_property_association

A Process_property_association is a mechanism to assign a property value to process related objects.

A Process_property_association is a type of Property_value_association (see 4.2.413).

The data associated with a Process_property_association are the following:

— described_element

The described_element specifies the object that is described by the property value.

See 4.3.1300, 4.3.1301, 4.3.1302, 4.3.1303, 4.3.1304, and 4.3.1305 for the application assertions.

There shall be exactly one object that defines the described_element for a Process_property_association.

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4.2.391 Process_state

A Process_state is a view of an in-process-item definition of a particular version of a Item (see 4.2.267). It characterizes a state of the Item_version (see 4.2.275) that occurs before the state identified by the 'related_item_definition'. The identifier of a Process_state shall be unique within the context of the Item_version and of the Process_plan_version (see 4.2.389).

NOTE - Process_state may be used to characterize intermediate states of the Item_version, if this Item_version is one of the produced outputs of a Process_plan (see 4.2.387).

A Process_state is a type of Design_discipline_item_definition (see 4.2.142).

The data associated with a Process_state are the following:

— related_item_definition

The related_item_definition specifies the Design_discipline_item_definition (see 4.2.142) that defines the final item that the in-process-item is a preliminary stage of.

See 4.3.1306 for the application assertion.

4.2.392 Product_class

A Product_class is the identification of a set of similar products to be offered to the market. Product_class objects that are related to each other by a Product_class_relationship (see 4.2.393) do not inherit any characteristics from each other.

EXAMPLE Figure 57 depicts a detail of an example of a structure build up by Product_class and Product_class_relationship objects.

The data associated with a Product_class are the following:

— description;

— id;

— level_type;

— name;

— version_id.

4.2.392.1 description

The description specifies additional information about the Product_class.

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See 4.3.1307 for the application assertion.

The description need not be specified for a particular Product_class (see 4.2.392).

If present, there shall be exactly one object that defines the description for a Product_class.

4.2.392.2 id

The id specifies the identifier of the Product_class that shall be unique.

NOTE - The scope of the uniqueness is usually dependent on the form of implementation; it may be e.g., a physical file or a data base.

4.2.392.3 level_type

The level_type specifies the level or category of this Product_class in a hierarchical structure of Product_-class objects. The level_type shall only be used if and only if the level_type is specified in the the context of the unit of functionality 'specification_control' (UoF S7).

EXAMPLE A high level Product_class (level_type = 'enterprise') may be used to define all Specification_-category (see 4.2.468) and Specification (see 4.2.467) objects for all Product_class objects of an enterprise with several brands and companies.

A second level Product_class (level_type = 'platform') may be used to group all products that are based on the same technical concept (platform); these products may belong to different brands.

A third level Product_class (level_type = 'car family') may be used to group all products that have a common base and a fixed set of characteristics (specification categories).

A fourth level Product_class (level_type = 'car type') may represent products that are offered to the market; this level of Product_class may be defined by the marketing department. A set of specifications sufficient to produce the car is associated with its Product_class. Within this association, a distinction is made between standard characteristics (e.g. number of doors) and options that have to be chosen (e.g., outside colour) or that may be chosen by the customer (e.g., radio).

The level_type need not be specified for a particular Product_class (see 4.2.392).

4.2.392.4 name

The name specifies the word or group of words by which the Product_class is referred to.

EXAMPLE '69 Buick Electra', 'Bugatti Royal', 'Pacific 213', and 'Airbus A320' are examples for name.

See 4.3.1307 for the application assertion.

The name need not be specified for a particular Product_class (see 4.2.392).

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If present, there shall be exactly one object that defines the name for a Product_class.

4.2.392.5 version_id

The version_id specifies the identification of a particular version of a Product_class.

The version_id need not be specified for a particular Product_class (see 4.2.392).

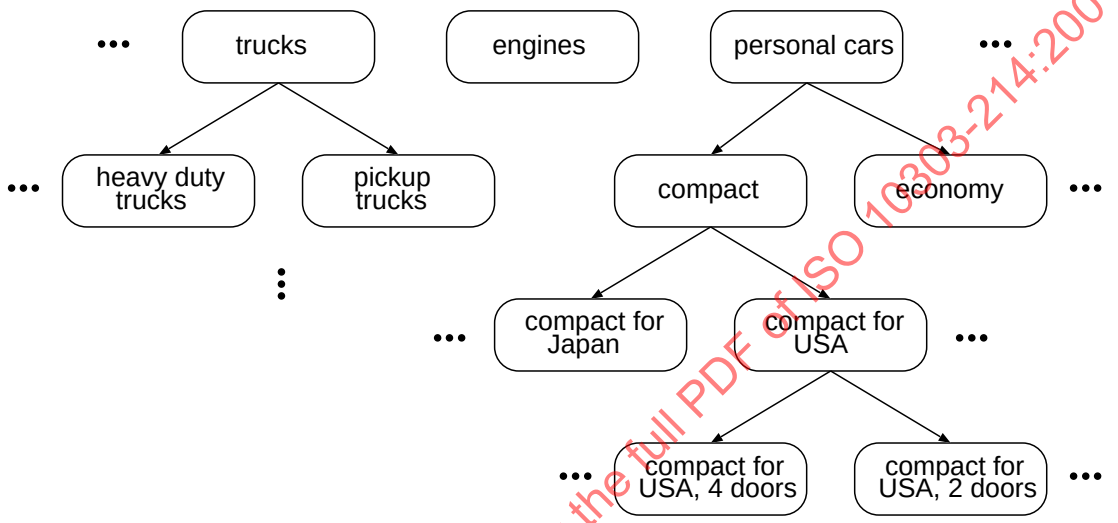


Figure 57 – Example structure of Product_class objects in a hierarchy

4.2.393 Product_class_relationship

A Product_class_relationship is a relationship between two Product_class (see 4.2.392) objects.

The data associated with a Product_class_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.393.1 description

The description specifies additional information about the Product_class_relationship.

See 4.3.1308 for the application assertion.

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The description need not be specified for a particular Product_class_relationship (see 4.2.393).

If present, there shall be exactly one object that defines the description for a Product_class_relationship.

4.2.393.2 related

The related specifies the second of the two Product_class (see 4.2.392) objects related by the Product_class_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1309 for the application assertion.

4.2.393.3 relating

The relating specifies the first of the two Product_class (see 4.2.392) objects related by the Product_class_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1309 for the application assertion.

4.2.393.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'derivation': the Product_class_relationship defines a relationship where the related Product_class (see 4.2.392) is derived from the relating Product_class;

— 'hierarchy': the Product_class_relationship defines a relationship where the relating Product_class is on a higher level in the hierarchy of Product_class objects than the related Product_class;

— 'substitution': The Product_class_relationship defines a relationship where the related Product_class replaces the relating Product_class;

— 'version sequence': the Product_class_relationship defines a relationship where the relating Product_class is the preceding version and the related Product_class is the following version.

NOTE - The relationship does not imply inheritance of any kind between the application objects that are related.

4.2.394 Product_component

A Product_component is an element in a conceptual product structure.

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NOTE 1 - A Product_component may, by intent, be generic to enable specializations. One or more distinct items may be defined from such a Product_component by adding specific characteristics.

NOTE 2 - A Product_component is a mechanism for collecting the knowledge a company has accumulated during the design of similar products.

A Product_component is a type of Complex_product (see 4.2.80) and Product_constituent (see 4.2.395).

The data associated with a Product_component are the following:

— description;

— instance_required;

— is_influenced_by;

— is_relevant_for;

— name.

4.2.394.1 description

The description specifies additional information about the Product_component.

See 4.3.1312 for the application assertion.

The description need not be specified for a particular Product_component (see 4.2.394).

If present, there shall be exactly one object that defines the description for a Product_component.

4.2.394.2 instance_required

The instance_required specifies if the existence of a corresponding Item_instance (see 4.2.271) is required for the various Alternative_solution (see 4.2.10) objects of that Product_component. A value of 'true' indicates that a corresponding Item_instance is required.

NOTE - There are Product_component objects that are not realized by parts. In these cases, no instance of an item is required.

EXAMPLE Trunk space or holes for wire harness are examples for Product_component objects that do not require instances.

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4.2.394.3 is_influenced_by

The is_influenced_by specifies the Specification_category (see 4.2.468) objects that impact the design of a solution for the Product_component in the context of the Product_class (see 4.2.392) objects that are referred to by the Class_category_association (see 4.2.64) objects.

NOTE - Each alternative solution for the Product_component (i.e. the design of these solutions) is influenced by the referenced Specification_category.

See 4.3.1311 for the application assertion.

4.2.394.4 is_relevant_for

The is_relevant_for specifies the Application_context (see 4.2.21) objects in which the Product_component has to be considered.

See 4.3.1310 for the application assertion.

4.2.394.5 name

The name specifies the word or group of words by which the Product_component is referred to.

EXAMPLE 1 'engine', 'chassis', and 'windshield wiper' are examples of name of the Product_component.

EXAMPLE 2 This attribute may also be used to indicate the type of component in a component structure such as 'BOM top node', 'BOM bottom node', 'structure BOM product node', or 'structure BOM node'.

See 4.3.1312 for the application assertion.

The name need not be specified for a particular Product_component (see 4.2.394).

If present, there shall be exactly one object that defines the name for a Product_component.

4.2.395 Product_constituent

A Product_constituent is an object that may participate in the functional, logical, or physical break-down or be an alternate realization of a Complex_product (see 4.2.80).

Each Product_constituent is a Product_component (see 4.2.394), a Product_function (see 4.2.397), or an Item_instance (see 4.2.271).

4.2.396 Product_design

A Product_design is a mechanism to associate an Item_version (see 4.2.275) with its corresponding Product_identification (see 4.2.398).

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The data associated with a Product_design are the following:

— design;

— product.

4.2.396.1 design

The design specifies the Item_version (see 4.2.275) that meets the requirements.

See 4.3.1313 for the application assertion.

4.2.396.2 product

The product specifies the Product_identification (see 4.2.398) that represents the requirements.

See 4.3.1314 for the application assertion.

4.2.397 Product_function

A Product_function is a behaviour or an action expected from a product.

> EXAMPLE The Product_function 'transportation' with sub-functions 'acceleration' and 'retardation' or the Product_function 'illumination' with sub-functions 'exterior illumination' and 'interior illumination' are examples for Product_function objects in a hierarchical structure.

A Product_function is a type of Complex_product (see 4.2.80) and Product_constituent (see 4.2.395).

The data associated with a Product_function are the following:

— description;

— is_relevant_for;

— name.

4.2.397.1 description

The description specifies additional information about the Product_function.

See 4.3.1316 for the application assertion.

The description need not be specified for a particular Product_function (see 4.2.397).

If present, there shall be exactly one object that defines the description for a Product_function.

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4.2.397.2 is_relevant_for

The is_relevant_for specifies the Application_context (see 4.2.21) objects in which the Product_function has to be considered.

See 4.3.1315 for the application assertion.

4.2.397.3 name

The name specifies the word or group of words by which the Product_function is referred to.

See 4.3.1316 for the application assertion.

The name need not be specified for a particular Product_function (see 4.2.397).

If present, there shall be exactly one object that defines the name for a Product_function.

4.2.398 Product_identification

A Product_identification identifies a manufacturable object, or expected as so. A Product_identification is defined with respect to the Product_class (see 4.2.392) it is a member of.

NOTE 1 - The kind of product that is to be manufactured from the data of the Product_identification, is the kind of product that the associated_product_class identifies a class of.

NOTE 2 - The intent of Product_identification is the identification of one manufacturable object whereas the intent of Product_class is the gathering of products with similar characteristics.

EXAMPLE A Product_identification that is associated with a Product_class that identifies a family of Diesel engines is intended to lead to the manufacture of a particular case of Diesel engine, and the Product_-identification that is associated with a Product_class that identifies a car family will lead to the manufacture of a car.

Each Product_identification may be a Product_specification (see 4.2.399).

The data associated with a Product_identification are the following:

— associated_product_class;

— description;

— id;

— name;

— version_id.

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4.2.398.1 associated_product_class

The associated_product_class specifies the Product_class (see 4.2.392) that a product belongs to.

See 4.3.1318 for the application assertion.

4.2.398.2 description

The description specifies additional information about the Product_identification.

See 4.3.1317 for the application assertion.

The description need not be specified for a particular Product_identification (see 4.2.398).

If present, there shall be exactly one object that defines the description for a Product_identification.

4.2.398.3 id

The id specifies the identifier of the Product_identification.

4.2.398.4 name

The name specifies the word or group of words by which the Product_identification is referred to.

See 4.3.1317 for the application assertion.

The name need not be specified for a particular Product_identification (see 4.2.398).

If present, there shall be exactly one object that defines the name for a Product_identification.

4.2.398.5 version_id

The version_id specifies the identification of a particular version of a Product_identification.

The version_id need not be specified for a particular Product_identification (see 4.2.398).

4.2.399 Product_specification

A Product_specification is a Product_identification (see 4.2.398) for which one or more additional Specification (see 4.2.467) objects enhance the characterization provided for the associated Product_class (see 4.2.392).

NOTE 1 - The actual set of Specification objects for a Product_specification are obtained by the union of 'defining_specifications' and of the Specification objects related to the 'associated_product_class' through a

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Class_specification_association (see 4.2.67) or a Class_condition_association (see 4.2.65) with association_-type 'identification'.

NOTE 2 - The specification of a Product_specification may be incomplete: there may not be in 'defining_specification' any instance of Specification for some Specification_category (see 4.2.468) declared as mandatory for the 'associated_product_class'. For these Specification_category objects any Specification available in the context of the 'associated_product_class' is considered as valid for the manufacturing of the product characterized by the considered Product_specification.

EXAMPLE If the colour is not specified for a given car family, the vehicle resulting from the realization of a Product_specification associated to the Product_class representing the car family may be without paint or painted in any available colour.

A Product_specification is a type of Product_identification (see 4.2.398).

The data associated with a Product_specification are the following:

— defining_specification

The defining_specification specifies the set of Specification objects necessary to discriminate the Product_specification within its Product_class.

See 4.3.1319 for the application assertion.

4.2.400 Product_structure_relationship

A Product_structure_relationship is an association between a Complex_product (see 4.2.80) and a Product_constituent (see 4.2.395), in which the Product_constituent is a functional, logical, or physical component or a realization of the Complex_product.

The data associated with a Product_structure_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.400.1 description

The description specifies additional information about the Product_structure_relationship.

See 4.3.1321 for the application assertion.

The description need not be specified for a particular Product_structure_relationship (see 4.2.400).

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If present, there shall be exactly one object that defines the description for a Product_structure_relationship.

4.2.400.2 related

The related specifies the Product_constituent (see 4.2.395) that is a functional, logical, or physical component or a realization of the relating Complex_product (see 4.2.80).

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1322 for the application assertion.

4.2.400.3 relating

The relating specifies the Complex_product (see 4.2.80) that is decomposed functionally, logically, or physically into or realized by the related Product_constituent (see 4.2.395).

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1320 for the application assertion.

4.2.400.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The related Product_constituent (see 4.2.395) is one of potentially more components of the relating Complex_product (see 4.2.80). This relation type shall only be used for Complex_product and Product_constituent of the same type;

— 'functionality': The related Product_constituent is an element of the functional structure of the relating Complex_product. This relation type shall only be used with a Complex_product of type Alternative_solution (see 4.2.10) or Product_component (see 4.2.394) and with a Product_constituent of type Product_function (see 4.2.397);

EXAMPLE 1 The Product_function 'heat dissipation' may be considered as one of the functionalities to be fulfilled by any technical solution for the Product_component 'braking system'.

— 'occurrence': The related Product_constituent is an occurrence defined by the relating Complex_product. This relation type shall only be used if related Product_constituent is of type Product_component;

— 'realization': The related Product_constituent is a means for fulfilling, either partially or fully, the requirements identified with the relating Complex_product. This relation type shall be used only when the Complex_product and the Product_constituent are of different types;

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EXAMPLE 2 The Product_component 'braking system' may be considered as a means to realize the Product_function 'braking'.

— 'specialization': The related Product_constituent fulfils the requirements of the relating Complex_product in a more specific way than defined for the relating Complex_product. This relation type shall only be used for Product_constituent and Complex_product of the same type.

4.2.401 Profile

A Profile is a planar outline. For all types of Profile, except for the general profiles, this outline is composed of various geometric parameters. The meaning of the parameters as well as the relation to the coordinate space is described for each type of Profile.

NOTE - A Profile may be used for the definition of form features.

Each Profile shall lie in the x-y-plane that is either the x-y-plane of its own local coordinate system (in the case where the Profile is used to define a feature that is applied as a Placed_feature (see 4.2.356)) or the x-y-plane defined by the Axis_placement (see 4.2.33) that serves as location_and_orientation (in the case where the Profile is used to define a feature that is applied as an Included_feature (see 4.2.261)).

Each Profile is an Open_profile (see 4.2.328) or a Closed_profile (see 4.2.72).

The data associated with a Profile are the following:

— is_defined_in;

— location_and_orientation.

4.2.401.1 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the Profile is defined. In the case where the Profile is used to define a feature that is applied as a Placed_feature (see 4.2.356), this is the own local coordinate space of the Profile. In the case where the Profile is used to define a feature that is applied as an Included_feature (see 4.2.261), this is the same coordinate space, in which the Included_feature is defined.

See 4.3.1324 for the application assertion.

4.2.401.2 location_and_orientation

The location_and_orientation specifies the Axis_placement (see 4.2.33) to which the parameters of the Profile refer. The location_and_orientation is specified for the purpose of evaluation by manufacturing systems, which use the information in order to determine various machining parameters. For each type of Profile it is specified, how the Axis_placement is located and oriented with respect to the outline of the Profile. In case of a Profile that is used to define a Placed_feature (see 4.2.356) the location_and_-

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orientation coincides with the origin and orientation of the Cartesian_coordinate_space (see 4.2.44) of the Profile.

See 4.3.1323 for the application assertion.

4.2.402 Profile_parameter

A Profile_parameter specifies the role of a Profile (see 4.2.401) in a General_feature (see 4.2.221). It is used to discriminate the members of the 'additional_profile_usage' of the General_feature.

The data associated with a Profile_parameter are the following:

— associated_profile;

— parameter_context;

— parameter_role.

4.2.402.1 associated_profile

The associated_profile specifies the Profile (see 4.2.401) for which a role is given.

See 4.3.1326 for the application assertion.

4.2.402.2 parameter_context

The parameter_context specifies the General_feature (see 4.2.221) in which the associated Profile (see 4.2.401) is identified.

See 4.3.1325 for the application assertion.

4.2.402.3 parameter_role

The parameter_role specifies the role of the Profile (see 4.2.401) that is used as an additional Profile in a General_feature (see 4.2.221).

EXAMPLE Examples for the parameter_role are 'boundary', 'diameter', or combinations of the value of the 'feature_type' of the General_feature with such a denominator.

4.2.403 Profile_usage

A Profile_usage is the identification of a Profile (see 4.2.401) and possibly of a geometric Transformation (see 4.2.533) used to place the Profile_usage in a reference coordinate space.

Each Profile_usage is a Closed_profile_usage (see 4.2.73) or an Open_profile_usage (see 4.2.329).

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The data associated with a Profile_usage are the following:

— profile_placement;

— used_profile.

4.2.403.1 profile_placement

The profile_placement specifies the geometric Transformation (see 4.2.533) that locates and orients the Profile (see 4.2.401) in the reference coordinate space.

See 4.3.1328 for the application assertion.

The profile_placement need not be specified for a particular Profile_usage (see 4.2.403).

4.2.403.2 used_profile

The used_profile specifies the Profile (see 4.2.401) that is used.

See 4.3.1327 for the application assertion.

4.2.404 Project

A Project is an identified program of work.

NOTE - A Project may be further characterized by planned or actual dates, allowed budget, or resources.

EXAMPLE For the development of a new car, a project is set up that is responsible for the development decisions as well as for the accounting of the costs.

The data associated with a Project are the following:

— actual_end_date;

— actual_start_date;

— affected_product_class;

— description;

— id;

— name;

— planned_end_date;

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— planned_start_date;

— work_program.

4.2.404.1 actual_end_date

The actual_end_date specifies the date when the Project was actually finished.

See 4.3.1330 for the application assertion.

The actual_end_date need not be specified for a particular Project (see 4.2.404).

4.2.404.2 actual_start_date

The actual_start_date specifies the date when the Project was actually started.

See 4.3.1330 for the application assertion.

The actual_start_date need not be specified for a particular Project (see 4.2.404).

4.2.404.3 affected_product_class

The affected_product_class specifies the set of Product_class (see 4.2.392) objects that are affected by the work carried out within a Project.

See 4.3.1334 for the application assertion.

4.2.404.4 description

The description specifies additional information about the Project.

See 4.3.1333 for the application assertion.

The description need not be specified for a particular Project (see 4.2.404).

If present, there shall be exactly one object that defines the description for a Project.

4.2.404.5 id

The id specifies the identifier of the Project.

4.2.404.6 name

The name specifies the word or group of words by which the Project is referred to.

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See 4.3.1333 for the application assertion.

There shall be exactly one object that defines the name for a Project (see 4.2.404).

4.2.404.7 planned_end_date

The planned_end_date specifies either the date when the Project is or was supposed to be finished or the planned duration of the Project.

See 4.3.1330, 4.3.1331, and 4.3.1332 for the application assertions.

The planned_end_date need not be specified for a particular Project (see 4.2.404).

If present, there shall be exactly one object that defines the planned_end_date for a Project.

4.2.404.8 planned_start_date

The planned_start_date specifies the date when the Project is or was supposed to be started.

See 4.3.1330 and 4.3.1332 for the application assertions.

The planned_start_date need not be specified for a particular Project (see 4.2.404).

If present, there shall be exactly one object that defines the planned_start_date for a Project.

4.2.404.9 work_program

The work_program specifies the Activity (see 4.2.2) objects that are carried out within the Project.

See 4.3.1329 for the application assertion.

4.2.405 Project_relationship

A Project_relationship is a relationship between two Project (see 4.2.404) objects.

The data associated with a Project_relationship are the following:

— description;

— related;

— relating;

— relation_type.

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4.2.405.1 description

The description specifies additional information about the Project_relationship.

See 4.3.1335 for the application assertion.

The description need not be specified for a particular Project_relationship (see 4.2.405).

If present, there shall be exactly one object that defines the description for a Project_relationship.

4.2.405.2 related

The related specifies the second of the two Project (see 4.2.404) objects related by a Project_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1336 for the application assertion.

4.2.405.3 relating

The relating specifies the first of the two Project (see 4.2.404) objects related by a Project_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1336 for the application assertion.

4.2.405.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The application object defines a relationship where the related Project (see 4.2.404) is one of potentially more components into which the relating Project is broken down;

— 'dependency': The related Project is dependent upon the relating Project;

— 'sequence': The application object defines a relationship where the relating Project shall be completed before the related Project starts;

— 'succession': The related Project is the successor of the relating Project.

4.2.406 Projection

A Projection is a condition where a Tolerance_zone (see 4.2.524) is projected from an element of a part. The projection is external to the part and made from one of the ends of the element for a specified length.

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NOTE - The concept of projected tolerance zones is defined in ISO 10578 [21].

A Projection is a type of Tolerance_zone_definition (see 4.2.525).

The data associated with a Projection are the following:

— projection_end;

— projection_length.

4.2.406.1 projection_end

The projection_end specifies the Shape_element (see 4.2.449) from which the tolerance zone is projected.

See 4.3.1337 for the application assertion.

4.2.406.2 projection_length

The projection_length specifies the distance from the projection_end where the Geometric_tolerance (see 4.2.243) shall be measured.

4.2.407 Projection_curve

A Projection_curve is the extension of a point, line, surface, or theoretical point of intersection to a location outside the part outline.

A Projection_curve is a type of Annotation_curve (see 4.2.16).

Each Projection_curve may be an Associated_projection_curve (see 4.2.32).

4.2.408 Promissory_usage

A Promissory_usage is a relationship between a constituent of an assembly and the assembly itself. The relationship describes the intention to use the constituent in an assembly.

NOTE - There may not be any geometric information provided for the constituent or the assembly that are associated by a Promissory_usage.

EXAMPLE In early design stages, the Promissory_usage may be used to create preliminary BOMs for prototyping.

A Promissory_usage is a type of Assembly_component_relationship (see 4.2.26).

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4.2.409 Property

A Property is the definition of a particular quality.

NOTE - A property may reflect physics or arbitrary user defined measurements.

Each Property is a Cost_property (see 4.2.105), a Quality_property (see 4.2.416), a Duration_property (see 4.2.175), a Material_property (see 4.2.310), a General_property (see 4.2.230), a Recyclability_property (see 4.2.428), or a Mass_property (see 4.2.306).

The data associated with a Property are the following:

— allowed_unit;

— description;

— id;

— property_source;

— version_id.

4.2.409.1 allowed_unit

The allowed_unit specifies the unit or set of units that are accepted.

EXAMPLE A company may accept a mass specified in kilograms or tons, but not in grams or pounds.

A Property_value (see 4.2.412) representing the Property shall not be expressed with a Unit (see 4.2.541) that is not contained in the allowed_unit, if the allowed_unit is specified. If specified, the 'global_unit' attribute of a Property_value_representation (see 4.2.414) representing the Property shall be contained in the allowed_unit, if the allowed_unit is specified.

See 4.3.1341 for the application assertion.

4.2.409.2 description

The description specifies additional information about the Property.

See 4.3.1339 for the application assertion.

The description need not be specified for a particular Property (see 4.2.409).

If present, there shall be exactly one object that defines the description for a Property.

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4.2.409.3 id

The id specifies the identifier of the Property.

4.2.409.4 property_source

The property_source specifies the External_library_reference (see 4.2.188) or Plib_property_reference (see 4.2.362) object that defines this kind of property.

See 4.3.1338 and 4.3.1340 for the application assertions.

The property_source need not be specified for a particular Property (see 4.2.409).

If present, there shall be exactly one object that defines the property_source for a Property.

4.2.409.5 version_id

The version_id specifies the identification of a particular version of a Property.

The version_id need not be specified for a particular Property (see 4.2.409).

4.2.410 Property_change

A Property_change is a mechanism to describe the differences between two objects concerning the properties of these objects.

The data associated with a Property_change are the following:

— added_property;

— deleted_property;

— description;

— id;

— is_describing.

4.2.410.1 added_property

The added_property specifies the set of Property_value_representation (see 4.2.414) objects that have been added to that object of the described relationship that is identified as relating.

See 4.3.1344 for the application assertion.

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4.2.410.2 deleted_property

The deleted_property specifies the Property_value_representation (see 4.2.414) objects that have been deleted from that object of the described relationship that is identified as relating.

See 4.3.1344 for the application assertion.

4.2.410.3 description

The description specifies additional information about the Property_change.

See 4.3.1343 for the application assertion.

There shall be exactly one object that defines the description for a Property_change (see 4.2.410).

4.2.410.4 id

The id specifies the identifier of the Property_change.

The id need not be specified for a particular Property_change (see 4.2.410).

4.2.410.5 is_describing

The is_describing specifies the Change (see 4.2.55) that collects the Property_change objects and the Model_change (see 4.2.315) objects.

See 4.3.1342 for the application assertion.

4.2.411 Property_relationship

A Property_relationship is a relationship between two Property (see 4.2.409) objects.

> EXAMPLE A Property_relationship may be used to indicate that the value of one Property can be derived from the value of another Property.

The data associated with a Property_relationship are the following:

— description;

— related;

— relating;

— relation_type.

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4.2.411.1 description

The description specifies additional information about the Property_relationship.

See 4.3.1345 for the application assertion.

The description need not be specified for a particular Property_relationship (see 4.2.411).

If present, there shall be exactly one object that defines the description for a Property_relationship.

4.2.411.2 related

The related specifies the second of the two Property (see 4.2.409) objects related by the Property_-relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1346 for the application assertion.

4.2.411.3 relating

The relating specifies the first of the two Property (see 4.2.409) objects related by the Property_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1346 for the application assertion.

4.2.411.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'decomposition': The Property_relationship defines a relationship where the related Property (see 4.2.409) is a member of a group of Property objects that is established by the relating Property;

— 'dependency': The related Property is dependent upon the relating Property;

— 'hierarchy': The application object defines a hierarchical relationship where the related Property is on a lower level than the relating Property;

— 'peer': The related Property shall not be used without the relating Property and vice versa;

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— 'substitution': The Property_relationship defines a relationship where the related Property replaces the relating Property;

— 'value domain': The Property_relationship defines a relationship where the values assigned to the relating Property shall be within the limits indicated by the values assigned to the related Property.

EXAMPLE The output range of a 4-bit analog to digital converter is restricted to 16 discrete values, while the input voltage is restricted to a continuous range.

4.2.412 Property_value

A Property_value is the numerical or textual value of a Property_value_representation (see 4.2.414).

Each Property_value is a Value_list (see 4.2.546), a String_value (see 4.2.478), or a Value_with_unit (see 4.2.549).

The data associated with a Property_value are the following:

— value_name

The value_name specifies the word or group of words by which the Property_value is referred to.

EXAMPLE 'l1' or 'vol2' are examples for the value_name of a Property_value.

4.2.413 Property_value_association

A Property_value_association is a mechanism to assign a Property_value_representation (see 4.2.414) to an object.

Each Property_value_association is a Process_property_association (see 4.2.390) or an Item_property_association (see 4.2.273).

The data associated with a Property_value_association are the following:

— describing_property_value;

— description;

— validity_context.

4.2.413.1 describing_property_value

The describing_property_value specifies the value that is being assigned.

See 4.3.1351 for the application assertion.

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4.2.413.2 description

The description specifies additional information about the Property_value_association.

See 4.3.1347 for the application assertion.

The description need not be specified for a particular Property_value_association (see 4.2.413).

If present, there shall be exactly one object that defines the description for a Property_value_association.

4.2.413.3 validity_context

The validity_context specifies the context in which a Property_value_association is applicable.

EXAMPLE 1 A Cost_property (see 4.2.105) is applicable in the context of supplier A and may be different if the item is supplied by a different supplier B.

EXAMPLE 2 Software can be used in different product classes, specified by the validity_context, with different parameter values.

See 4.3.1348, 4.3.1349, and 4.3.1350 for the application assertions.

The validity_context need not be specified for a particular Property_value_association (see 4.2.413).

If present, there shall be exactly one object that defines the validity_context for a Property_value_-association.

4.2.414 Property_value_representation

A Property_value_representation is the representation of Property (see 4.2.409).

Each Property_value_representation may be a Material_property_value_representation (see 4.2.312).

The data associated with a Property_value_representation are the following:

— definition;

— global_unit;

— qualifier;

— specified_value;

— value_determination.

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4.2.414.1 definition

The definition specifies the Property (see 4.2.409) that the Property_value_representation characterizes.

See 4.3.1352 for the application assertion.

4.2.414.2 global_unit

The global_unit specifies a unit that is valid for all Property_value (see 4.2.412) that are referenced as 'specified_value' by the Property_value_representation.

See 4.3.1354 for the application assertion.

The global_unit need not be specified for a particular Property_value_representation (see 4.2.414).

4.2.414.3 qualifier

The qualifier specifies the kind of the Property_value_representation. The following values shall be used:

— 'nominal': The value is the nominal value;

— 'specified': The value is specified;

— 'typical': The value is a typical value.

The qualifier need not be specified for a particular Property_value_representation (see 4.2.414).

4.2.414.4 specified_value

The specified_value specifies the Property_value (see 4.2.412) that qualifies the Property_value_representation by a Value_with_unit (see 4.2.549), a String_value (see 4.2.478), or an arbitrary aggregate thereof.

See 4.3.1353 for the application assertion.

4.2.414.5 value_determination

The value_determination specifies information on how the Property_value_representation shall be interpreted. Where applicable, the following values shall be used:

— 'calculated': The value has been calculated;

— 'designed': The value represents a value intended by the design;

— 'estimated': The value has been estimated;

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— ’measured’: The value has been measured;

— ’required’: The value represents a requirement;

— ’set point’: The value is used as the initialization value.

The value_determination need not be specified for a particular Property_value_representation (see 4.2.414).

4.2.415 Property_value_representation_relationship

A Property_value_representation_relationship is a relationship between two Property_value (see 4.2.412) objects.

The data associated with a Property_value_representation_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.415.1 description

The description specifies additional information about the Property_value_representation_relationship.

See 4.3.1355 for the application assertion.

The description need not be specified for a particular Property_value_representation_relationship (see 4.2.415).

If present, there shall be exactly one object that defines the description for a Property_value_representation_relationship.

4.2.415.2 related

The related specifies the second of the two objects related by the Property_value_representation_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.1356 for the application assertion.

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4.2.415.3 relating

The relating specifies the first of the two objects related by the Property_value_representation_relationship.

NOTE - The semantics of this attribute is defined by the attribute relation_type.

See 4.3.1356 for the application assertion.

4.2.415.4 relation_type

The relation_type specifies the meaning of the relationship.

EXAMPLE 1 Property_value_representation (see 4.2.414) objects representing 'cycle time', 'feed time', and 'drill time' for a process may be related by a Property_value_representation_relationship with relation_type 'dependency'.

Where applicable, the following values shall be used:

— 'decomposition': The Property_value_representation_relationship specifies a relationship where the related Property_value_representation is one of potentially more sub values of the relating Property_value_representation;

— 'dependency': The Property_value_representation_relationship defines a deriving relationship where the related Property_value_representation is based on the relating Property_value_representation;

— 'equivalence': The Property_value_representation_relationship defines a relationship where the related Property_value_representation represents the same matter of fact as by the relating Property_value_representation;

EXAMPLE 2 The distance of 1 km and 1000 m is the same. 1 km is equivalent to 1000 m, but they have different values and units.

— 'substitution': The Property_value_representation_relationship defines a relationship where the related Property_value_representation replaces the relating Property_value_representation.

4.2.416 Quality_property

A Quality_property is a property that enables to provide information about the level of quality of products or processes.

EXAMPLE Within a prototype building activity several alternative manufacturing technologies are tested. A Quality_property for the resulting parts, used tools, and the used process operations may document the level of quality reached for the parts.

A Quality_property is a type of Property (see 4.2.409).

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4.2.417 Quantified_instance

A Quantified_instance is the identification of the quantified occurrence of an object that is defined either as a Design_discipline_item_definition (see 4.2.142) or as a Product_identification (see 4.2.398).

EXAMPLE 1 Radiator liquid or engine oil are examples for Quantified_instance objects.

EXAMPLE 2 In a Technical_solution (see 4.2.510) for the front left brake a certain screw is used four times.

A Quantified_instance is a type of Item_instance (see 4.2.271).

The data associated with a Quantified_instance are the following:

— quantity

The quantity specifies a Numerical_value (see 4.2.324) specifying the quantity of occurrences.

If the quantity can not be expressed as a particular value, the concept of Selected_instance (see 4.2.445) shall be used instead to represent this instance.

NOTE - The quantity may be specified as a count measure, as a mass measure, as a length measure, as an area measure, or as a volume measure.

See 4.3.1357 for the application assertion.

4.2.418 Radiused_bead_end_type

A Radiused_bead_end_type is an end condition of a bead feature. It is defined by the rotation of the bead profile at the bead start or end about its y-axis.

A Radiused_bead_end_type is a type of Bead_end_type (see 4.2.38).

4.2.419 Radiused_slot_end_type

A Radiused_slot_end_type is an end condition of a slot feature. It is defined by the rotation of the slot profile at the slot start or end about its y-axis.

NOTE - The resulting radius equals half the width of the swept profile at each position along the y-axis of the swept profile.

EXAMPLE Figure 58 depicts a Radiused_slot_end_type.

A Radiused_slot_end_type is a type of Slot_end_type (see 4.2.457).

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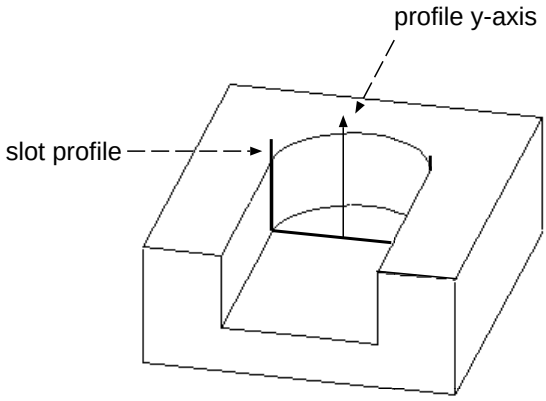


Figure 58 – Shape of a slot with radiused end

4.2.420 Rectangular_boss

A Rectangular_boss is a volume adding feature that is specified by an enclosed volume bounded by a rectangular block. The boundary of the Rectangular_boss shall be defined using a Rectangular_closed_-pocket (see 4.2.421). A Rectangular_boss shall not have a taper of type Directed_taper (see 4.2.154).

A Rectangular_boss is a type of Boss_feature (see 4.2.42).

4.2.421 Rectangular_closed_pocket

A Rectangular_closed_pocket is a volume removal feature whose enclosed volume is characterized by opposite sides being equal in length.

EXAMPLE Figure 59 shows a typical rectangular pocket.

A Rectangular_closed_pocket is a type of Pocket_feature (see 4.2.366).

The data associated with a Rectangular_closed_pocket are the following:

— boundary

The boundary specifies the Closed_profile_usage (see 4.2.73) that defines the cross section of the Rectangular_closed_pocket. The Closed_profile_usage shall reference a Rectangular_closed_profile (see 4.2.422) as used_profile.

See 4.3.1358 for the application assertion.

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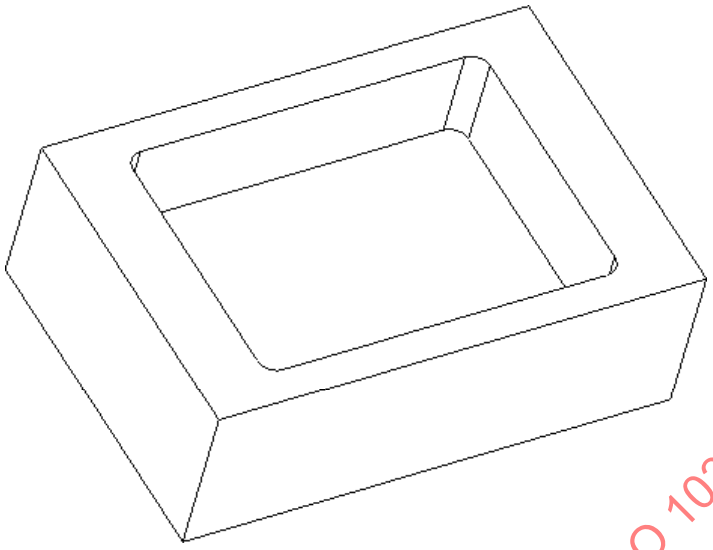


Figure 59 – Rectangular_closed_pocket in a part

4.2.422 Rectangular_closed_profile

A Rectangular_closed_profile is a closed profile that is characterized by four sides with opposite sides equal in length.

EXAMPLE Figure 60 shows a Rectangular_closed_profile.

The x-axis of the inherited Axis_placement (see 4.2.33) is parallel to the base line of the longest edges of the rectangle that defines the basis shape of this type of Profile (see 4.2.401). The y-axis is parallel to the shortest edge of the rectangle defining the basis shape. The midpoint of this rectangle coincides with the location of the Axis_placement.

A Rectangular_closed_profile is a type of Closed_profile (see 4.2.72).

The data associated with a Rectangular_closed_profile are the following:

— corner_radius;

— profile_length;

— profile_width.

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4.2.422.1 corner_radius

The corner_radius specifies the radius of fillet to be applied to the four corners of a Rectangular_closed_-profile. The following constraint applies:

$$r \leq min(\tfrac{a}{2}, \tfrac{b}{2})$$

where r is the corner_radius, a is the profile_length, and b is the profile_width.

See 4.3.1359 for the application assertion.

The corner_radius need not be specified for a particular Rectangular_closed_profile (see 4.2.422).

4.2.422.2 profile_length

The profile_length specifies the length of the longest side of a Rectangular_closed_profile. The longest side is oriented along the x-axis of the coordinate space of the Rectangular_closed_profile.

See 4.3.1359 for the application assertion.

4.2.422.3 profile_width

The profile_width specifies the length of the shortest side of a Rectangular_closed_profile. The shortest side is oriented along the y-axis of the coordinate space of the Rectangular_closed_profile.

See 4.3.1359 for the application assertion.

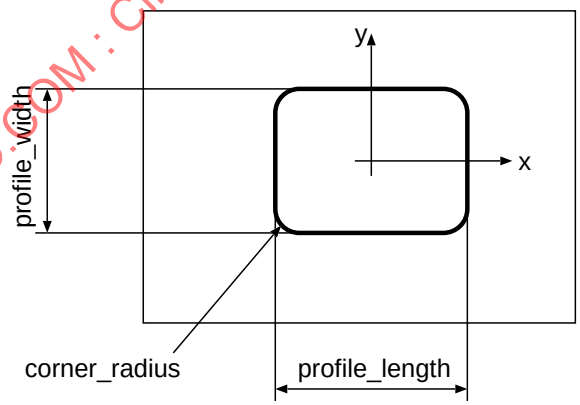


Figure 60 – Definition of a Rectangular_closed_profile

4.2.423 Rectangular_offset_pattern

A Rectangular_offset_pattern is the modification of the placement of a particular occurrence of the base feature in a Rectangular_pattern (see 4.2.426) relative to its expected placement.

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EXAMPLE Figure 61 depicts a Rectangular_offset_pattern.

The data associated with a Rectangular_offset_pattern are the following:

— column_index;

— offset_direction;

— offset_distance;

— row_index.

4.2.423.1 column_index

The column_index specifies the index of the column of the Rectangular_offset_pattern.

4.2.423.2 offset_direction

The offset_direction specifies the offset direction of the Rectangular_offset_pattern.

The direction is defined in the same coordinate space as the Rectangular_offset_pattern and lies in a plane that is either parallel to the x-y-plane of this coordinate space (in the case where the Rectangular_offset_-pattern is applied as a Placed_feature (see 4.2.356)) or parallel to the x-y-plane of the Axis_placement (see 4.2.33) that serves as the reference (in the case where the Rectangular_offset_pattern is applied as an Included_feature (see 4.2.261)).

4.2.423.3 offset_distance

The offset_distance specifies the offset distance of the Rectangular_offset_pattern.

See 4.3.1360 for the application assertion.

4.2.423.4 row_index

The row_index specifies the index of the row of the Rectangular_offset_pattern.

4.2.424 Rectangular_omit_pattern

A Rectangular_omit_pattern is an omission of a particular occurrence of the base feature in a Rectangu-lar_pattern (see 4.2.426).

The data associated with a Rectangular_omit_pattern are the following:

— column_index;

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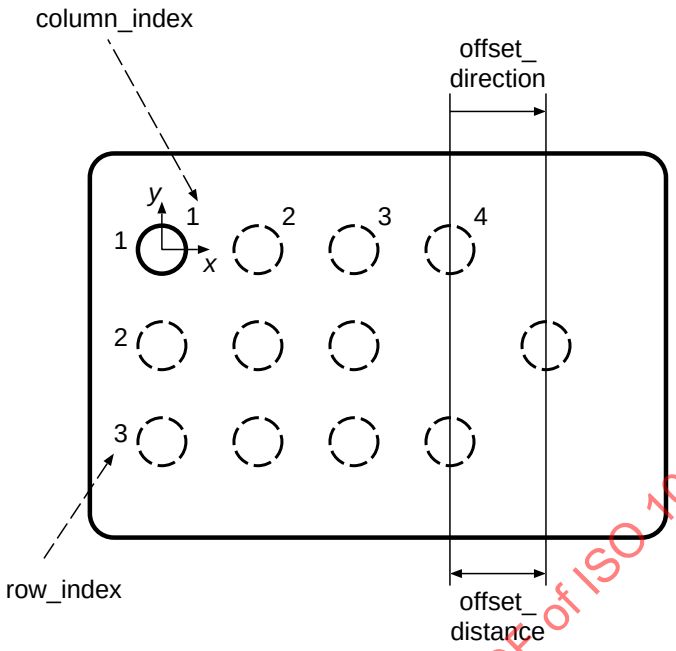


Figure 61 – Parameters defining an offset in a rectangular pattern

— row_index.

4.2.424.1 column_index

The column_index specifies the index of the column of the Rectangular_omit_pattern.

4.2.424.2 row_index

The row_index specifies the index of the row of the Rectangular_omit_pattern.

4.2.425 Rectangular_open_pocket

A Rectangular_open_pocket is a volume removal feature with opposite sides being equal in length and one side that is not closed.

A Rectangular_open_pocket is a type of Pocket_feature (see 4.2.366).

The data associated with a Rectangular_open_pocket are the following:

— boundary

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The boundary specifies the Open_profile_usage (see 4.2.329) that defines the cross section of the Rectangular_open_pocket. The Open_profile_usage shall reference a Square_u_profile (see 4.2.476) as used_profile.

See 4.3.1361 for the application assertion.

4.2.426 Rectangular_pattern

A Rectangular_pattern is a pattern defined by a base feature replicated on a rectangular grid.

The rows and columns lie in the x-y-plane of either the local pattern coordinate space (in the case of a Placed_feature (see 4.2.356)) or of the Axis_placement (see 4.2.33) representing location and orientation of the pattern.

EXAMPLE Figure 62 illustrates a Rectangular_pattern.

The inherited attribute 'location_and_orientation' shall reference the same Axis_placement as the base feature of the pattern being created.

A Rectangular_pattern is a type of Replicate_feature (see 4.2.433).

The data associated with a Rectangular_pattern are the following:

— column_layout_direction;

— column_spacing;

— columns;

— missing_feature;

— relocated_feature;

— row_layout_direction;

— row_spacing;

— rows.

4.2.426.1 column_layout_direction

The column_layout_direction specifies the direction of the column layout of the Rectangular_pattern.

The direction is defined in the same coordinate space as the Rectangular_pattern and lies in a plane that is either parallel to the x-y-plane of this coordinate space (in the case where the Rectangular_pattern is applied as a Placed_feature (see 4.2.356)) or parallel to the x-y-plane of the Axis_placement (see 4.2.33)

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that serves as the reference (in the case where the Rectangular_pattern is applied as an Included_feature (see 4.2.261)).

4.2.426.2 column_spacing

The column_spacing specifies the spacing of the columns of the Rectangular_pattern.

See 4.3.1362 for the application assertion.

4.2.426.3 columns

The columns specifies the number of columns of the Rectangular_pattern.

4.2.426.4 missing_feature

The missing_feature specifies the Rectangular_omit_pattern (see 4.2.424) objects that define which nodes on the grid are not assigned a replicate of the base.

those instances that are missing in the Rectangular_pattern.

See 4.3.1364 for the application assertion.

4.2.426.5 relocated_feature

The relocated_feature specifies the Rectangular_offset_pattern (see 4.2.423) objects that define in which nodes of the grid a further offset is applied to the replicate.

See 4.3.1363 for the application assertion.

4.2.426.6 row_layout_direction

The row_layout_direction specifies the direction of the row layout of the Rectangular_pattern.

The direction is defined in the same coordinate space as the Rectangular_pattern and lies in a plane that is either parallel to the x-y-plane of this coordinate space (in the case where the Rectangular_pattern is applied as a Placed_feature (see 4.2.356)) or parallel to the x-y-plane of the Axis_placement (see 4.2.33) that serves as the reference (in the case where the Rectangular_pattern is applied as an Included_feature (see 4.2.261)).

4.2.426.7 row_spacing

The row_spacing specifies the spacing of the rows of the Rectangular_pattern.

See 4.3.1362 for the application assertion.

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4.2.426.8 rows

The rows specifies the number of rows of the Rectangular_pattern.

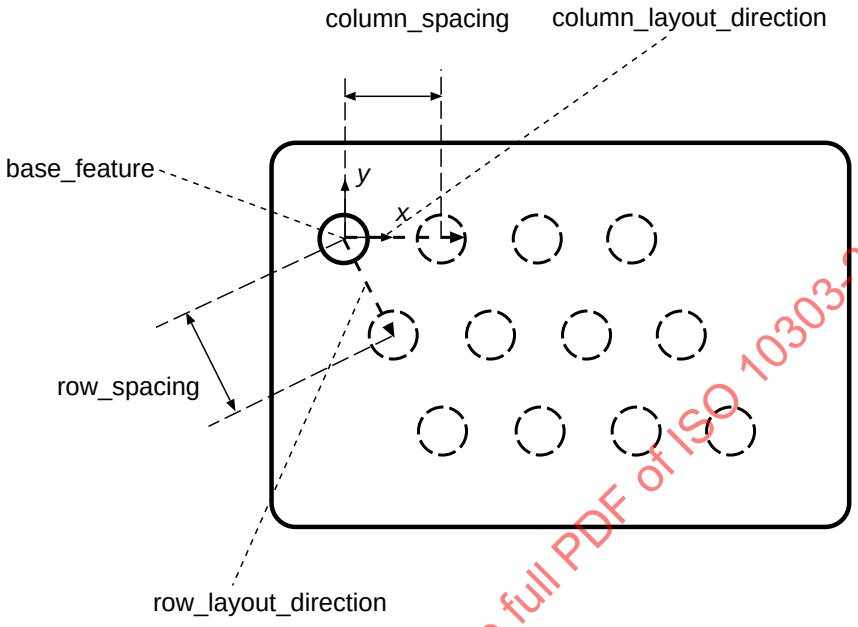


Figure 62 – Parameters defining a Rectangular_pattern

4.2.427 Rectangular_size

A Rectangular_size is the definition of the planar size of an object.

Each Rectangular_size may be a Named_size (see 4.2.321).

The data associated with a Rectangular_size are the following:

— density;

— height;

— width.

4.2.427.1 density

The density specifies the resolution of the object if it is a raster picture.

See 4.3.1365 for the application assertion.

The density need not be specified for a particular Rectangular_size (see 4.2.427).

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4.2.427.2 height

The height specifies the size of the object in vertical direction.

See 4.3.1365 for the application assertion.

4.2.427.3 width

The width specifies the size of the object in horizontal direction.

See 4.3.1365 for the application assertion.

4.2.428 Recyclability_property

A Recyclability_property is information concerning the ability to reuse objects or components of objects after their primarily intended usage.

A Recyclability_property is a type of Property (see 4.2.409).

4.2.429 Reference_plane

A Reference_plane is the definition of a plane that is used to further specify the application of Geometric_tolerance (see 4.2.243) objects. In this plane the two-dimensional tolerance zone is spread from the ideal position of the toleranced element in both directions.

NOTE - The tolerance value is twice the distance between the ideal position and the boundary of the tolerance zone.

The data associated with a Reference_plane are the following:

— plane_location;

— plane_normal.

4.2.429.1 plane_location

The plane_location specifies a Cartesian point on the reference plane.

4.2.429.2 plane_normal

The plane_normal specifies a direction vector that indicates a direction normal to the reference plane.

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4.2.430 Replaced_definition_relationship

A Replaced_definition_relationship is a relationship between two Design_discipline_item_definition (see 4.2.142) objects where the relating Design_discipline_item_definition is replaced by the related Design_discipline_item_definition.

Each Replaced_definition_relationship shall be referenced by an Effectivity (see 4.2.179) that defines the start of the validity of the replacement.

NOTE - A Replaced_definition_relationship may be used to build up version sequences of Design_discipline_item_definition objects.

A Replaced_definition_relationship is a type of Item_definition_relationship (see 4.2.269).

The data associated with a Replaced_definition_relationship are the following:

— description

The description specifies additional information about the Replaced_definition_relationship.

See 4.3.1366 for the application assertion.

The description need not be specified for a particular Replaced_definition_relationship.

If present, there shall be exactly one object that defines the description for a Replaced_definition_relationship.

4.2.431 Replaced_usage_relationship

A Replaced_usage_relationship is a relationship between two Item_instance (see 4.2.271) objects where the relating Item_instance is replaced by the related Item_instance.

Each Replaced_usage_relationship shall be referenced by an Effectivity (see 4.2.179) that defines the validity of the replacement.

A Replaced_usage_relationship is a type of Item_instance_relationship (see 4.2.272).

The data associated with a Replaced_usage_relationship are the following:

— description;

— usage_context.

4.2.431.1 description

The description specifies additional information about the Replaced_usage_relationship.

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See 4.3.1368 for the application assertion.

The description need not be specified for a particular Replaced_usage_relationship (see 4.2.431).

If present, there shall be exactly one object that defines the description for a Replaced_usage_relationship.

4.2.431.2 usage_context

The usage_context specifies the object that identifies the context in which the replacement is applicable. In the case, where the usage_context refers to a Process_operation_input_or_output (see 4.2.383), the 'relating' Item_instance (see 4.2.271) shall be referred to as 'element' by the Process_operation_input_or_output. In the case, where the usage_context refers to an Item_definition_instance_relationship (see 4.2.268), the 'relating' Item_instance shall be referred to as 'related' by the Item_definition_instance_relationship. In the case, where the usage_context refers to a Product_structure_relationship (see 4.2.400), the 'relating' Item_instance shall be referred to as 'related' by the Product_structure_relationship.

See 4.3.1367, 4.3.1369, and 4.3.1370 for the application assertions.

There shall be exactly one object that defines the usage_context for a Replaced_usage_relationship (see 4.2.431).

4.2.432 Replicate_base_assignment

A Replicate_base_assignment is a mechanism to associate a Replicate_feature (see 4.2.433) with the Feature_definition (see 4.2.199) that is the base feature to be replicated.

The data associated with a Replicate_base_assignment are the following:

— base_feature;

— replicate_placement.

4.2.432.1 base_feature

The base_feature specifies the Feature_definition (see 4.2.199) representing the feature to be replicated.

See 4.3.1371 for the application assertion.

4.2.432.2 replicate_placement

The replicate_placement specifies the geometric Transformation (see 4.2.533) used to place the base feature in the Replicate_feature (see 4.2.433)'s coordinate space.

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In the case of a Replicate_feature applied as a Placed_feature (see 4.2.356) the replicate_placement is used to place the base feature in the local coordinate system of the Replicate_feature.

See 4.3.1372 for the application assertion.

The replicate_placement need not be specified for a particular Replicate_base_assignment (see 4.2.432).

4.2.433 Replicate_feature

A Replicate_feature is a feature that is specified by an existing base feature and the arrangement of replicates of that feature.

A Replicate_feature is a type of Feature_definition (see 4.2.199).

Each Replicate_feature is a Circular_pattern (see 4.2.62), a General_pattern (see 4.2.228), or a Rectangular_pattern (see 4.2.426).

The data associated with a Replicate_feature are the following:

— location_and_orientation;

— replicate_base.

4.2.433.1 location_and_orientation

The location_and_orientation specifies the Axis_placement (see 4.2.33) that defines the location and orientation of the feature. The location_and_orientation is specified for the purpose of evaluation by manufacturing systems, which use the information in order to determine various machining parameters. For each type of Replicate_feature it is specified, how the Axis_placement is located and oriented.

See 4.3.1373 for the application assertion.

4.2.433.2 replicate_base

The replicate_base specifies a Replicate_base_assignment (see 4.2.432) that has the information about the feature that is replicated and possibly about a transformation used to place the base feature in the coordinate space of the Replicate_feature.

See 4.3.1374 for the application assertion.

4.2.434 Retention_period

A Retention_period is the definition of a period of time that product data needs to be maintained due to organizational policy or legal requirements.

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The data associated with a Retention_period are the following:

— earliest_end_definition;

— is_applied_to;

— latest_end_definition;

— retention_purpose;

— start_definition.

4.2.434.1 earliest_end_definition

The earliest_end_definition specifies the point in time after which any object the Retention_period is applied to may be deleted or destroyed.

In this context deletion or destruction applies to all subordinate objects that are not referenced by other objects.

See 4.3.1393, 4.3.1402, and 4.3.1403 for the application assertions.

There shall be exactly one object that defines the earliest_end_definition for a Retention_period (see 4.2.434).

4.2.434.2 is_applied_to

The is_applied_to specifies the objects whose existence is controlled by the Retention_period.

NOTE - The master document is the one for which earliest_end_definition and latest_end_definition are the same.

See 4.3.1375, 4.3.1376, 4.3.1377, 4.3.1378, 4.3.1379, 4.3.1380, 4.3.1381, 4.3.1382, 4.3.1383, 4.3.1384, 4.3.1385, 4.3.1386, 4.3.1387, 4.3.1388, 4.3.1389, 4.3.1390, 4.3.1391, 4.3.1392, 4.3.1394, 4.3.1395, 4.3.1396, 4.3.1397, 4.3.1398, 4.3.1399, 4.3.1400, 4.3.1401, 4.3.1404, 4.3.1405, 4.3.1406, 4.3.1407, 4.3.1408, 4.3.1409, 4.3.1410, 4.3.1411, 4.3.1412, 4.3.1413, 4.3.1414, 4.3.1415, 4.3.1417, 4.3.1418, 4.3.1419, 4.3.1420, 4.3.1421, 4.3.1422, 4.3.1423, 4.3.1424, 4.3.1425, 4.3.1426, 4.3.1427, 4.3.1428, 4.3.1429, 4.3.1430, 4.3.1431, 4.3.1432, 4.3.1433, 4.3.1434, 4.3.1435, 4.3.1436, 4.3.1437, 4.3.1438, 4.3.1439, 4.3.1440, 4.3.1441, and 4.3.1442 for the application assertions.

There shall be at least one object that the Retention_period (see 4.2.434) is_applied_to.

4.2.434.3 latest_end_definition

The latest_end_definition specifies the point in time before which any objects that the Retention_period is applied to shall be deleted or destroyed.

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In this context deletion or destruction applies to all subordinate objects that are not used by other objects.

See 4.3.1393, 4.3.1402, and 4.3.1403 for the application assertions.

There shall be exactly one object that defines the latest_end_definition for a Retention_period (see 4.2.434).

4.2.434.4 retention_purpose

The retention_purpose specifies the rationale behind the Retention_period.

See 4.3.1416 for the application assertion.

The retention_purpose need not be specified for a particular Retention_period (see 4.2.434).

If present, there shall be exactly one object that defines the retention_purpose for a Retention_period.

4.2.434.5 start_definition

The start_definition specifies the point in time at which the Retention_period starts.

See 4.3.1393 and 4.3.1403 for the application assertions.

There shall be exactly one object that defines the start_definition for a Retention_period (see 4.2.434).

4.2.435 Rib_feature

A Rib_feature is a feature that is applied to solid parts to increase the stability of certain regions of a part.

EXAMPLE Figure 63 illustrates a Rib_feature.

A Rib_feature is a type of Process_feature_in_solid (see 4.2.380).

The data associated with a Rib_feature are the following:

— draft_taper;

— fillet_radius;

— rib_profile;

— shoulder_radius;

— sweep_path.

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4.2.435.1 draft_taper

The draft_taper specifies a Directed_taper (see 4.2.154) that defines the value of the draft angle that is applied to the side walls of the Rib_feature and the draft direction.

See 4.3.1443 for the application assertion.

The draft_taper need not be specified for a particular Rib_feature (see 4.2.435).

4.2.435.2 fillet_radius

The fillet_radius specifies a radius shape blend between a Rib_feature and the surrounding faces.

NOTE - If different fillets are required for the various intersection between the Rib_feature and the shape of the part, Transition_feature (see 4.2.537) objects have to be applied.

See 4.3.1444 for the application assertion.

The fillet_radius need not be specified for a particular Rib_feature (see 4.2.435).

4.2.435.3 rib_profile

The rib_profile specifies the Open_profile_usage (see 4.2.329) which references the Open_profile (see 4.2.328) that is swept along the Path (see 4.2.342). The Open_profile is the cross section of the rib including the two sides and the connecting top part. It shall be shaped in a way that the two sides of the resulting Rib_feature are parallel (before the application of a Directed_taper (see 4.2.154)).

See 4.3.1445 for the application assertion.

4.2.435.4 shoulder_radius

The shoulder_radius specifies the blend radius at the shoulder of the Rib_feature.

See 4.3.1444 for the application assertion.

The shoulder_radius need not be specified for a particular Rib_feature (see 4.2.435).

4.2.435.5 sweep_path

The sweep_path specifies the Path (see 4.2.342) along which the Open_profile (see 4.2.328) is swept. The sweep process shall stop as soon as the added volume intersects the surfaces of the part.

See 4.3.1446 for the application assertion.

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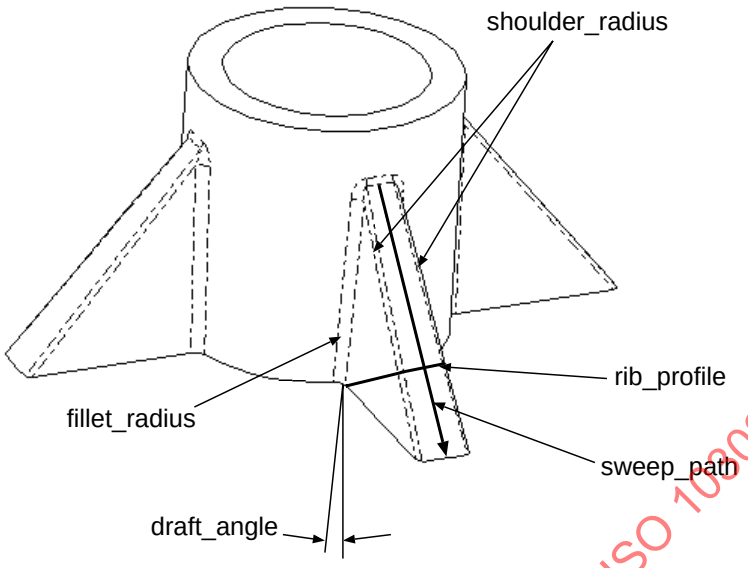


Figure 63 – Parameters defining a Rib_feature

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4.2.436 Right_angular_wedge

A Right_angular_wedge is a solid that can be envisioned as the result of intersecting a block with a plane perpendicular to one of its faces, as shown in figure 64. The received face perpendicular to the cutting plane is triangular or trapezoidal. A Right_angular_wedge is defined by its position in space, by the triangular or trapezoidal face that is defined by three values, and by the depth of the solid.

A Right_angular_wedge is a type of Csg_primitive (see 4.2.107).

4.2.437 Right_circular_cone

A Right_circular_cone is a CSG primitive in the form of a cone that may be truncated. It is defined by an axis, a point on the axis, the semi-angle of the cone, and a distance giving the location in the negative direction along the axis from the point to the base of the cone. In addition, a radius may be provided to define the size of the truncated face; this radius may be zero in order to indicate that there is no truncation but an apex.

A Right_circular_cone is a type of Csg_primitive (see 4.2.107).

4.2.438 Right_circular_cylinder

A Right_circular_cylinder is a CSG primitive in the form of a solid cylinder of finite height. It is defined by an axis point at the centre of one planar circular face, an axis, a height, and a radius. The faces are perpendicular to the axis and are circular discs with the specified radius. The height is the distance from the first circular face centre in the positive direction of the axis to the second circular centre.

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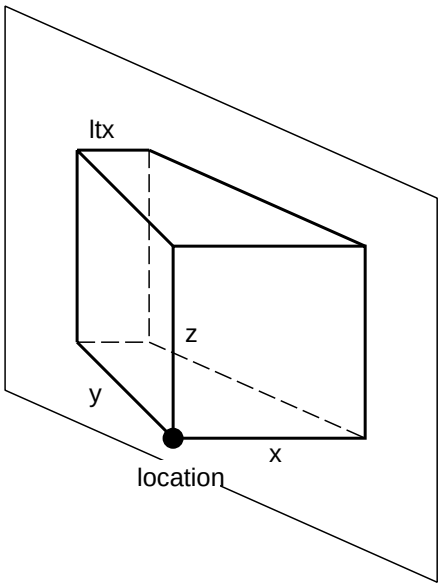


Figure 64 – Right_angular_wedge and its attributes

A Right_circular_cylinder is a type of Csg_primitive (see 4.2.107).

4.2.439 Round_hole

A Round_hole is a hole that is a removal of a volume of cylindrical shape from a solid part.

A Round_hole is a type of Process_feature_in_solid (see 4.2.380).

The data associated with a Round_hole are the following:

— bottom_condition;

— diameter;

— hole_depth;

— taper.

4.2.439.1 bottom_condition

The bottom_condition specifies the Hole_bottom_condition (see 4.2.257) that defines the type of the hole bottom.

See 4.3.1451 and 4.3.1453 for the application assertions.

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There shall be exactly one object that defines the bottom_condition for a Round_hole (see 4.2.439).

4.2.439.2 diameter

The diameter specifies the Closed_profile_usage (see 4.2.73) that defines the cross section of the hole in order to define the cylinder that is subtracted from the part. The Closed_profile_usage shall reference a Circular_closed_profile (see 4.2.58) as used_profile.

See 4.3.1448 for the application assertion.

4.2.439.3 hole_depth

The hole_depth specifies the Linear_path (see 4.2.300) that is used as sweep path.

See 4.3.1452 for the application assertion.

4.2.439.4 taper

The taper specifies a shape variation to be applied to the Round_hole.

See 4.3.1447, 4.3.1449, and 4.3.1450 for the application assertions.

The taper need not be specified for a particular Round_hole (see 4.2.439).

If present, there shall be exactly one object that defines the taper for a Round_hole.

4.2.440 Rounded_u_profile

A Rounded_u_profile is an open profile that is specified by a shape bounded by two parallel lines and a semi circle. Each line begins at the end point of the semi circle. The lines are tangent to the circle and extend infinitely. The x-axis of the inherited Axis_placement (see 4.2.33) is tangent to the arc curve in its midpoint. The y-axis is oriented such that the lines outlining the sides of the profile have positive y co-ordinates. The Axis_placement is located in the midpoint of the base curve.

EXAMPLE Figure 65 depicts a Rounded_u_profile.

A Rounded_u_profile is a type of Open_profile (see 4.2.328).

The data associated with a Rounded_u_profile are the following:

— width

The width specifies the distance across a Rounded_u_profile.

See 4.3.1454 for the application assertion.

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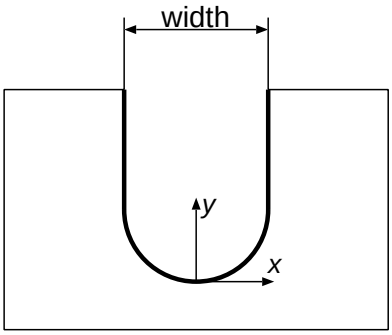


Figure 65 – Definition of a Rounded_u_profile

4.2.441 Roundness_tolerance

A Roundness_tolerance is the limitation of the amount of deviation points of a surface of revolution lying within the same plane perpendicular to a common axis may have from being equidistant from the axis. It defines a tolerance zone bounded by two concentric circles within which each element of the surface must lie. The Roundness_tolerance applies independently at any plane perpendicular to the common axis.

A Roundness_tolerance is a type of Geometric_tolerance (see 4.2.243).

4.2.442 Same_time_machining_relationship

A Same_time_machining_relationship is a relationship between two Item_instance (see 4.2.271) objects that specifies that those two objects shall be manufactured together within the same Process_operation_-occurrence (see 4.2.384).

EXAMPLE Figure 66 shows an example for this case.

A Same_time_machining_relationship is a type of Item_instance_relationship (see 4.2.272).

The data associated with a Same_time_machining_relationship are the following:

— description;

— placement.

4.2.442.1 description

The description specifies additional information about the Same_time_machining_relationship.

See 4.3.1456 for the application assertion.

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The description need not be specified for a particular Same_time_machining_relationship (see 4.2.442).

If present, there shall be exactly one object that defines the description for a Same_time_machining_-relationship.

4.2.442.2 placement

The placement specifies the geometrical Transformation (see 4.2.533) between the local coordinate system of the related Item_instance (see 4.2.271) with respect to the local coordinate system of the relating Item_instance.

NOTE - The transformation is needed to position the related Item_instance with respect to the relating Item_instance for the same time machining process.

In the case where the placement is realized by a Template_instance (see 4.2.512) the scale factor of that Template_instance shall be omitted or set to 1.

See 4.3.1455 and 4.3.1457 for the application assertions.

The placement need not be specified for a particular Same_time_machining_relationship (see 4.2.442).

If present, there shall be exactly one object that defines the placement for a Same_time_machining_-relationship.

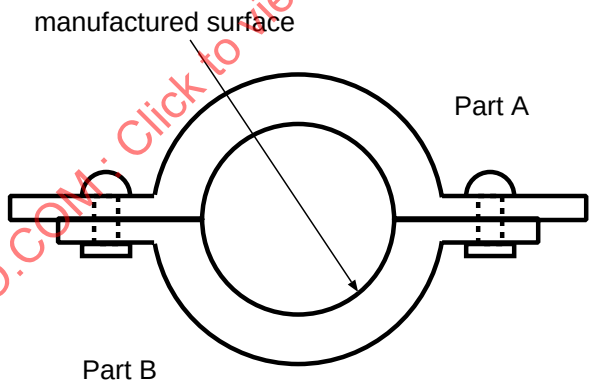


Figure 66 – Same_time_machining_relationship

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4.2.443 Security_classification

A Security_classification is the level of confidentiality that is required in order to protect product data against unauthorized usage.

The data associated with a Security_classification are the following:

— is_applied_to;

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— level;

— name;

— purpose.

4.2.443.1 is_applied_to

The is_applied_to specifies the objects with which the Security_classification is associated.

See 4.3.1458, 4.3.1459, 4.3.1460, 4.3.1461, 4.3.1462, 4.3.1463, 4.3.1464, 4.3.1465, 4.3.1466, 4.3.1467, 4.3.1468, 4.3.1469, 4.3.1470, 4.3.1471, 4.3.1472, 4.3.1473, 4.3.1474, 4.3.1475, 4.3.1476, 4.3.1477, 4.3.1479, 4.3.1480, 4.3.1481, 4.3.1482, 4.3.1483, 4.3.1484, 4.3.1485, 4.3.1486, 4.3.1487, 4.3.1489, 4.3.1490, 4.3.1491, 4.3.1492, 4.3.1493, and 4.3.1494 for the application assertions.

There shall be at least one object that the Security_classification (see 4.2.443) is_applied_to.

4.2.443.2 level

The level specifies the Security_level (see 4.2.444) associated with the object.

See 4.3.1488 for the application assertion.

4.2.443.3 name

The name specifies the word or group of words used to refer to the Security_classification.

See 4.3.1478 for the application assertion.

There shall be exactly one object that defines the name for a Security_classification (see 4.2.443).

4.2.443.4 purpose

The purpose specifies the rationale behind the Security_classification.

See 4.3.1478 for the application assertion.

The purpose need not be specified for a particular Security_classification (see 4.2.443).

If present, there shall be exactly one object that defines the purpose for a Security_classification.

4.2.444 Security_level

A Security_level is the specification of a level of security within some security classification scheme.

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NOTE - The values of Security_level are company specific.

The data associated with a Security_level are the following:

— level_name;

— used_classification_system.

4.2.444.1 level_name

The level_name specifies the word or abbreviation used to refer to the Security_level.

4.2.444.2 used_classification_system

The used_classification_system specifies the Classification_system (see 4.2.71) that contains the information about how to interpret the level of the Security_level.

See 4.3.1495 for the application assertion.

The used_classification_system need not be specified for a particular Security_level (see 4.2.444).

4.2.445 Selected_instance

A Selected_instance is the identification of the occurrence of an object that is either defined as a Design_discipline_item_definition (see 4.2.142) or as a Product_identification (see 4.2.398) and whose quantity depends on certain constraints.

EXAMPLE 1 In a BOM where the exact amount of grease or glue can usually not be specified as a quantity, the specification of this grease or glue are examples for Selected_instance objects.

EXAMPLE 2 To minimize the concentricity error of a wheel, weights are attached to the rim; this set of weights is a Selected_instance. The quantity as well as the position of these weights depends on the concentricity behaviour of each particular wheel as manufactured and tested.

A Selected_instance is a type of Item_instance (see 4.2.271).

The data associated with a Selected_instance are the following:

— selected_quantity;

— selection_control.

4.2.445.1 selected_quantity

The selected_quantity specifies the quantity of the part, tool or raw material foreseen as Selected_instance. The selected_quantity shall be of type Value_limit (see 4.2.544) or Value_range (see 4.2.547).

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NOTE - If the quantity is to be specified as a minimum and/or a maximum, then Value_limit or Value_range may be used.

EXAMPLE The quantity of engine oil used in a car may be in the range of 3.7 to 3.9 liters. This is expressed using Value_range as the selected_quantity.

See 4.3.1496 for the application assertion.

4.2.445.2 selection_control

The selection_control specifies the constraint that has to be evaluated for the Selected_instance.

EXAMPLE 'as required for balance' and 'as required for lubrication' are examples for a selection_control.

4.2.446 Serial_configuration

A Serial_configuration is a Manufacturing_configuration (see 4.2.305) that applies onwards from a given serial number of the product that is considered within the object referred to as 'is_solution_for'.

A Serial_configuration is a type of Manufacturing_configuration (see 4.2.305).

The data associated with a Serial_configuration are the following:

— serial_end_number;

— serial_start_number.

4.2.446.1 serial_end_number

The serial_end_number specifies the serial number of that instance of the product that is the last instance for which the Serial_configuration applies.

NOTE - If the serial_end_number is not specified, it is not foreseen that the Serial_configuration ceases to be valid; i.e., the Serial_configuration is expected to apply to all serial numbers greater than the serial start number for the product for whose characteristics the Serial_configuration identifies a solution.

The serial_end_number need not be specified for a particular Serial_configuration (see 4.2.446).

4.2.446.2 serial_start_number

The serial_start_number specifies the serial number of that instance of the product that is the first instance for which the Serial_configuration applies.

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4.2.447 Shape_dependent_property

A Shape_dependent_property is a characteristic of the shape, or of a portion of the shape of an object. This object is either an item, an occurrence of an item in the product structure or the physical realization of an item.

NOTE - A Shape_dependent_property is independent of the representations of the shape.

Each Shape_dependent_property is a Centre_of_mass (see 4.2.49), a Moments_of_inertia (see 4.2.319), or a General_shape_dependent_property (see 4.2.231).

The data associated with a Shape_dependent_property are the following:

— described_element;

— description;

— is_defined_in;

— value_determination.

4.2.447.1 described_element

The described_element specifies the object that the Shape_dependent_property is associated to.

See 4.3.1498 and 4.3.1500 for the application assertions.

There shall be exactly one object that defines the described_element for a Shape_dependent_property (see 4.2.447).

4.2.447.2 description

The description specifies additional information about the Shape_dependent_property.

See 4.3.1499 for the application assertion.

The description need not be specified for a particular Shape_dependent_property (see 4.2.447).

If present, there shall be exactly one object that defines the description for a Shape_dependent_property.

4.2.447.3 is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) in which the property is applicable.

NOTE - The values of geometry related properties are specified relative to a Cartesian_coordinate_space.

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EXAMPLE A Centre_of_mass (see 4.2.49) may be specified in different coordinate spaces for different dimensioning applications.

See 4.3.1497 for the application assertion.

The is_defined_in need not be specified for a particular Shape_dependent_property (see 4.2.447).

4.2.447.4 value_determination

The value_determination specifies information on how the Shape_dependent_property shall be interpreted. Where applicable, the following values shall be used:

— 'calculated': The value has been calculated;

— 'designed': The value represents a value intended by the design;

— 'estimated': The value has been estimated;

— 'measured': The value has been measured;

— 'required': The value represents a requirement.

NOTE - A Shape_dependent_property may be specified in the design stage of a product but it may also be documented as measured on a prototype.

The value_determination need not be specified for a particular Shape_dependent_property (see 4.2.447).

4.2.448 Shape_description_association

A Shape_description_association is a mechanism to associate the definition of a shape or of a portion of a shape with a geometric representation.

NOTE - Through Shape_description_association, it is possible to associate objects with geometry defined in an external document; the same is possible through Document_assignment (see 4.2.156). The difference between the two possibilities is that in the case of Shape_description_association, it is the shape of the object that is assigned whereas Document_assignment may be used to assign other kinds of geometry.

The data associated with a Shape_description_association are the following:

— defining_geometry;

— is_defining_shape_for;

— role.

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4.2.448.1 defining_geometry

The defining_geometry specifies the Geometric_model (see 4.2.238) or the External_model (see 4.2.189) that contains the shape information.

See 4.3.1501 and 4.3.1504 for the application assertions.

There shall be exactly one object that defines the defining_geometry for a Shape_description_association (see 4.2.448).

4.2.448.2 is_defining_shape_for

The is_defining_shape_for specifies the object the Shape_description_association is associated with.

See 4.3.1502, 4.3.1503, 4.3.1505, 4.3.1506, 4.3.1507, 4.3.1508, and 4.3.1509 for the application assertions.

There shall be exactly one object that the Shape_description_association (see 4.2.448) is_defining_shape_for.

4.2.448.3 role

The role specifies the function performed by the referenced model. Where applicable, the following values shall be used:

— 'detailed representation': The geometry in the referenced model provides a detailed representation of the shape;

— 'idealized representation': The geometry in the referenced model provides a simplified representation of the shape, e.g., for analysis purposes.

EXAMPLE For analysis purposes an 'idealized representation' that is not fully detailed in every respect may be sufficient and be preferable due to less overhead implied by its usage.

4.2.449 Shape_element

A Shape_element is a portion of shape that has to be identified explicitly to be associated with other information.

EXAMPLE 1 In order to identify a portion of one face of a shaft that shall have a surface coating applied to it, Shape_element is used. Figure 67 shows this example.

NOTE - Shape_element objects can be classified using General_classification (see 4.2.216).

EXAMPLE 2 An example for classifying Shape_element objects is to identify all parts of an air plane that constitute the outer surface of the plane and are therefore relevant for aerodynamic analysis.

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Each Shape_element may be a Coating_layer (see 4.2.75) or a Feature_occurrence (see 4.2.200).

The data associated with a Shape_element are the following:

— composition;

— description;

— element_name.

4.2.449.1 composition

The composition specifies the shape that the Shape_element is part of.

See 4.3.1510 for the application assertion.

4.2.449.2 description

The description specifies additional information about the Shape_element.

See 4.3.1511 for the application assertion.

The description need not be specified for a particular Shape_element (see 4.2.449).

If present, there shall be exactly one object that defines the description for a Shape_element.

4.2.449.3 element_name

The element_name specifies the word or group of words by which the Shape_element is referred to.

The element_name need not be specified for a particular Shape_element (see 4.2.449).

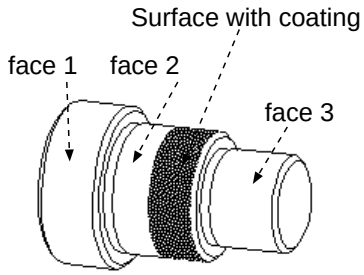


Figure 67 – Shape_element on a shaft

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4.2.450 Shape_element_relationship

A Shape_element_relationship is a relationship between two Shape_element (see 4.2.449) objects.

The data associated with a Shape_element_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.450.1 description

The description specifies additional information about the Shape_element_relationship.

See 4.3.1512 for the application assertion.

The description need not be specified for a particular Shape_element_relationship (see 4.2.450).

If present, there shall be exactly one object that defines the description for a Shape_element_relationship.

4.2.450.2 related

The related specifies the second of the two Shape_element (see 4.2.449) objects related by a Shape_-element_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1513 for the application assertion.

4.2.450.3 relating

The relating specifies the first of the two Shape_element (see 4.2.449) objects related by a Shape_-element_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1513 for the application assertion.

4.2.450.4 relation_type

The relation_type specifies the meaning of the relationship.

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EXAMPLE 'transition priority' may be used to define the precedence between two intersecting Transition_feature (see 4.2.537) objects.

4.2.451 Shell

A Shell is a collection of Face (see 4.2.191) objects that establish a Surface_model (see 4.2.496).

A Shell is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Shell are the following:

— included_face

The included_face specifies the set of Face objects that form a Shell.

See 4.3.1514 for the application assertion.

4.2.452 Significant_number_of_digits

A Significant_number_of_digits is an entry in a Tolerance_table_cell (see 4.2.523) representing the range of applicability of a tolerance value by specifying the presented number of digits.

The number of digits used for the dimension determine which default tolerance entry in the general tolerance table is valid for this particular dimension

The data associated with a Significant_number_of_digits are the following:

— number_of_digits

The number_of_digits specifies the significant number of digits used for a dimension specification of a part.

4.2.453 Simple_pair_range

A Simple_pair_range is the valid range of the pair parameters of a pair. A Simple_pair_range shall represent either a cylindrical pair range, a gear pair range, a planar pair range, a prismatic pair range, a rack and pinion pair range, a revolute pair range, a rolling curve pair range, a rolling surface pair range, a screw pair range, a sliding curve pair range, a sliding surface pair range, a spherical pair range, or a universal pair range.

The data associated with a Simple_pair_range are the following:

— is_applied_to

The is_applied_to specifies the Kinematic_pair (see 4.2.287) that the Simple_pair_range applies to.

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See 4.3.1515 for the application assertion.

4.2.454 Single_datum

A Single_datum is a single element used as reference for tolerancing purposes.

A Single_datum is a type of Datum (see 4.2.123).

The data associated with a Single_datum are the following:

— datum_name;

— is_defined_by;

— modification.

4.2.454.1 datum_name

The datum_name specifies the word or group of words by which the Single_datum is referred to.

EXAMPLE Typical names of Single_datum objects are 'A', 'B', or 'C'.

4.2.454.2 is_defined_by

The is_defined_by specifies the Datum_target_set (see 4.2.127), the Derived_geometry (see 4.2.136), or the Shape_element (see 4.2.449) that represents the Single_datum.

See 4.3.1516, 4.3.1517, and 4.3.1518 for the application assertions.

There shall be exactly one object that the Single_datum (see 4.2.454) is_defined_by.

4.2.454.3 modification

The modification specifies a Tolerance_condition (see 4.2.522) that is associated with the application of the Single_datum.

EXAMPLE Material conditions such as LMC or MMC are typical conditions.

See 4.3.1519 for the application assertion.

The modification need not be specified for a particular Single_datum (see 4.2.454).

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4.2.455 Single_instance

A Single_instance is one particular occurrence of an object that is defined either as a Design_discipline_-item_definition (see 4.2.142) or as a Product_identification (see 4.2.398).

NOTE - A Single_instance may or may not be associated with placement information using an Instance_-placement (see 4.2.264).

EXAMPLE In a Technical_solution (see 4.2.510) for the 'front left brake', a 'brake disk' is used and its position is specified by a geometric Transformation (see 4.2.533).

A Single_instance is a type of Item_instance (see 4.2.271).

4.2.456 Size_dimension

A Size_dimension is the representation of the size of an individual shape element.

A Size_dimension is a type of Geometric_dimension (see 4.2.237).

Each Size_dimension is an Angular_size_dimension (see 4.2.14), a Thickness_dimension (see 4.2.516), or a General_size_dimension (see 4.2.232).

The data associated with a Size_dimension are the following:

— is_applied_to

The is_applied_to specifies the geometric or annotation element which the Size_dimension is applied to.

See 4.3.1520 and 4.3.1521 for the application assertions.

There shall be exactly one object that the Size_dimension is_applied_to.

4.2.457 Slot_end_type

A Slot_end_type is the definition of a kind of end for a Slot_feature (see 4.2.458).

Each Slot_end_type is a Radiused_slot_end_type (see 4.2.419), a Flat_slot_end_type (see 4.2.208), an Open_slot_end_type (see 4.2.330), or a Woodruff_slot_end_type (see 4.2.563).

The data associated with a Slot_end_type are the following:

— is_applied_to

The is_applied_to specifies to which end of the path the Slot_end_type applies.

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The following values shall be used:

— 'end': The Slot_end_type is applied to that end of the Slot_feature that corresponds to the end of the defining Path (see 4.2.342);

— 'start': The Slot_end_type is applied to that end of the Slot_feature that corresponds to the start of the defining Path.

4.2.458 Slot_feature

A Slot_feature is a channel or depression with a continuous course.

EXAMPLE Figure 68 illustrates examples of slots.

A Slot_feature is a type of Process_feature_in_solid (see 4.2.380).

The data associated with a Slot_feature are the following:

— end_condition;

— slot_profile;

— sweep_path.

4.2.458.1 end_condition

The end_condition specifies the Slot_end_type (see 4.2.457) objects that define the type of the extremities of the slot. A Slot_feature that is defined with a Complete_circular_path (see 4.2.79) shall have two end conditions of type Open_slot_end_type (see 4.2.330).

See 4.3.1524 for the application assertion.

4.2.458.2 slot_profile

The slot_profile specifies the Open_profile_usage (see 4.2.329) that identifies the Open_profile (see 4.2.328) that is swept along the sweep path.

See 4.3.1522 for the application assertion.

4.2.458.3 sweep_path

The sweep_path specifies the Path (see 4.2.342) that serves as a sweep path for a Slot_feature.

See 4.3.1523 for the application assertion.

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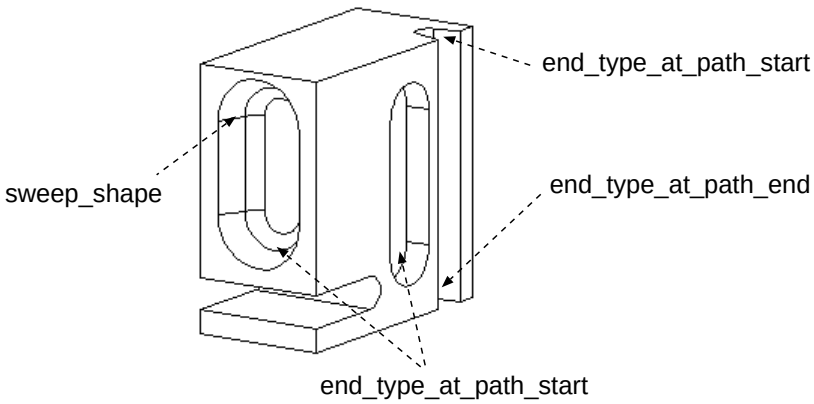


Figure 68 – various shapes of slots

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4.2.459 Solid_fill_area

A Solid_fill_area is an enclosed area that is uniformly filled by a single colour.

4.2.460 Solid_of_linear_extrusion

A Solid_of_linear_extrusion is a solid that is formed by sweeping a planar Face (see 4.2.191) along a straight line in space about a specified depth.

A Solid_of_linear_extrusion is a type of Swept_face_solid (see 4.2.502).

4.2.461 Solid_of_revolution

A Solid_of_revolution is a solid formed by revolving a planar Face (see 4.2.191) about an axis.

The axis shall be in the plane of the Face and shall not intersect the interior of the Face. The planar Face may have holes which will sweep into holes in the solid. The direction of revolution is clockwise if viewed along the axis in the positive direction.

A Solid_of_revolution is a type of Swept_face_solid (see 4.2.502).

4.2.462 Solid_replica

A Solid_replica is a copy of a solid within a CSG tree at a new location and orientation.

NOTE - Additionally, the received object may have been uniformly resized or mirrored.

A Solid_replica is a type of Detailed_geometric_model_element (see 4.2.144).

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The data associated with a Solid_replica are the following:

— replicated_solid

The replicated_solid specifies the solid to be replicated.

See 4.3.1525, 4.3.1526, 4.3.1527, 4.3.1528, 4.3.1529, and 4.3.1530 for the application assertions.

There shall be exactly one object that defines the replicated_solid for a Solid_replica.

4.2.463 Specific_document_classification

A Specific_document_classification is a classification of a Document (see 4.2.155) with respect to specific criteria. The specific criteria are covered in the 'classification_name' attribute.

The data associated with a Specific_document_classification are the following:

— associated_document;

— classification_name;

— description.

4.2.463.1 associated_document

The associated_document the associated_document specifies the Document (see 4.2.155) with which a particular Specific_document_classification is associated.

See 4.3.1531 for the application assertion.

4.2.463.2 classification_name

The classification_name provides classification information.

NOTE The overall classification information is obtained by traversing the hierarchical tree established by Specific_item_classification_hierarchy (see 4.2.466).

Where applicable, the following values shall be used:

— 'catalogue': The assigned document is the catalogue in which the associated object is listed;

EXAMPLE The document can be the catalogue of the manufacturer.

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— ’manual’: The assigned document is the handbook that is supplied for the associated object;

— ’specification’: The assigned document specifies the considerations that lead to the design finally chosen for the associated object.

4.2.463.3 description

The description specifies additional information about the Specific_document_classification.

See 4.3.1532 for the application assertion.

The description need not be specified for a particular Specific_document_classification (see 4.2.463).

If present, there shall be exactly one object that defines the description for a Specific_document_classification.

4.2.464 Specific_document_classification_hierarchy

A Specific_document_classification_hierarchy is used to build up hierarchical structures of Specific_document_classification_hierarchy objects.

The data associated with a Specific_document_classification_hierarchy are the following:

— sub_classification;

— super_classification.

4.2.464.1 sub_classification

The sub_classification specifies the lower level of Specific_document_classification (see 4.2.463) in Specific_document_classification_hierarchy that is included in the super class.

See 4.3.1533 for the application assertion.

4.2.464.2 super_classification

The super_classification specifies the higher level of Specific_document_classification (see 4.2.463) in Specific_document_classification_hierarchy that is included in the sub class.

See 4.3.1533 for the application assertion.

4.2.465 Specific_item_classification

A Specific_item_classification is a classification of an Item (see 4.2.267) with respect to specific criteria. The specific criteria are covered in the ’classification_name’ attribute.

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NOTE 1 - If an Item requires classification by more than one criterion, several Specific_item_classification objects are associated to the same Item.

NOTE 2 - For the attribute 'classification_name' a set of predefined values is specified hereafter. If values other than the proposed ones are used, they should be of general classifying nature. This kind of classification ought not to be used to classify names or identifiers of objects, e.g., in order to classify part families; for this purpose General_classification (see 4.2.216) ought to be used.

NOTE 3 - In order to assign functional information to an Item, Item_function_association (see 4.2.270) ought to be used.

The data associated with a Specific_item_classification are the following:

— associated_item;

— classification_name;

— description.

4.2.465.1 associated_item

The associated_item specifies the Item (see 4.2.267) with which a particular Specific_item_classification is associated.

See 4.3.1534 for the application assertion.

4.2.465.2 classification_name

The classification_name provides high level classification information. Where applicable, the following values shall be used:

— 'application control': This type of classification is used to indicate that an Item (see 4.2.267) shall be considered under certification aspects; these aspects may be specified further by the 'description' attribute;

EXAMPLE 1 Prior to the release of a new car to the market, both function and quality of certain parts have to be certified by an authority, e.g., the department of transportation. For such Item objects, certification requirements have to be considered during the design phase.

— 'assembly': This type of classification shall be used for any Item that has an Assembly_definition (see 4.2.27) provided for at least one of its versions, i.e., it is decomposed further;

— 'collection': This type of classification shall be used for any Item that has a Collection_definition (see 4.2.78) provided for at least one of its versions;

— 'completely knocked down': This type of classification is used to indicate that an Item is used in a production site that has assembling facilities only;

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EXAMPLE 2 The 'completely knocked down' may indicate that the components are shipped to and assembled in a different country.

— 'detail': This type of classification shall be used for any Item that has no Assembly_definition provided for any of its versions, i.e., it is not further decomposed;

— 'in process': This type of classification is used to indicate that the Item identifies an intermediate object in a manufacturing process;

NOTE - Detailed information about the stage the Item has within the manufacturing process may be obtained from the Process_operation_occurrence (see 4.2.384)

— 'part': The Item plays the role of a part;

— 'prototype': This type of classification is used to indicate that the Item identifies a prototype and is not intended for serial production;

— 'raw material': The Item plays the role of raw material;

— 'regulated': This type of classification is used to indicate that for an Item certain regulations have to be considered;

— 'safety': This type of classification is used to indicate that an Item is relevant for safety purposes;

— 'service': This type of classification is used to indicate that an Item is relevant for service purposes;

— 'tool': The Item plays the role of a tool.

4.2.465.3 description

The description specifies additional information about the Specific_item_classification.

See 4.3.1535 for the application assertion.

The description need not be specified for a particular Specific_item_classification (see 4.2.465).

If present, there shall be exactly one object that defines the description for a Specific_item_classification.

4.2.466 Specific_item_classification_hierarchy

A Specific_item_classification_hierarchy is used to build up hierachical structures of Specific_item_-classification (see 4.2.465).

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The data associated with a Specific_item_classification_hierarchy are the following:

— sub_classification;

— super_classification.

4.2.466.1 sub_classification

The sub_classification specifies the lower level of Specific_item_classification (see 4.2.465) in a Specific_item_classification_hierarchy that is included in the super class.

See 4.3.1536 for the application assertion.

4.2.466.2 super_classification

The super_classification specifies the higher level of Specific_item_classification (see 4.2.465) in a Specific_item_classification_hierarchy that includes the sub class.

See 4.3.1536 for the application assertion.

4.2.467 Specification

A Specification is a characteristic of a product. A Specification discriminates one product from other members of the same Product_class (see 4.2.392). A Specification refers to a Specification_category (see 4.2.468) that completes the semantics of the Specification.

NOTE 1 - A Specification may be a characteristic of the members of more than one Product_class using Class_specification_association (see 4.2.67) objects.

NOTE 2 - A Specification in combination with a Configuration (see 4.2.94) may be used to define under which conditions an Item (see 4.2.267) is used for a product of a Product_class.

EXAMPLE 'coupe', 'hatch back', or 'sedan' are examples for specifications belonging to the Specification_category of type 'car body'. 'radio 1 with CD player' and 'radio 2 without CD player' are examples for specifications belonging to the Specification_category of type 'radio equipment'. 'disk brake' and 'drum brake' are examples for specifications belonging to the Specification_category of type 'braking system'.

The data associated with a Specification are the following:

— category;

— description;

— id;

— name;

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— package;

— version_id.

4.2.467.1 category

The category specifies the Specification_category (see 4.2.468) that completes the semantics of the Specification.

See 4.3.1538 for the application assertion.

4.2.467.2 description

The description specifies additional information about the Specification.

See 4.3.1537 for the application assertion.

The description need not be specified for a particular Specification (see 4.2.467).

If present, there shall be exactly one object that defines the description for a Specification.

4.2.467.3 id

The id specifies the identifier of the Specification that shall be unique within the scope of a Specification_category (see 4.2.468).

4.2.467.4 name

The name specifies the word or group of words by which the Specification is referred to.

See 4.3.1537 for the application assertion.

The name need not be specified for a particular Specification (see 4.2.467).

If present, there shall be exactly one object that defines the name for a Specification.

4.2.467.5 package

The package specifies whether this Specification represents a package of Specification objects or not. Such a Specification combines those Specification objects that shall be offered to the market as a set. In the case where package is 'true', there shall be exactly one Specification_inclusion (see 4.2.471) per Product_class (see 4.2.392) considered, that refers to this Specification as 'if_condition'. The Specification objects that are members of the package, shall be specified as included_specification.

NOTE 1 - Commercial packages may be defined by the marketing department.

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NOTE 2 - Usually the members of a package belong to distinct Specification_category (see 4.2.468) objects.

EXAMPLE A sports package contains sports seats, a special steering wheel, special tyres and wheels. A winter package contains heated front seats, heated windshield washers, heated exterior mirrors, and special tyres.

4.2.467.6 version_id

The version_id specifies the identification of a particular version of a Specification.

The version_id need not be specified for a particular Specification (see 4.2.467).

4.2.468 Specification_category

A Specification_category is the definition of a set of Specification (see 4.2.467) objects serving the same purpose.

EXAMPLE The category 'kind of drive' for the Specification objects 'front wheel drive' and 'rear wheel drive' or the category 'level of equipment' for the Specification objects 'standard', 'comfortable', and 'luxurious' are examples for a Specification_category.

The data associated with a Specification_category are the following:

— description;

— id;

— implicit_exclusive_condition.

4.2.468.1 description

The description specifies information about the Specification_category.

EXAMPLE The description 'trim' characterizes a Specification_category for Specification (see 4.2.467) objects that controls the quality and colour of the interior parts including e.g., inner door panels and upholstery. Other examples are 'kind of drive', 'rear brake type', 'brake power regulator', 'radio equipment', or 'type of car body'.

See 4.3.1539 for the application assertion.

There shall be exactly one object that defines the description for a Specification_category (see 4.2.468).

4.2.468.2 id

The id specifies the identifier of the Specification_category that shall be unique.

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NOTE - The scope of uniqueness is usually dependent on the form of implementation.

EXAMPLE The scope of uniqueness may be set by the extent of a physical file or data base.

4.2.468.3 implicit_exclusive_condition

The implicit_exclusive_condition specifies whether the Specification (see 4.2.467) objects within the Specification_category are mutually exclusive for the production of one particular product. A value of 'true' indicates that the referenced objects are mutually exclusive for the production of the particular product.

EXAMPLE 'safety equipment' is an example for a non mutually exclusive Specification_category if e.g. ABS and airbag are Specification objects in this category. 'engine' is an example for a Specification_category with an implicit_exclusive_condition since usually only one engine can be mounted for power supply.

NOTE - More complex conditions can be handled using Specification_expression (see 4.2.470) objects.

4.2.469 Specification_category_hierarchy

A Specification_category_hierarchy is used to build up hierarchical structures of Specification_category (see 4.2.468) objects.

The data associated with a Specification_category_hierarchy are the following:

— sub_category;

— super_category.

4.2.469.1 sub_category

The sub_category is the lower level of Specification_category (see 4.2.468) in Specification_category_-hierarchy.

See 4.3.1540 for the application assertion.

4.2.469.2 super_category

The super_category is the higher level of Specification_category (see 4.2.468) in Specification_category_hierarchy.

See 4.3.1540 for the application assertion.

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4.2.470 Specification_expression

A Specification_expression is a combination of Specification (see 4.2.467) objects formed by Boolean operations.

The data associated with a Specification_expression are the following:

— description;

— id;

— operand;

— operation.

4.2.470.1 description

The description specifies additional information about the Specification_expression.

See 4.3.1541 for the application assertion.

The description need not be specified for a particular Specification_expression (see 4.2.470).

If present, there shall be exactly one object that defines the description for a Specification_expression.

4.2.470.2 id

The id specifies the identifier of the Specification_expression.

The id need not be specified for a particular Specification_expression (see 4.2.470).

4.2.470.3 operand

The operand specifies the operands of the Boolean operation that are either Specification (see 4.2.467) objects or other Specification_expression objects.

See 4.3.1542 and 4.3.1543 for the application assertions.

There shall be at least one object that defines the operand for a Specification_expression (see 4.2.470).

4.2.470.4 operation

The operation specifies the kind of Boolean operation. Four kinds of operations are permitted:

— 'and': All of the identified Specification (see 4.2.467) objects shall be used;

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— 'or': A subset or all of the identified Specification objects shall be used;

— 'oneof': Exactly one of the identified Specification objects shall be used;

— 'not': The identified Specification shall not be used.

4.2.471 Specification_inclusion

A Specification_inclusion is the representation of the statement that specifies that the application of a Specification (see 4.2.467) or of a Specification_expression (see 4.2.470) implies the inclusion of an additional Specification or Specification_expression.

NOTE - The Specification_inclusion is intended to complete the set of Specification objects for a Product_-specification (see 4.2.399) in order to enable the manufacturing of the product on the basis of an initial set of Specification objects defined.

EXAMPLE The source of such a completion may be a customer order.

The data associated with a Specification_inclusion are the following:

— description;

— id;

— if_condition;

— included_specification.

4.2.471.1 description

The description specifies additional information about the Specification_inclusion.

See 4.3.1544 for the application assertion.

The description need not be specified for a particular Specification_inclusion (see 4.2.471).

If present, there shall be exactly one object that defines the description for a Specification_inclusion.

4.2.471.2 id

The id specifies the identifier of the Specification_inclusion.

The id need not be specified for a particular Specification_inclusion (see 4.2.471).

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4.2.471.3 if_condition

The if_condition specifies the Specification (see 4.2.467) or the Specification_expression (see 4.2.470) that serves as the condition for the inclusion.

See 4.3.1545 and 4.3.1546 for the application assertions.

There shall be exactly one object that defines the if_condition for a Specification_inclusion (see 4.2.471).

4.2.471.4 included_specification

The included_specification specifies the Specification (see 4.2.467) or the Specification_expression (see 4.2.470) objects that are to be included. The included_specification shall not reference a Specification_-expression with an operation of type 'or' or 'oneof', except for negating expressions, i.e., as participants in an expression preceded by a 'not' operator. Expressions of operator 'not' shall not be nested within each other.

NOTE 1 - In the case where more than one Specification is to be included a Specification_expression of type AND shall be used.

NOTE 2 - In the case where the included_specification is a NOT expression, the object actually defines an exclusion.

See 4.3.1545 and 4.3.1546 for the application assertions.

There shall be exactly one object that defines the included_specification for a Specification_inclusion (see 4.2.471).

4.2.472 Specified_instance

A Specified_instance is a mechanism to identify a certain Item_instance (see 4.2.271) in a multi level assembly structure that reuses partial decompositions.

EXAMPLE A 'chassis' consists among others of the sub assemblies 'front axle' and 'rear axle'. Both axle assemblies consist, among others, of the 'left wheel' and the 'right wheel'. In order to identify the 'left wheel' of the 'rear axle', the Specified_instance object references 'left wheel' as related_instance, 'rear axle' as 'upper_usage', and 'chassis' as 'assembly_context'.

The 'definition' of a Specified_instance shall be the same object as the one referenced by the 'related_-instance' as 'definition'.

A Specified_instance is a type of Item_instance (see 4.2.271).

The data associated with a Specified_instance are the following:

— assembly_context;

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— related_instance;

— upper_usage.

4.2.472.1 assembly_context

The assembly_context specifies an Assembly_definition (see 4.2.27) object in which the instance identified by this mechanism is used.

See 4.3.1547 for the application assertion.

4.2.472.2 related_instance

The related_instance specifies the Item_instance (see 4.2.271) that is to be identified.

The related_instance shall not be of type Specified_instance.

See 4.3.1548 for the application assertion.

4.2.472.3 upper_usage

The upper_usage specifies the Item_instance (see 4.2.271) in which the related_instance is used. This Item_instance shall be the immediate upper level instance or another Specified_instance.

See 4.3.1548 for the application assertion.

4.2.473 Sphere

A Sphere is a solid of spherical shape defined by a centre point and a radius.

A Sphere is a type of Csg_primitive (see 4.2.107).

4.2.474 Spherical_bottom

A Spherical_bottom is a hole bottom that is defined by a hemisphere that is tangent to the sides of the Round_hole (see 4.2.439).

A Spherical_bottom is a type of Hole_bottom_condition (see 4.2.257).

The data associated with a Spherical_bottom are the following:

— radius

The radius specifies the distance between the centre of the sphere and its surface.

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See 4.3.1549 for the application assertion.

4.2.475 Spherical_surface

A Spherical_surface is a surface with a constant distance (the radius) from a central point.

A Spherical_surface is a type of Surface (see 4.2.489).

4.2.476 Square_u_profile

A Square_u_profile is an open profile that is bounded by three lines. One is the base line and has a defined length. The other two lines begin at the ends of the base line and extend infinitely. The corners of a Square_u_profile may be blended by a radius. The x-axis of the inherited Axis_placement (see 4.2.33) is parallel to the base line. The y-axis is orient such that the side lines of the outline of the profile have positive y co-ordinates. The Axis_placement is located in the midpoint of the base line.

EXAMPLE Figure 69 depicts a Square_u_profile.

A Square_u_profile is a type of Open_profile (see 4.2.328).

The data associated with a Square_u_profile are the following:

— first_angle;

— first_radius;

— second_angle;

— second_radius;

— width.

4.2.476.1 first_angle

The first_angle specifies the size of an angle between the base and that side of the profile that intersects the x-axis at a positive value.

See 4.3.1550 for the application assertion.

4.2.476.2 first_radius

The first_radius specifies a radius shape blend between the base and that side of the profile that intersects the x-axis at a positive value.

See 4.3.1550 for the application assertion.

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The first_radius need not be specified for a particular Square_u_profile (see 4.2.476).

4.2.476.3 second_angle

The second_angle specifies the size of an angle between the base and that side of the profile that intersects the x-axis at a negative value.

See 4.3.1550 for the application assertion.

4.2.476.4 second_radius

The second_radius specifies a radius shape blend between the base and that side of the profile that intersects the x-axis at a negative value.

See 4.3.1550 for the application assertion.

The second_radius need not be specified for a particular Square_u_profile (see 4.2.476).

4.2.476.5 width

The width specifies the size of the base line for a Square_u_profile.

See 4.3.1550 for the application assertion.

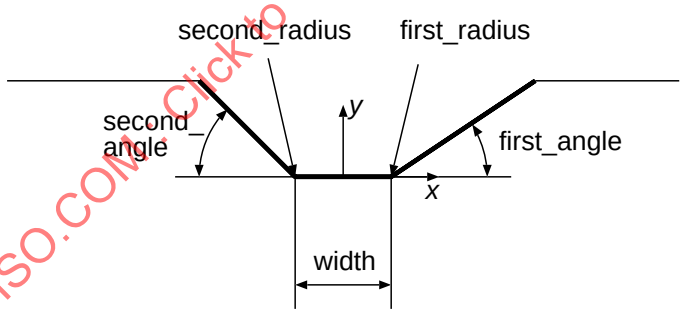


Figure 69 – Definition of a Square_u_profile

4.2.477 Straightness_tolerance

A Straightness_tolerance is a constraint on the deviation that a curve or any curve on a surface may have from being a straight line. It defines a tolerance zone within which the curve must lie.

A Straightness_tolerance is a type of Geometric_tolerance (see 4.2.243).

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The data associated with a Straightness_tolerance are the following:

— affected_plane

The affected_plane specifies the plane in which the tolerance applies.

This attribute covers information that is given on drawings implicitly by the drawing plane. If the affected_plane is not specified, the tolerance applies in all directions (on drawings indicated by the diameter symbol).

See 4.3.1551 for the application assertion.

The affected_plane need not be specified for a particular Straightness_tolerance.

4.2.478 String_value

A String_value represents a sequence of one or more alphanumeric characters.

A String_value is a type of Property_value (see 4.2.412).

The data associated with a String_value are the following:

— value_specification

The value_specification specifies the string represented by the String_value.

See 4.3.1552 for the application assertion.

There shall be exactly one object that defines the value_specification for a String_value.

4.2.479 String_with_language

A String_with_language represents text information in a specific language together with an identification of the language used.

The data associated with a String_with_language are the following:

— contents;

— language_specification.

4.2.479.1 contents

The contents is textual information stored in the language identified by the language attribute.

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4.2.479.2 language_specification

The language_specification specifies the Language (see 4.2.291) in which the contents is given.

See 4.3.1553 for the application assertion.

4.2.480 Structuring_method_hierarchy

A Structuring_method_hierarchy is a mechanism to build up a nesting of Group (see 4.2.250) objects within Group or Layer (see 4.2.292) objects in structuring methods.

NOTE - This mechanism facilitates the nesting of groups in other groups and the nesting of groups in a layer, but not the nesting of one layer in another layer or group.

The data associated with a Structuring_method_hierarchy are the following:

— related;

— relating.

4.2.480.1 related

The related specifies the Group (see 4.2.250) object to be nested. A Group that contains Shape_element (see 4.2.449) objects shall not participate, directly or indirectly, in a Layer (see 4.2.292).

See 4.3.1554 for the application assertion.

4.2.480.2 relating

The relating specifies the structuring method in that the Group (see 4.2.250) is nested.

See 4.3.1554 and 4.3.1555 for the application assertions.

There shall be exactly one object that the Structuring_method_hierarchy (see 4.2.480) is relating to.

4.2.481 Styled_annotation_model

A Styled_annotation_model is a set of annotation elements.

For this particular type of Styled_model (see 4.2.484), the inherited attribute 'element' shall refer to Annotation_element (see 4.2.17) objects only.

A Styled_annotation_model is a type of Styled_model (see 4.2.484).

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The data associated with a Styled_annotation_model are the following:

— is_defined_in

The is_defined_in specifies the Cartesian_coordinate_space (see 4.2.44) of the Styled_annotation_model.

NOTE - A Styled_annotation_model is defined in its own coordinate space since it does not refer to a Geometric_model (see 4.2.238) that has a coordinate space that could be shared.

See 4.3.1556 for the application assertion.

4.2.482 Styled_element

A Styled_element is a Detailed_element (see 4.2.143) that has presentation information.

A Styled_element is a type of Detailed_element (see 4.2.143).

Each Styled_element is an Annotation_element (see 4.2.17) or a Styled_model_element (see 4.2.485).

The data associated with a Styled_element are the following:

— appearance;

— invisible.

4.2.482.1 appearance

The appearance specifies the associated presentation information.

See 4.3.1557 for the application assertion.

4.2.482.2 invisible

The invisible specifies if the Styled_element is invisible.

4.2.483 Styled_geometric_model

A Styled_geometric_model is a set of geometric elements that have presentation information.

NOTE 1 - A Styled_geometric_model is defined in the Cartesian_coordinate_space (see 4.2.44) of the corresponding Geometric_model (see 4.2.238).

NOTE 2 - In order to exchange a 3D model and a 2D drawing of the same item, which may be specified using different length units, separate instances of Geometric_model or Styled_geometric_model in a Cartesian_coordinate_space_3d (see 4.2.46) for the model and Drawing_sheet (see 4.2.173) in a Cartesian_coordinate_space_2d (see 4.2.45) for the drawing are used.

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A Styled_geometric_model is a type of Styled_model (see 4.2.484).

The data associated with a Styled_geometric_model are the following:

— styled_geometry_context

The styled_geometry_context specifies the Geometric_model that contains the styled geometric elements.

See 4.3.1558 for the application assertion.

4.2.484 Styled_model

A Styled_model is a set of geometric or annotation elements that have presentation information.

NOTE - Each Styled_model may be a combination of a Styled_model_version (see 4.2.487) and one of the other types of Styled_model.

Each Styled_model may be a Styled_model_version (see 4.2.487).

Each Styled_model is either a Styled_geometric_model (see 4.2.483) or a Styled_annotation_model (see 4.2.481).

The data associated with a Styled_model are the following:

— additional_elements;

— description;

— element;

— model_id.

4.2.484.1 additional_elements

The additional_elements specifies the Template_instance (see 4.2.512) objects that are additionally imported into the Styled_model using a Transformation (see 4.2.533). The additional_elements shall also be of type Styled_model.

See 4.3.1561 for the application assertion.

4.2.484.2 description

The description specifies additional information about the Styled_model.

See 4.3.1559 for the application assertion.

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The description need not be specified for a particular Styled_model (see 4.2.484).

If present, there shall be exactly one object that defines the description for a Styled_model.

4.2.484.3 element

The element specifies the set of Styled_element (see 4.2.482) objects that forms the Styled_model.

See 4.3.1560 for the application assertion.

4.2.484.4 model_id

The model_id specifies the identifier of the Styled_model.

4.2.485 Styled_model_element

A Styled_model_element is a Styled_element (see 4.2.482) that represents geometry.

A Styled_model_element is a type of Styled_element (see 4.2.482).

The data associated with a Styled_model_element are the following:

— element

The element specifies the Detailed_model_element (see 4.2.145) the presentation information is attached to.

See 4.3.1562 for the application assertion.

4.2.486 Styled_model_relationship

A Styled_model_relationship is a relationship between two Styled_model (see 4.2.484) objects.

The data associated with a Styled_model_relationship are the following:

— description;

— related;

— relating;

— relation_type.

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4.2.486.1 description

The description specifies additional information about the Styled_model_relationship.

See 4.3.1563 for the application assertion.

The description need not be specified for a particular Styled_model_relationship (see 4.2.486).

If present, there shall be exactly one object that defines the description for a Styled_model_relationship.

4.2.486.2 related

The related specifies the second of the two Styled_model (see 4.2.484) objects related by the Styled_-model_relationship.

See 4.3.1564 for the application assertion.

4.2.486.3 relating

The relating specifies the first of the two Styled_model (see 4.2.484) objects related by the Styled_-model_relationship.

See 4.3.1564 for the application assertion.

4.2.486.4 relation_type

The relation_type specifies the meaning of the relationship.

4.2.487 Styled_model_version

A Styled_model_version is a particular version of a Styled_model (see 4.2.484).

A Styled_model_version is a type of Styled_model (see 4.2.484).

The data associated with a Styled_model_version are the following:

— version_id

The version_id specifies the identification of a particular version of a Styled_model.

4.2.488 Supplier_solution

A Supplier_solution is an alternative solution provided by a particular supplier.

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EXAMPLE The Product_component (see 4.2.394) 'tyre' has a Technical_solution (see 4.2.510) of '225x50 VR17' with suppliers A, B, or C. With each of these suppliers a Supplier_solution is associated.

A Supplier_solution is a type of Alternative_solution (see 4.2.10).

The data associated with a Supplier_solution are the following:

— probability_rate;

— supplier.

4.2.488.1 probability_rate

The probability_rate specifies the share that is assigned to the supplier in the context of the base element.

The probability_rate need not be specified for a particular Supplier_solution (see 4.2.488).

4.2.488.2 supplier

The supplier specifies the Organization (see 4.2.331) that acts as supplier for the Supplier_solution.

See 4.3.1565 for the application assertion.

4.2.489 Surface

A Surface is a set of mathematical points which is the image of a continuous function defined over a connected subset of the plane R2. It can be envisioned as a set of connected points in 3-dimensional space which is always locally 2-dimensional, but need not be manifold.

NOTE - In the context of UoF G8 the Surface includes the concept of composite surfaces.

A Surface is a type of Detailed_geometric_model_element (see 4.2.144).

Each Surface is an Offset_surface (see 4.2.326), a Spherical_surface (see 4.2.475), a Trimmed_surface (see 4.2.540), a B_spline_surface (see 4.2.37), a Surface_of_linear_extrusion (see 4.2.497), a Toroidal_surface (see 4.2.530), a Surface_of_revolution (see 4.2.498), a Plane (see 4.2.360), a Cylindrical_surface (see 4.2.114), or a Conical_surface (see 4.2.96).

4.2.490 Surface_appearance

A Surface_appearance is the definition of the visual appearance of a surface.

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The data associated with a Surface_appearance are the following:

— element;

— side.

4.2.490.1 element

The element specifies the elements that belong to a particular Surface_appearance.

EXAMPLE Surface boundaries, parameter lines, rendering, or fill areas are examples for element.

See 4.3.1566 for the application assertion.

4.2.490.2 side

The side specifies the side of a surface that the Surface_appearance is applied to.

4.2.491 Surface_appearance_element

A Surface_appearance_element is one of of various elements to be applied in the presentation of the identified side of a surface. The choice includes the appearance characteristics for the surface boundaries, isoparametric curves on surfaces, rendering, silhouettes, segmentation curves, control grids, and fill areas.

The data associated with a Surface_appearance_element are the following:

— presented_surface_condition

The presented_surface_condition specifies the Visual_appearance (see 4.2.560) that is presented by the Surface_appearance_element.

See 4.3.1567 for the application assertion.

The presented_surface_condition need not be specified for a particular Surface_appearance_element.

4.2.492 Surface_condition

A Surface_condition is a definition of a characteristic or property of a surface of an item.

NOTE - A Surface_condition may be specified during the design phase of a product as an expected characteristic of the parts resulting from the manufacturing process, but it may also be documented as measured on a prototype.

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Each Surface_condition is a Visual_appearance (see 4.2.560), a Tactile_appearance (see 4.2.504), a Treatment_result (see 4.2.538), a Surface_texture (see 4.2.500), a Contact_ratio (see 4.2.102), or a Hardness (see 4.2.254).

The data associated with a Surface_condition are the following:

— is_caused_by;

— value_determination.

4.2.492.1 is_caused_by

The is_caused_by specifies the Process_operation_occurrence (see 4.2.384) that is used to produce the Surface_condition.

See 4.3.1568 for the application assertion.

The is_caused_by need not be specified for a particular Surface_condition (see 4.2.492).

4.2.492.2 value_determination

The value_determination specifies information on how the Surface_condition shall be interpreted. Where applicable, the following values shall be used:

— 'calculated': The value has been calculated from a particular representation;

— 'designed': The value represents a value intended by the design;

— 'estimated': The value has been estimated;

— 'measured': The value has been measured;

— 'required': The value represents a requirement.

The value_determination need not be specified for a particular Surface_condition (see 4.2.492).

4.2.493 Surface_condition_association

A Surface_condition_association is a mechanism to associate a Surface_condition (see 4.2.492) with an object.

The data associated with a Surface_condition_association are the following:

— described_element;

— describing_surface_condition.

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4.2.493.1 described_element

The described_element specifies the object that is characterized by the Surface_condition (see 4.2.492).

See 4.3.1569 and 4.3.1570 for the application assertions.

There shall be exactly one object that defines the described_element for a Surface_condition_association (see 4.2.493).

4.2.493.2 describing_surface_condition

The describing_surface_condition specifies the condition of a surface that is being assigned to an object.

See 4.3.1571 for the application assertion.

4.2.494 Surface_condition_callout

A Surface_condition_callout is a combination of annotation elements that represents information about a surface condition.

For this particular type of callout the inherited attribute 'contents' shall refer to Annotation_curve (see 4.2.16), Surface_condition_symbol (see 4.2.495), or Text (see 4.2.514) objects only.

A Surface_condition_callout is a type of Draughting_callout (see 4.2.169).

4.2.495 Surface_condition_symbol

A Surface_condition_symbol is a pre-defined annotation symbol used to present information about surface conditions.

This part of ISO 10303 supports the surface condition symbols defined in ISO 1302. These symbols are, in the context of this AP, identified by a three digit code as shown on figure 70.

4.2.496 Surface_model

A Surface_model is the representation of geometry formed by a collection of Shell (see 4.2.451) objects.

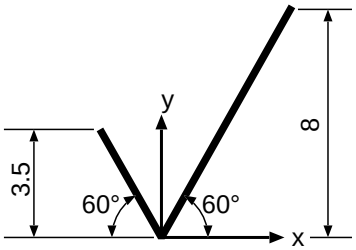
A Surface_model shall not intersect with another Surface_model except at edges and vertices.

NOTE - Two Surface_model objects may share faces.

A Surface_model is a type of Geometric_model (see 4.2.238).

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Basic symbol
name = '000'

Dimensions shown are in
mm and prior to scaling

Digit #1		Digit #2		Digit #3	
	0		0		0
	1		1		1
	2		2		
			3		
			4		
			5		
			6		
			7		

Figure 70 – Pre-defined surface condition symbols

The data associated with a Surface_model are the following:

— element

The element specifies the set of Shell objects that form the Surface_model.

See 4.3.1572 for the application assertion.

4.2.497 Surface_of_linear_extrusion

A Surface_of_linear_extrusion is a surface that is defined by sweeping any curve, defined in a 3D geometric space, in a given direction. The result is an infinite surface that shall be trimmed by applying a Face (see 4.2.191).

A Surface_of_linear_extrusion is a type of Surface (see 4.2.489).

4.2.498 Surface_of_revolution

A Surface_of_revolution is a surface that is specified by a complete revolution of a curve, defined in a 3D geometric space, about an axis.

A Surface_of_revolution is a type of Surface (see 4.2.489).

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4.2.499 Surface_profile_tolerance

A Surface_profile_tolerance is the definition of a uniform boundary along an ideal profile within which the elements of a surface must lie.

The tolerance zone established by a Surface_profile_tolerance is three dimensional, extending along the length and the width of the considered feature as a whole respectively along each segment of a defined size if the segment attribute is specified.

A Surface_profile_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Surface_profile_tolerance are the following:

— reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1573 for the application assertion.

4.2.500 Surface_texture

A Surface_texture is the characterization of irregularities of the surface of a shape or of a portion of a shape. Such an irregularity has a negligible impact on its dimensions but may impact some of its mechanical or functional characteristics. In the context of this AP Surface_texture covers the concepts of roughness and waviness as well as information about the method and parameters used to determine these irregularities.

A Surface_texture is a type of Surface_condition (see 4.2.492).

The data associated with a Surface_texture are the following:

— measuring_direction;

— measuring_method.

4.2.500.1 measuring_direction

The measuring_direction specifies the path in which the Surface_texture is measured on actual parts.

See 4.3.1574 for the application assertion.

The measuring_direction need not be specified for a particular Surface_texture (see 4.2.500).

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4.2.500.2 measuring_method

The measuring_method specifies the method or standard that describes the method used to characterize the Surface_texture. Where applicable, the following values shall be used:

— 'ISO 4287': The used surface texture parameters are defined in ISO 4287;

— 'ISO 12085': The used surface texture parameters are defined in ISO 12085;

— 'ISO 13565': The used surface texture parameters are defined in ISO 13565.

4.2.501 Surface_texture_parameter

A Surface_texture_parameter is a combination of a parameter name and possibly indices describing one particular parameter of a surface texture such as roughness or waviness.

The meaning of the Surface_texture_parameter is defined by the measuring method that is specified by the using Default_surface_texture (see 4.2.133) or Surface_texture (see 4.2.500).

EXAMPLE A typical Surface_texture_parameter according to ISO 4287 is Ra; in this case, the parameter name is 'R' and the index is 'a'.

NOTE - Qualifier such as 'min' or 'max' may be assigned using the subtypes of Value_with_unit (see 4.2.549).

The data associated with a Surface_texture_parameter are the following:

— described_texture;

— parameter_index;

— parameter_name;

— parameter_value.

4.2.501.1 described_texture

The described_texture specifies the surface texture that is described by the Surface_texture_parameter.

See 4.3.1575 and 4.3.1576 for the application assertions.

There shall be exactly one object that defines the described_texture for a Surface_texture_parameter (see 4.2.501).

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4.2.501.2 parameter_index

The parameter_index specifies an index that specifies the name of the Surface_texture_parameter further.

The parameter_index need not be specified for a particular Surface_texture_parameter (see 4.2.501).

4.2.501.3 parameter_name

The parameter_name specifies the word or group of words by which the Surface_texture_parameter is referred to.

EXAMPLE 1 Parameter names defined in ISO 4287 are, e.g., sampling or evaluation length 'l', primary profile parameter 'P', roughness profile parameter 'R', and waviness profile parameter 'W'. Parameter indices defined in ISO 4287 are, e.g., maximum peak height 'p', maximum valley depth 'v', maximum height 'y', mean height 'c', total height 't', arithmetical mean deviation 'a', and root mean square deviation 'q'.

EXAMPLE 2 Parameter names defined in ISO 12085 are, e.g., mean spacing of roughness motifs 'AR', mean depth of roughness motifs 'R', mean spacing of waviness motifs 'AW', and mean depth of waviness motifs 'W'.

4.2.501.4 parameter_value

The parameter_value specifies the value of the Surface_texture_parameter.

See 4.3.1577 for the application assertion.

4.2.502 Swept_face_solid

A Swept_face_solid is a solid that is defined by a sweep of a planar Face (see 4.2.191). A Swept_face_-solid shall not self-intersect.

A Swept_face_solid is a type of Detailed_geometric_model_element (see 4.2.144).

Each Swept_face_solid is a Solid_of_linear_extrusion (see 4.2.460) or a Solid_of_revolution (see 4.2.461).

The data associated with a Swept_face_solid are the following:

— swept_face

The swept_face specifies the Face that is swept.

See 4.3.1578 for the application assertion.

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4.2.503 Symmetry_tolerance

A Symmetry_tolerance is a constraint on the amount of deviation a toleranced element may have from being symmetrical to a datum. Any edge or (median) plane of the part must lie in a tolerance zone limited by two parallel lines or planes, symmetrically located with respect to a datum.

A Symmetry_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Symmetry_tolerance are the following:

— affected_plane;

— reference_datum.

4.2.503.1 affected_plane

The affected_plane specifies the plane in which the tolerance applies.

This attribute covers information that is given on drawings implicitly by the drawing plane. If the affected_plane is not specified, the tolerance applies in all directions (on drawings indicated by the diameter symbol).

See 4.3.1580 for the application assertion.

The affected_plane need not be specified for a particular Symmetry_tolerance (see 4.2.503).

4.2.503.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1579 for the application assertion.

4.2.504 Tactile_appearance

A Tactile_appearance is the appearance of a surface of a part regarding the sense of touch.

At least one of the attributes ’id’ or ’name’ shall be instantiated.

A Tactile_appearance is a type of Surface_condition (see 4.2.492).

The data associated with a Tactile_appearance are the following:

— depth;

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— description;

— id;

— name.

4.2.504.1 depth

The depth specifies the extent of the Tactile_appearance in the normal direction of the surface.

NOTE - The interpretation of the depth depends on the definition of the Tactile_appearance, i.e., on the contents of the attribute description.

See 4.3.1582 for the application assertion.

The depth need not be specified for a particular Tactile_appearance (see 4.2.504).

4.2.504.2 description

The description specifies additional information about the Tactile_appearance.

See 4.3.1581 for the application assertion.

The description need not be specified for a particular Tactile_appearance (see 4.2.504).

If present, there shall be exactly one object that defines the description for a Tactile_appearance.

4.2.504.3 id

The id specifies the identifier of the Tactile_appearance.

The id need not be specified for a particular Tactile_appearance (see 4.2.504).

4.2.504.4 name

The name specifies the word or group of words by which the Tactile_appearance is referred to.

See 4.3.1581 for the application assertion.

The name need not be specified for a particular Tactile_appearance (see 4.2.504).

If present, there shall be exactly one object that defines the name for a Tactile_appearance.

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4.2.505 Target_area

A Target_area is an area bounded by a closed Shape_element (see 4.2.449). The shape of the Target_area is described explicitly by a set of curves with reference to the part coordinate system.

A Target_area is a type of Datum_target (see 4.2.125).

The data associated with a Target_area are the following:

— is_defined_by

The is_defined_by specifies the Shape_element that represents the Target_area.

See 4.3.1583 for the application assertion.

4.2.506 Target_circle

A Target_circle is a target that is defined by a circle.

The centre of the circle is specified by the placing Axis_placement (see 4.2.33). The orientation of the Target_circle is the x-y-plane of the Axis_placement.

A Target_circle is a type of Placed_target (see 4.2.357).

The data associated with a Target_circle are the following:

— diameter

The diameter specifies the diameter of the Target_circle.

4.2.507 Target_line

A Target_line is a target that is defined by a straight line.

The first end point of the Target_line is specified by the placing Axis_placement (see 4.2.33). The second end point is located on the z-axis of the Axis_placement at the specified distance.

A Target_line is a type of Placed_target (see 4.2.357).

The data associated with a Target_line are the following:

— target_length

The target_length specifies the length of the Target_line.

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4.2.508 Target_point

A Target_point is a target that is defined by a single point.

The position of the Target_point is defined by the placing Axis_placement (see 4.2.33).

A Target_point is a type of Placed_target (see 4.2.357).

4.2.509 Target_rectangle

A Target_rectangle is a target that is defined by a rectangle.

The centre of the rectangle is specified by the placing Axis_placement (see 4.2.33). The orientation of the Target_rectangle is the x-y-plane with half the length of the rectangle in positive and half the length in negative direction along the x-axis and with half the width of the rectangle in positive and half the width in negative direction along the y-axis of the Axis_placement.

A Target_rectangle is a type of Placed_target (see 4.2.357).

The data associated with a Target_rectangle are the following:

— target_length;

— target_width.

4.2.509.1 target_length

The target_length specifies the length of the Target_rectangle.

4.2.509.2 target_width

The target_width specifies the width of the Target_rectangle.

4.2.510 Technical_solution

A Technical_solution is an alternative solution where the functional requirements are fulfilled in a certain technical way.

EXAMPLE ’disc brake’, ’disc brake ventilated’, ’disc brake with ABS’ for Product_component (see 4.2.394) ’front left brake’ are examples for a Technical_solution.

A Technical_solution is a type of Alternative_solution (see 4.2.10).

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The data associated with a Technical_solution are the following:

— description

The description specifies additional information about the Technical_solution.

See 4.3.1584 for the application assertion.

There shall be exactly one object that defines the description for a Technical_solution.

4.2.511 Tee_profile

A Tee_profile is an open profile with a shape similar to the capital letter 'T' as shown in figure 71. The x-axis of the inherited Axis_placement (see 4.2.33) is parallel to the base line of the cross bar, the y-axis is oriented such that the curves constituting the outline of the profile have positive y co-ordinates. It is located in the midpoint of the base line of the cross bar.

A Tee_profile is a type of Open_profile (see 4.2.328).

The data associated with a Tee_profile are the following:

— cross_bar_depth;

— cross_bar_width;

— depth;

— first_angle;

— first_offset;

— radius;

— second_angle;

— second_offset;

— width.

4.2.511.1 cross_bar_depth

The cross_bar_depth specifies the depth dimension of the Tee_profile bar size.

See 4.3.1585 for the application assertion.

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4.2.511.2 cross_bar_width

The cross_bar_width specifies the width dimension of the Tee_profile bar size.

See 4.3.1585 for the application assertion.

4.2.511.3 depth

The depth specifies the depth dimension of the Tee_profile stem.

See 4.3.1585 for the application assertion.

4.2.511.4 first_angle

The first_angle specifies the angular measurement for creating a chamfer on the open end of a Tee_-profile.

See 4.3.1585 for the application assertion.

4.2.511.5 first_offset

The first_offset specifies the distance from the edge of the Tee_profile stem to create a chamfer on the open end of a Tee_profile.

See 4.3.1585 for the application assertion.

4.2.511.6 radius

The radius specifies an arc size for blending the sides of a Tee_profile cross bar.

See 4.3.1585 for the application assertion.

The radius need not be specified for a particular Tee_profile (see 4.2.511).

4.2.511.7 second_angle

The second_angle specifies the angular measurement for creating a chamfer between the stem and the cross bar of the Tee_profile.

See 4.3.1585 for the application assertion.

4.2.511.8 second_offset

The second_offset specifies the distance from the edge between the Tee_profile stem and the Tee_profile cross bar along the stem to create a chamfer between the stem and the cross bar.

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See 4.3.1585 for the application assertion.

4.2.511.9 width

The width specifies the width dimension of the Tee_profile stem.

See 4.3.1585 for the application assertion.

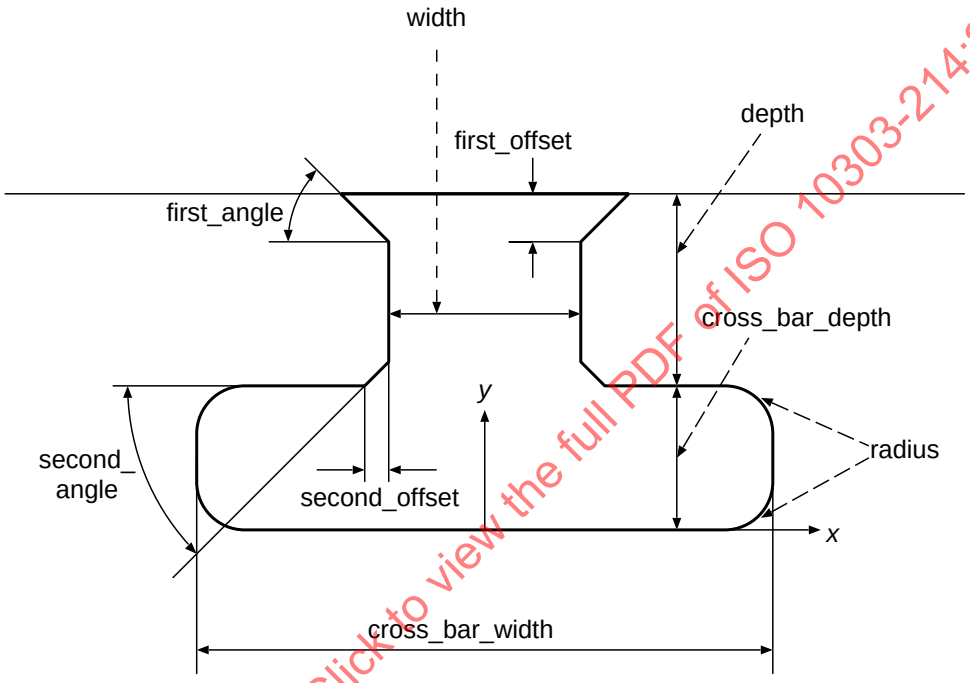


Figure 71 – Definition of a Tee_profile

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4.2.512 Template_instance

A Template_instance is a replica of a Geometric_model (see 4.2.238), of a Styled_model (see 4.2.484), or of an External_model (see 4.2.189).

The location of the replica and any additional geometrical transformation to be applied to the replica, i.e., uniform scaling, rotation or mirroring, are specified by the attribute 'transformation'.

NOTE 1 - In the case where the units of the Cartesian coordinate space of the definition are different from the units to be applied to the Template_instance, unit conversion is required.

NOTE 2 - In case of length unit conversion this conversion applies in addition to the scale attribute.

EXAMPLE In a technical drawing of a mechanical part with several identical drilling holes, the hole geometry (circle) together with its annotation elements (diameter dimension and centrelines) is defined once. This

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particular definition is instantiated several times at different locations by corresponding Template_instance objects.

A Template_instance is a type of Detailed_model_element (see 4.2.145).

The data associated with a Template_instance are the following:

— id;

— model_placement;

— scale;

— template_definition.

4.2.512.1 id

The id specifies the identifier of the Template_instance.

4.2.512.2 model_placement

The model_placement specifies the geometrical transformation applied to the instance. All transformations that can be expressed by an orthonormal 2×2 (for 2D) or 3×3 (for 3D) matrix can be applied.

EXAMPLE Examples for suitable operations are rotation and mirroring.

See 4.3.1589 for the application assertion.

4.2.512.3 scale

The scale specifies the scaling factor for all Cartesian coordinate directions. The scaling factor shall be positive. If the scaling factor is omitted, it shall be 1.0.

The scale need not be specified for a particular Template_instance (see 4.2.512).

4.2.512.4 template_definition

The template_definition specifies the object to be replicated.

See 4.3.1586, 4.3.1587, and 4.3.1588 for the application assertions.

There shall be exactly one object that defines the template_definition for a Template_instance (see 4.2.512).

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4.2.513 Terminator_symbol

A Terminator_symbol is a predefined annotation symbol used to present a line terminator.

This AP supports the terminator symbols shown in figure 72 .

4.2.514 Text

A Text is a collection of characters that convey some human interpretable information.

A Text is a type of Annotation_element (see 4.2.17).

4.2.515 Text_appearance

A Text_appearance is the definition of the visual presentation of text. Text_appearance may be predefined or user defined. Predefined text fonts are the fonts 'A' and 'B' as defined in ISO 3098 – 1 and ISO 3098 – 2. User defined text fonts are defined by thickness, colour, text rotation angle, character aspect ratio, character rotation angle, character scale, and character slant angle as shown in figure 73.

4.2.516 Thickness_dimension

A Thickness_dimension is a geometric property of an object.

A Thickness_dimension is a type of Size_dimension (see 4.2.456).

The data associated with a Thickness_dimension are the following:

— used_path

The used_path specifies the path along which the thickness dimension is applied or measured.

See 4.3.1590 for the application assertion.

The used_path need not be specified for a particular Thickness_dimension.

4.2.517 Thread_feature

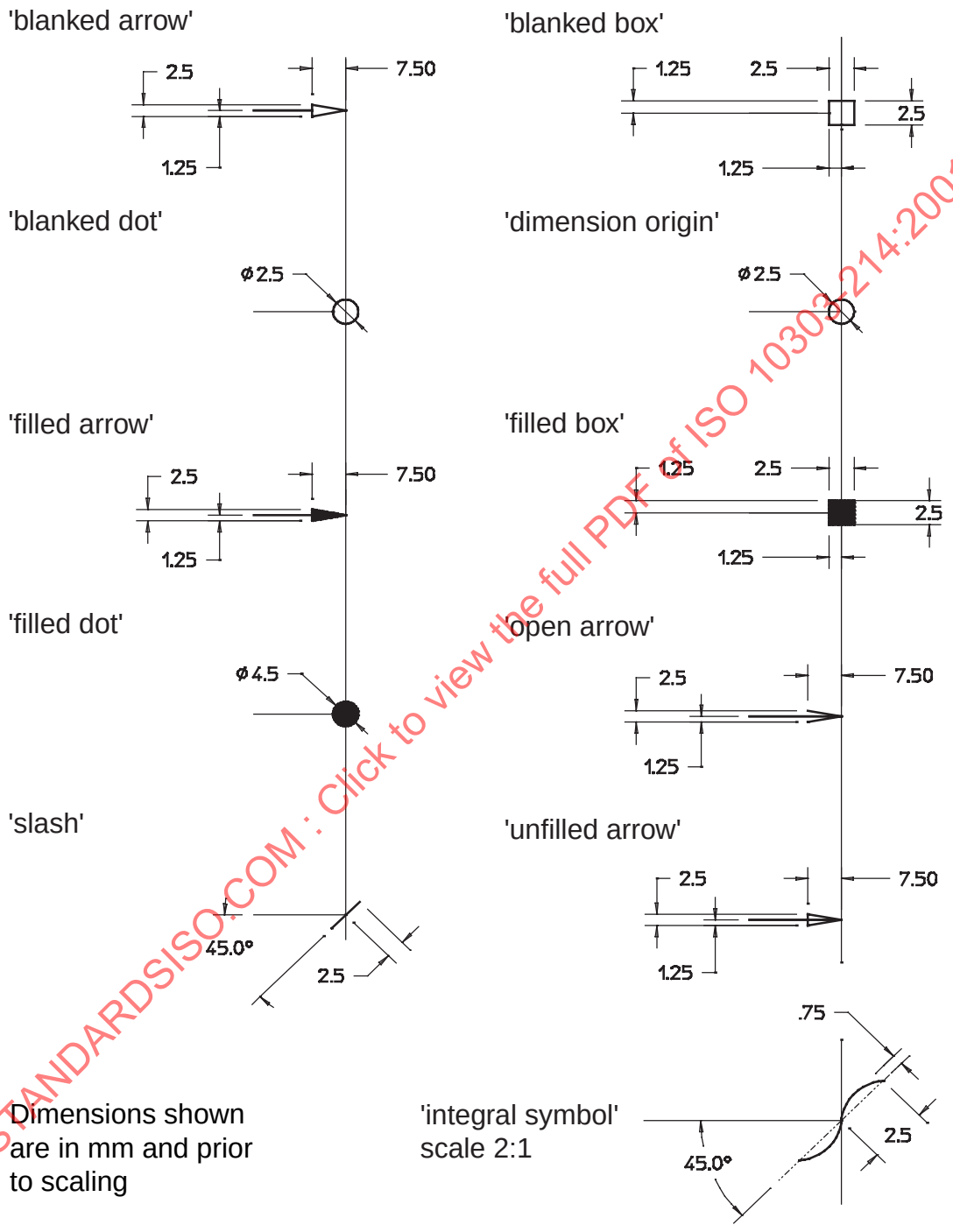
A Thread_feature is a feature that is specified by a ridge of uniform section on the form of a helix on the external or internal surface of a cylinder.

EXAMPLE 1 Thread features may be used to design screws and bolts.

EXAMPLE 2 Figure 74 shows a Thread_feature applied to a screw.

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Figure 72 – Predefined terminator symbols

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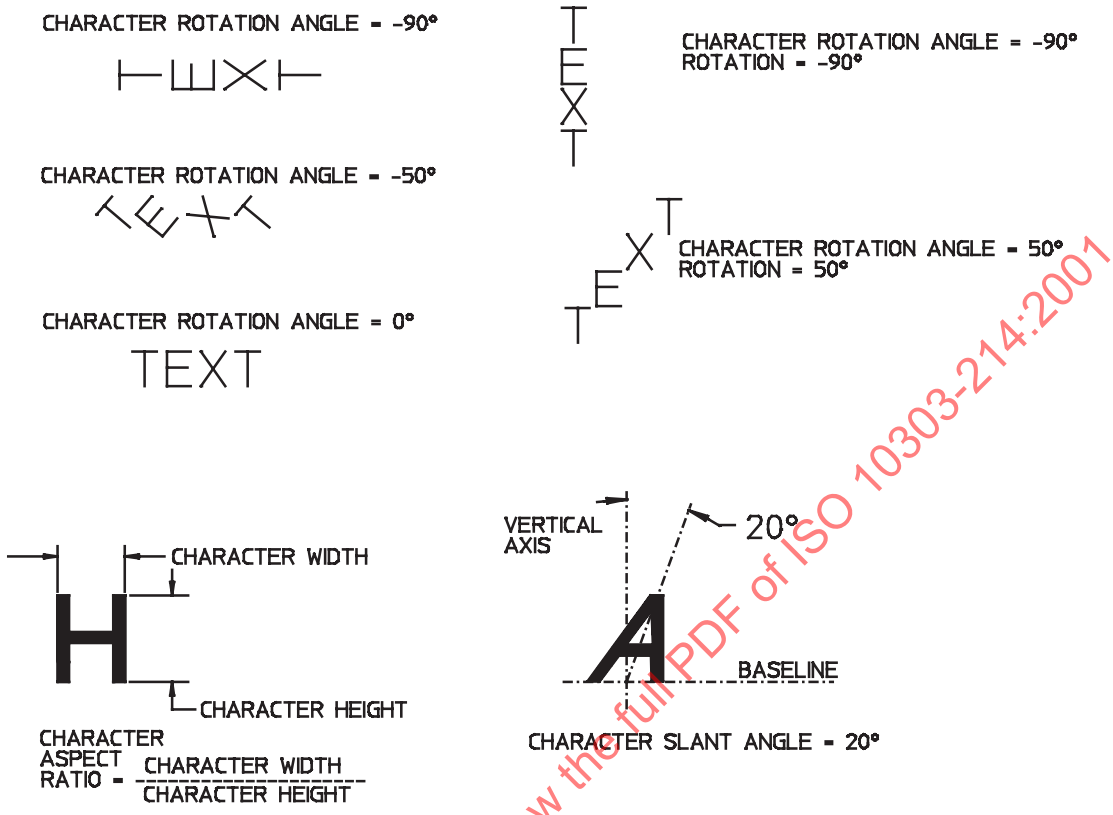


Figure 73 – Text appearance and rotation

The data associated with a Thread_feature are the following:

— effective_thread_length;

— location_and_orientation;

— maximum_thread_length;

— thread_definition.

4.2.517.1 effective_thread_length

The effective_thread_length specifies the length of the thread which is usable by the application.

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4.2.517.2 location_and_orientation

The location_and_orientation specifies an Axis_placement (see 4.2.33) whose location represents the start of the thread and whose z-axis points into the direction of the possible runout.

See 4.3.1591 for the application assertion.

4.2.517.3 maximum_thread_length

The maximum_thread_length specifies the usable thread length plus the runout.

The maximum_thread_length need not be specified for a particular Thread_feature (see 4.2.517).

4.2.517.4 thread_definition

The thread_definition specifies the Thread_specification (see 4.2.518) that contains the parameters specifying the thread.

See 4.3.1592 for the application assertion.

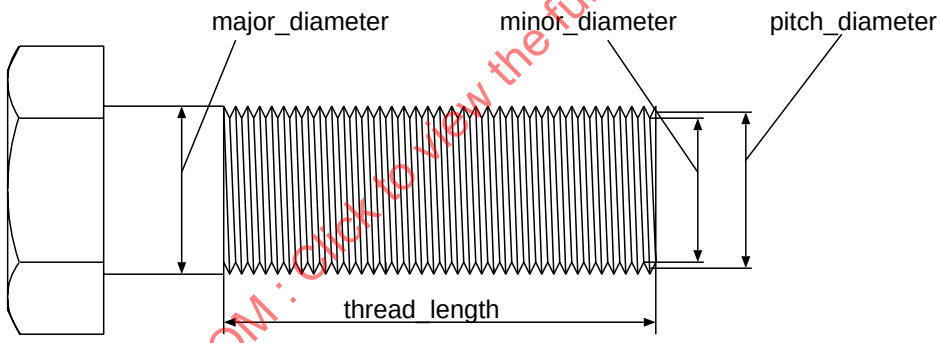


Figure 74 – Screw with thread

4.2.518 Thread_specification

A Thread_specification is a set of parameters specifying a thread independent from its application.

Each Thread_specification is a Defined_thread (see 4.2.135) or a Catalogue_thread (see 4.2.48).

The data associated with a Thread_specification are the following:

— density;

— fit_class;

— form_type;

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— hand;

— inner;

— major_diameter;

— qualifier.

4.2.518.1 density

The density specifies the number of threads per the axial unit of length of measure.

See 4.3.1593 for the application assertion.

4.2.518.2 fit_class

The fit_class specifies the class of fit for the thread as defined in ISO 965-1.

EXAMPLE Examples for fit_class are '4e' and '2E'.

4.2.518.3 form_type

The form_type specifies the kind of thread. Where applicable, the following values shall be used:

— 'M': The Thread_specification specifies a general purpose metric thread;

NOTE 1 - General purpose metric threads are defined in ISO 261

— 'R': The Thread_specification specifies a pipe thread (Whitworth);

NOTE 2 - Pipe threads of type 'R' are defined in ISO 7

— 'Tr': The Thread_specification specifies a metric trapezoidal thread;

NOTE 3 - Metric trapezoidal threads are defined in ISO 2902

— 'G': The Thread_specification specifies a pipe thread;

NOTE 4 - Pipe threads of type 'G' are defined in ISO 228

— 'UNC': The Thread_specification specifies a unified coarse thread;

— 'UNF': The Thread_specification specifies a unified fine thread.

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4.2.518.4 hand

The hand specifies if the thread is right or left handed. The following values shall be used:

— 'left hand': The thread is a left handed thread;

— 'right hand': The Thread is a right handed thread.

When viewed toward an end, a right hand winds in a clockwise direction and a left hand winds in a counter-clockwise direction.

4.2.518.5 inner

The inner specifies if it is an inner or outer thread. A value of 'true' indicates that it is a thread in a hole; a value of 'false' indicates that it is a thread on a shaft.

4.2.518.6 major_diameter

The major_diameter specifies the dimension of the largest diameter of a thread.

See 4.3.1593 for the application assertion.

4.2.518.7 qualifier

The qualifier specifies the thread as text.

EXAMPLE 1 'M 20', 'Tr 40 × 7', 'G $^{3}/_{4}$', or 'R $^{1}/_{2}$' are examples for the qualifier.

EXAMPLE 2 The number of parallel helixes a thread consists of is an example for the use of the qualifier.

The qualifier need not be specified for a particular Thread_specification (see 4.2.518).

4.2.519 Through_hole_bottom_condition

A Through_hole_bottom_condition is a condition characterizing a Round_hole (see 4.2.439) that is open at both ends.

EXAMPLE Figure 45 shows the application of a Through_hole_bottom_condition.

4.2.520 Through_pocket_bottom_condition

A Through_pocket_bottom_condition is an end condition for a pocket feature that passes through two faces of a part.

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4.2.521 Tiling

A Tiling is a pattern of tiles that represents graphical symbols defined within a containment border. The containment border defines the edges of the tile. All elements contained within the border are duplicated for each tile. Tiles are placed within a fill area adjacently and do not overlap. The containment border may be blanked.

NOTE - The Tiling may be defined by the user or may be externally defined.

4.2.522 Tolerance_condition

A Tolerance_condition is the representation of a condition for a surface element wherein it contains the amount of material.

NOTE 1 - Tolerances of position are determined by a material condition of mating surfaces.

NOTE 2 - The usage of material conditions is defined in ISO 2692 [11].

The data associated with a Tolerance_condition are the following:

— condition

The condition specifies the kind of Tolerance_condition.

EXAMPLE Maximum material condition (MMC) and least material condition (LMC) are examples for a Tolerance_condition.

4.2.523 Tolerance_table_cell

A Tolerance_table_cell is the information contained in one cell of a General_tolerance_table (see 4.2.234).

EXAMPLE Figure 41 depicts an example for a General_tolerance_table.

The data associated with a Tolerance_table_cell are the following:

— cell_value;

— description;

— limit;

— table;

— tolerance_class.

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4.2.523.1 cell_value

The cell_value specifies the value of a Tolerance_table_cell.

See 4.3.1596 and 4.3.1599 for the application assertions.

There shall be exactly one object that defines the cell_value for a Tolerance_table_cell (see 4.2.523).

4.2.523.2 description

The description specifies additional information about the Tolerance_table_cell.

See 4.3.1595 for the application assertion.

The description need not be specified for a particular Tolerance_table_cell (see 4.2.523).

If present, there shall be exactly one object that defines the description for a Tolerance_table_cell.

4.2.523.3 limit

The limit specifies the limit for the values of the dimensions for which the values provided as the cell_-value are valid.

See 4.3.1597 and 4.3.1598 for the application assertions.

There shall be exactly one object that defines the limit for a Tolerance_table_cell (see 4.2.523).

4.2.523.4 table

The table specifies the General_tolerance_table (see 4.2.234) the Tolerance_table_cell belongs to.

See 4.3.1594 for the application assertion.

4.2.523.5 tolerance_class

The tolerance_class specifies the tolerance class for which the values provided in the Tolerance_table_-cell are valid.

EXAMPLE Examples for tolerance_class are ’f’ for ’fine’, ’m’ for ’medium’, ’c’ for ’coarse’, and ’v’ for ’very coarse’.

4.2.524 Tolerance_zone

A Tolerance_zone is the zone wherein all points of the toleranced element shall fall.

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EXAMPLE Figure 75 depicts a Tolerance_zone of a straightness tolerance of ’0.1’ specified for a line.

The data associated with a Tolerance_zone are the following:

— form_type;

— is_zone_for.

4.2.524.1 form_type

The form_type specifies the shape of the Tolerance_zone.

EXAMPLE ’cylindrical’, ’parallelepiped’, or ’spherical’ are examples for form_type.

4.2.524.2 is_zone_for

The is_zone_for specifies the set of Geometric_tolerance (see 4.2.243) objects for which the Tolerance_zone defines the zone.

See 4.3.1600 for the application assertion.

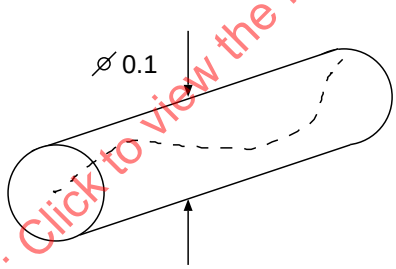


Figure 75 – Tolerance_zone

4.2.525 Tolerance_zone_definition

A Tolerance_zone_definition is the specification of the boundaries of a Tolerance_zone (see 4.2.524).

Each Tolerance_zone_definition may be a Projection (see 4.2.406).

The data associated with a Tolerance_zone_definition are the following:

— first_element;

— is_defining;

— second_element.

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4.2.525.1 first_element

The first_element specifies the Shape_element (see 4.2.449) that represents the first or, in the case of a cylindrical tolerance zone, the only boundary of the Tolerance_zone_definition.

See 4.3.1601 for the application assertion.

4.2.525.2 is_defining

The is_defining specifies the Tolerance_zone (see 4.2.524) that is specified by the Tolerance_zone_definition.

See 4.3.1602 for the application assertion.

4.2.525.3 second_element

The second_element specifies the Shape_element (see 4.2.449) that represents the second bounding element.

See 4.3.1601 for the application assertion.

The second_element need not be specified for a particular Tolerance_zone_definition (see 4.2.525).

4.2.526 Tool_attachment_point_frame

A Tool_attachment_point_frame is a kinematic attachment frame of a tool that may be attached to a link of a Kinematic_mechanism (see 4.2.286).

A Tool_attachment_point_frame is a type of Transformation_to_reference_frame (see 4.2.536).

4.2.527 Tool_centre_point_frame

A Tool_centre_point_frame is a kinematic reference frame of a tool that may be attached to a link of a Kinematic_mechanism (see 4.2.286).

A Tool_centre_point_frame is a type of Transformation_to_reference_frame (see 4.2.536).

4.2.528 Tool_part_relationship

A Tool_part_relationship is a relationship between two Design_discipline_item_definition (see 4.2.142) objects. It establishes a relationship between an item (related) and a tool (relating) that is used to produce the item.

NOTE - This relationship is, by default, valid only in the application contexts that are relevant for both related Design_discipline_item_definition objects.

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A Tool_part_relationship is a type of Item_definition_relationship (see 4.2.269).

The data associated with a Tool_part_relationship are the following:

— placement;

— used_technology_description.

4.2.528.1 placement

The placement specifies the relative position of the Item (see 4.2.267) representing the part with respect to the local coordinate system of the Item representing the tool.

In the case where the placement is realized by a Template_instance (see 4.2.512), the scale factor of that Template_instance shall be omitted or set to 1.

See 4.3.1603 and 4.3.1605 for the application assertions.

The placement need not be specified for a particular Tool_part_relationship (see 4.2.528).

If present, there shall be exactly one object that defines the placement for a Tool_part_relationship.

4.2.528.2 used_technology_description

The used_technology_description specifies the technology that is used to manufacture the part using this tool and, possibly, the reasons for the use of a particular technology.

See 4.3.1604 for the application assertion.

The used_technology_description need not be specified for a particular Tool_part_relationship (see 4.2.528).

If present, there shall be exactly one object that defines the used_technology_description for a Tool_-part_relationship.

4.2.529 Topologically_connected_set

A Topologically_connected_set is a collection of Face (see 4.2.191) and/or Oriented_edge_curve (see 4.2.334) objects.

A Topologically_connected_set is a type of Detailed_geometric_model_element (see 4.2.144).

The data associated with a Topologically_connected_set are the following:

— element

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The element specifies the set of Face or Oriented_edge_curve objects that are part of the Topologically_-connected_set.

See 4.3.1606 and 4.3.1607 for the application assertions.

There shall be at least one object that defines the element for a Topologically_connected_set.

4.2.530 Toroidal_surface

A Toroidal_surface is a surface that can be produced by revolving a circle about a non-intersecting line in the plane of its circle.

NOTE - Cases where the minor radius of the torus is actually greater than the major radius are possible.

A Toroidal_surface is a type of Surface (see 4.2.489).

4.2.531 Torus

A Torus is a solid that is defined by sweeping the area of one circle with minor radius about another circle with larger radius. A Torus is defined by the position in space and the radius of the larger circle, and by the radius of the swept area.

A Torus is a type of Csg_primitive (see 4.2.107).

4.2.532 Total_runout_tolerance

A Total_runout_tolerance is a geometric constraint on a cylindrical surface with respect to a datum axis the part is rotated about. The tolerance is applied simultaneously to all positions as the part is rotated 360 degrees.

NOTE 1 - Where applied to surfaces constructed around a datum axis, Total_runout_tolerance is used to control cumulative variations of circularity, straightness, coaxiality, angularity, taper, and profile of a surface.

NOTE 2 - Where applied to surfaces constructed at right angles to a datum axis, Total_runout_tolerance controls cumulative variations or perpendicularity and flatness.

A Total_runout_tolerance is a type of Geometric_tolerance (see 4.2.243).

The data associated with a Total_runout_tolerance are the following:

— angle;

— reference_datum.

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4.2.532.1 angle

The angle specifies the direction with respect to the datum axis in which a runout tolerance is controlled.

If the angle is specified the runout tolerance applies for this angle. If the angle is not specified the runout tolerance applies normal to the feature surface.

The angle need not be specified for a particular Total_runout_tolerance (see 4.2.532).

4.2.532.2 reference_datum

The reference_datum specifies the Single_datum (see 4.2.454) or the Compound_datum (see 4.2.84) objects that define the reference for this type of geometric tolerance.

See 4.3.1608 for the application assertion.

4.2.533 Transformation

A Transformation is a geometric transformation composed of translation and rotation. Scaling is not included.

Each Transformation is a Transformation_3d (see 4.2.535) or a Transformation_2d (see 4.2.534).

4.2.534 Transformation_2d

A Transformation_2d is the definition of a geometric transformation in 2D space.

A Transformation_2d is a type of Transformation (see 4.2.533).

4.2.535 Transformation_3d

A Transformation_3d is the definition of a geometric transformation in 3D space.

A Transformation_3d is a type of Transformation (see 4.2.533).

4.2.536 Transformation_to_reference_frame

A Transformation_to_reference_frame is a relative position of one kinematic frame with respect to another kinematic frame.

Each Transformation_to_reference_frame may be a Tool_attachment_point_frame (see 4.2.526) or a Tool_centre_point_frame (see 4.2.527).

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4.2.537 Transition_feature

A Transition_feature is a transition area between two faces.

A Transition_feature shall have shape representation.

Each Transition_feature is an Edge_round (see 4.2.177), a Fillet (see 4.2.205), or a Chamfer (see 4.2.51).

The data associated with a Transition_feature are the following:

— face_1;

— face_2.

4.2.537.1 face_1

The face_1 specifies the first of the two Face (see 4.2.191) objects that the Transition_feature is applied to.

See 4.3.1609 for the application assertion.

4.2.537.2 face_2

The face_2 specifies the second of the two Face (see 4.2.191) objects that the Transition_feature is applied to.

See 4.3.1609 for the application assertion.

4.2.538 Treatment_result

A Treatment_result is a general surface condition that is a result of a certain treatment.

At least one of the attributes ’id’ or ’name’ shall be instantiated.

A Treatment_result is a type of Surface_condition (see 4.2.492).

The data associated with a Treatment_result are the following:

— description;

— id;

— name;

— purpose.

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4.2.538.1 description

The description specifies additional information about the Treatment_result.

See 4.3.1610 for the application assertion.

There shall be exactly one object that defines the description for a Treatment_result (see 4.2.538).

4.2.538.2 id

The id specifies the identifier of the Treatment_result.

The id need not be specified for a particular Treatment_result (see 4.2.538).

4.2.538.3 name

The name specifies the word or group of words by which the Treatment_result is referred to.

See 4.3.1610 for the application assertion.

The name need not be specified for a particular Treatment_result (see 4.2.538).

If present, there shall be exactly one object that defines the name for a Treatment_result.

4.2.538.4 purpose

The purpose specifies the effects that are a consequence of the treatment.

See 4.3.1610 for the application assertion.

The purpose need not be specified for a particular Treatment_result (see 4.2.538).

If present, there shall be exactly one object that defines the purpose for a Treatment_result.

4.2.539 Trimmed_curve

A Trimmed_curve is a curve of finite length that is the result of trimming a curve between two points. The trimming points are the start and end points of the Trimmed_curve. These points may be specified by Cartesian points or by parameter values.

A Trimmed_curve is a type of Curve (see 4.2.108).

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4.2.540 Trimmed_surface

A Trimmed_surface is a surface of finite area with identifiable boundaries. A Trimmed_surface is either a b-spline surface, a curve bounded surface, or a rectangular composite surface. A Trimmed_surface shall only be used in Geometrically_bounded_surface_model (see 4.2.248) objects.

A Trimmed_surface is a type of Surface (see 4.2.489).

4.2.541 Unit

An Unit is a quantity chosen as a standard in terms of which other quantities may be expressed.

The types of units supported by this standard are SI units as well as derived or conversion based units as defined in ISO 10303-41.

The data associated with a Unit are the following:

— unit_name

The unit_name specifies the term representing the kind of unit.

EXAMPLE ’gram’, ’litre’, or ’volt’ are examples for the unit_name.

4.2.542 Upper_lower_limit

An Upper_lower_limit is an entry in a Tolerance_table_cell (see 4.2.523) representing the range of applicability of a tolerance value by specifying an upper and a lower limit.

For the dimensions falling into that range, the corresponding tolerance table entry shall be applied, if no other specific tolerance value has been assigned to them.

The data associated with an Upper_lower_limit are the following:

— lower_limit;

— upper_limit.

4.2.542.1 lower_limit

The lower_limit specifies the lower value of the value range.

4.2.542.2 upper_limit

The upper_limit specifies the upper value of the value range.

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4.2.543 Upper_lower_toleranced_datum

An Upper_lower_toleranced_datum is an entry in a Tolerance_table_cell (see 4.2.523) that is a tolerance range for a dimension.

The data associated with an Upper_lower_toleranced_datum are the following:

— lower_tolerance_value;

— upper_tolerance_value.

4.2.543.1 lower_tolerance_value

The lower_tolerance_value specifies the lower value with measure of the tolerance range.

4.2.543.2 upper_tolerance_value

The upper_tolerance_value specifies the upper value with measure of the tolerance range.

4.2.544 Value_limit

A Value_limit is a qualified numerical value representing either the lower limit or the upper limit of a particular physical characteristic.

EXAMPLE ’30.5 max’ and ’5 min’ are examples for a Value_limit.

A Value_limit is a type of Value_with_unit (see 4.2.549).

The data associated with a Value_limit are the following:

— limit;

— limit_qualifier.

4.2.544.1 limit

The limit specifies the value of the limit.

4.2.544.2 limit_qualifier

The limit_qualifier specifies the kind of limit. The following values shall be used:

— ’maximum’: The specified limit is an upper limit;

— ’minimum’: The specified limit is a lower limit.

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4.2.545 Value_limitation

A Value_limitation is a mechanism to add information about limitations to a Numerical_value (see 4.2.324).

The data associated with a Value_limitation are the following:

— envelope;

— is_defined_by;

— limited_value.

4.2.545.1 envelope

The envelope specifies whether a geometric constraint resulting from the limitation has to be fulfilled in itself or not. A value of 'true' indicates that the envelope of the perfect shape corresponding to the maximum material shall not be larger than the specified dimension and tolerance.

NOTE 1 - The concept of the envelope principle is defined in ISO 8015 [19].

NOTE 2 - A dimension where the envelope principle applies, appears on drawings with an 'E' enclosed in a circle following the dimension value.

The envelope need not be specified for a particular Value_limitation (see 4.2.545).

4.2.545.2 is_defined_by

The is_defined_by specifies the limitation that is associated with the Numerical_value (see 4.2.324).

See 4.3.1611 and 4.3.1613 for the application assertions.

There shall be exactly one object that the Value_limitation (see 4.2.545) is_defined_by.

4.2.545.3 limited_value

The limited_value specifies the Numerical_value (see 4.2.324) that is limited.

See 4.3.1612 for the application assertion.

4.2.546 Value_list

A Value_list is an ordered collection of Property_value (see 4.2.412) objects.

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EXAMPLE A General_property (see 4.2.230) may be composed of different property values such as 'mass', 'speed', and 'age' which are altogether necessary in a given context. The Value_list collects all of them in a given order, such that each is identifiable by its index in the list.

A Value_list is a type of Property_value (see 4.2.412).

The data associated with a Value_list are the following:

— values

The values specifies the ordered collection of Property_value objects that together are provided as a Property_value.

See 4.3.1614 for the application assertion.

4.2.547 Value_range

A Value_range is a pair of numerical values representing the range in which the value shall lie.

A Value_range is a type of Value_with_unit (see 4.2.549).

The data associated with a Value_range are the following:

— lower_limit;

— upper_limit.

4.2.547.1 lower_limit

The lower_limit specifies the minimum acceptable value that is constrained by the Value_range.

4.2.547.2 upper_limit

The upper_limit specifies the maximum acceptable value that is constrained by the Value_range.

4.2.548 Value_termination

A Value_termination specifies a condition where a Joggle_feature (see 4.2.277) has a specified depth.

EXAMPLE 76 shows a value terminated joggle feature.

A Value_termination is a type of Joggle_termination (see 4.2.278).

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The data associated with a Value_termination are the following:

— angle;

— depth.

4.2.548.1 angle

The angle specifies the slope angle of the terminating face of the Joggle_feature (see 4.2.277) measured from the panel surface.

See 4.3.1615 for the application assertion.

4.2.548.2 depth

The depth specifies the distance from the rim of the panel to a point that corresponds to the end of the Joggle_feature (see 4.2.277).

See 4.3.1615 for the application assertion.

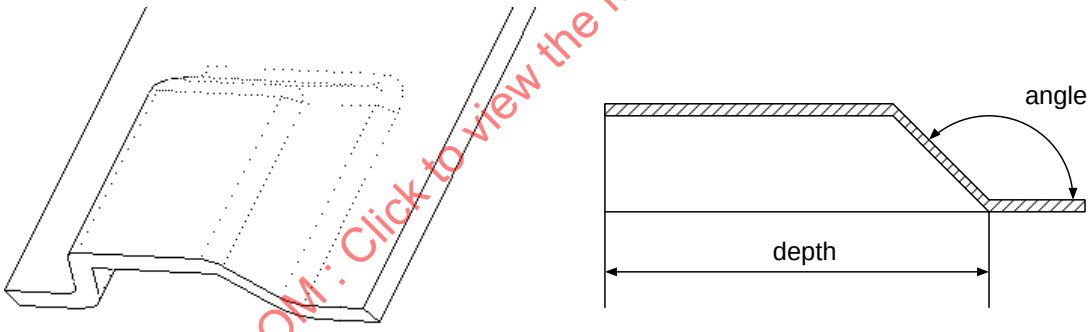


Figure 76 – Value terminated joggle feature

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4.2.549 Value_with_unit

A Value_with_unit is either a single numerical measure, or a range of numerical measures with upper, lower, or upper and lower bounds.

A Value_with_unit is a type of Property_value (see 4.2.412).

Each Value_with_unit is a Value_range (see 4.2.547), a Numerical_value (see 4.2.324), or a Value_limit (see 4.2.544).

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The data associated with a Value_with_unit are the following:

— significant_digits;

— unit_component.

4.2.549.1 significant_digits

The significant_digits specifies the number of decimal digits that are relevant for the use of the Value_-with_unit. If present, the numerical measure or range may be specified using more digits than the significant digits but shall not be specified using less digits.

The significant_digits need not be specified for a particular Value_with_unit (see 4.2.549).

4.2.549.2 unit_component

The unit_component specifies the unit in which the Value_with_unit is expressed.

See 4.3.1616 for the application assertion.

The unit_component need not be specified for a particular Value_with_unit (see 4.2.549).

4.2.550 Vector_appearance

A Vector_appearance is the definition of the visual appearance of a vector.

A Vector_appearance is a type of Curve_appearance (see 4.2.109).

The data associated with a Vector_appearance are the following:

— arrow_head_type

The arrow_head_type specifies the type of the arrow head.

See 4.3.1617 for the application assertion.

4.2.551 Vee_profile

A Vee_profile is an open profile that is specified by a shape bounded by two lines that connect at a point and extend infinitely. The enclosed angle shall be smaller than 180 degrees. The connection of the two lines may be blended with a radius. The x-y-plane of the inherited Axis_placement (see 4.2.33) coincides with the x-y-plane of the base lines outlining the profile. It is located in the connection of these two lines.

NOTE - The orientation of the Axis_placement is further constrained by the 'tilt_angle' of the Vee_profile.

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EXAMPLE Figure 77 depicts a Vee_profile.

A Vee_profile is a type of Open_profile (see 4.2.328).

The data associated with a Vee_profile are the following:

— profile_angle;

— radius;

— tilt_angle.

4.2.551.1 profile_angle

The profile_angle specifies the size of the angle between the two sides of the Vee_profile. The angle shall be greater than 0 degrees and less than 180 degrees.

See 4.3.1618 for the application assertion.

4.2.551.2 radius

The radius specifies the size of the blend radius at the point of the 'V', or where the two sides come together.

See 4.3.1618 for the application assertion.

The radius need not be specified for a particular Vee_profile (see 4.2.551).

4.2.551.3 tilt_angle

The tilt_angle specifies the size of the angle between one side of the Vee_profile and the x-axis of the local coordinate system of the Vee_profile.

See 4.3.1618 for the application assertion.

4.2.552 Vertex_loop

A Vertex_loop is a loop that consists of only one vertex. The dimensionality of a Vertex_loop is zero.

EXAMPLE The tip of a cone is an example for the usage of a Vertex_loop.

The data associated with a Vertex_loop are the following:

— loop_vertex

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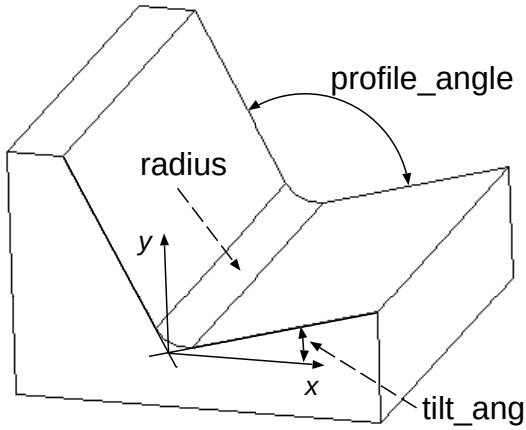


Figure 77 – Definition of a Vee_profile

The loop_vertex specifies a Vertex_point (see 4.2.553) that represents the geometry of the associated vertex.

See 4.3.1619 for the application assertion.

4.2.553 Vertex_point

A Vertex_point is a topological construct corresponding to a point. It has dimensionality 0 and extent 0. The geometric location of the Vertex_point is defined by an associated point.

The data associated with a Vertex_point are the following:

— vertex_geometry

The vertex_geometry specifies the geometric point that defines the position in geometric space of the vertex point.

See 4.3.1620 for the application assertion.

4.2.554 View

A View is the representation of a two-dimensional picture. This picture consists of the image generated by the projection mechanism defined by one Model_image (see 4.2.316) and additional View_placed_-

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annotation (see 4.2.558). A View is placed in the coordinate space of a Drawing_sheet (see 4.2.173) or of a View_area (see 4.2.555).

The data associated with a View are the following:

— description;

— id;

— layout;

— name;

— view_placement;

— view_space.

4.2.554.1 description

The description specifies additional information about the View.

See 4.3.1623 for the application assertion.

The description need not be specified for a particular View (see 4.2.554).

If present, there shall be exactly one object that defines the description for a View.

4.2.554.2 id

The id specifies the identification of the View.

The id need not be specified for a particular View (see 4.2.554).

4.2.554.3 layout

The layout specifies either a Drawing_sheet (see 4.2.173) or a View_area (see 4.2.555) in which the View is placed.

See 4.3.1622 and 4.3.1625 for the application assertions.

There shall be exactly one object that defines the layout for a View (see 4.2.554).

4.2.554.4 name

The name specifies the word or group of words by which the View is referred to.

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See 4.3.1623 for the application assertion.

There shall be exactly one object that defines the name for a View (see 4.2.554).

4.2.554.5 view_placement

The view_placement specifies the Transformation_2d (see 4.2.534) that is used to place and orient the View on a Drawing_sheet (see 4.2.173) or on a View_area (see 4.2.555).

See 4.3.1624 for the application assertion.

4.2.554.6 view_space

The view_space specifies the two-dimensional Cartesian coordinate space where the presented picture is defined.

See 4.3.1621 for the application assertion.

4.2.555 View_area

A View_area is a collection of View (see 4.2.554) objects, placed in a specified rectangular area. The placement of the views is defined relative to the two dimensional coordinate space of the View_area.

The data associated with a View_area are the following:

— area_space;

— description;

— id;

— name;

— revision_id;

— size.

4.2.555.1 area_space

The area_space specifies the Cartesian_coordinate_space_2d (see 4.2.45) space relative to that the presented views are placed.

See 4.3.1626 for the application assertion.

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4.2.555.2 description

The description specifies additional information about the View_area.

See 4.3.1627 for the application assertion.

The description need not be specified for a particular View_area (see 4.2.555).

If present, there shall be exactly one object that defines the description for a View_area.

4.2.555.3 id

The id specifies the identifier of the View_area.

The id need not be specified for a particular View_area (see 4.2.555).

4.2.555.4 name

The name specifies the word or group of words by which the View_area is referred to.

See 4.3.1627 for the application assertion.

The name need not be specified for a particular View_area (see 4.2.555).

If present, there shall be exactly one object that defines the name for a View_area.

4.2.555.5 revision_id

The revision_id specifies the identifier of the revision of the View_area.

The revision_id need not be specified for a particular View_area (see 4.2.555).

4.2.555.6 size

The size specifies the width and the height of the View_area.

4.2.556 View_area_assignment

A View_area_assignment is an association of a View_area (see 4.2.555) with the object that is presented on the View_area.

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The data associated with a View_area_assignment are the following:

— associated_view_area;

— is_describing.

4.2.556.1 associated_view_area

The associated_view_area specifies the View_area (see 4.2.555) that is associated with the object.

See 4.3.1642 for the application assertion.

4.2.556.2 is_describing

The is_describing specifies the object that is associated with the View_area (see 4.2.555).

See 4.3.1628, 4.3.1629, 4.3.1630, 4.3.1631, 4.3.1632, 4.3.1633, 4.3.1634, 4.3.1635, 4.3.1636, 4.3.1637, 4.3.1638, 4.3.1639, 4.3.1640, and 4.3.1641 for the application assertions.

There shall be exactly one object that the View_area_assignment (see 4.2.556) is_describing.

4.2.557 View_area_relationship

A View_area_relationship is a relationship between two View_area (see 4.2.555) objects.

The data associated with a View_area_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.557.1 description

The description specifies additional information about the View_area_relationship.

See 4.3.1643 for the application assertion.

The description need not be specified for a particular View_area_relationship (see 4.2.557).

If present, there shall be exactly one object that defines the description for a View_area_relationship.

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4.2.557.2 related

The related specifies the secondary view area in the relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1644 for the application assertion.

4.2.557.3 relating

The relating specifies the primary view area in the relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1644 for the application assertion.

4.2.557.4 relation_type

The relation_type specifies the kind of relationship. Where applicable, the following values shall be used:

— 'copy': The application object defines a relationship where the related View_area (see 4.2.555) is a copy of the relating View_area;

— 'derivation': The application object defines a relationship where the related View_area is derived from the relating View_area;

— 'hierarchy': The application object defines a hierarchical relationship where the related View_area is on a lower level than the relating View_area;

— 'substitution': The application object defines a relationship where the related View_area replaces the relating View_area.

4.2.558 View_placed_annotation

A View_placed_annotation is an annotation that is located in the coordinate system of a View (see 4.2.554).

The data associated with a View_placed_annotation are the following:

— element;

— reference_view.

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4.2.558.1 element

The element specifies the annotation element that is associated to a View_placed_annotation.

See 4.3.1645 and 4.3.1646 for the application assertions.

There shall be exactly one object that defines the element for a View_placed_annotation (see 4.2.558).

4.2.558.2 reference_view

The reference_view specifies the view that is associated to a View_placed_annotation.

See 4.3.1647 for the application assertion.

4.2.559 View_relationship

A View_relationship is a relationship between two View (see 4.2.554) objects.

The data associated with a View_relationship are the following:

— description;

— related;

— relating;

— relation_type.

4.2.559.1 description

The description specifies additional information about the View_relationship.

See 4.3.1648 for the application assertion.

The description need not be specified for a particular View_relationship (see 4.2.559).

If present, there shall be exactly one object that defines the description for a View_relationship.

4.2.559.2 related

The related specifies the second of the two View (see 4.2.554) objects related by the View_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1649 for the application assertion.

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4.2.559.3 relating

The relating specifies the first of the two View (see 4.2.554) objects related by the View_relationship.

NOTE - The semantics of this attribute are defined by the attribute relation_type.

See 4.3.1649 for the application assertion.

4.2.559.4 relation_type

The relation_type specifies the meaning of the relationship. Where applicable, the following values shall be used:

— 'dependency': The related View (see 4.2.554) is dependent of the relating View. This means that the related View has the same view direction as the relating View;

4.2.560 Visual_appearance

A Visual_appearance is the appearance of a surface of a part regarding the optical impression.

At least one of the attributes 'id' or 'name' shall be instantiated.

A Visual_appearance is a type of Surface_condition (see 4.2.492).

The data associated with a Visual_appearance are the following:

— colour_id;

— colour_name;

— id;

— lustre;

— name;

— pattern;

— transparency.

4.2.560.1 colour_id

The colour_id specifies the identifier of the colour of the Visual_appearance.

EXAMPLE A colour can be identified using a code such as 'C130202250'.

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4.2.560.2 colour_name

The colour_name specifies the word or group of words by which the colour of the Visual_appearance is referred to.

EXAMPLE A colour may be referred to, e.g., by a customer, by name such as 'arctic white'.

See 4.3.1650 for the application assertion.

The colour_name need not be specified for a particular Visual_appearance (see 4.2.560).

If present, there shall be exactly one object that defines the colour_name for a Visual_appearance.

4.2.560.3 id

The id specifies the identifier of the Visual_appearance.

The id need not be specified for a particular Visual_appearance (see 4.2.560).

4.2.560.4 lustre

The lustre specifies the kind of shining or the kind of reflection of the surface.

4.2.560.5 name

The name specifies the word or group of words by which the Visual_appearance is referred to.

See 4.3.1650 for the application assertion.

The name need not be specified for a particular Visual_appearance (see 4.2.560).

If present, there shall be exactly one object that defines the name for a Visual_appearance.

4.2.560.6 pattern

The pattern specifies the pattern used for the definition of the Visual_appearance.

EXAMPLE A pattern may be used to specify the texture of a seat cover for visual appearance purposes.

The pattern need not be specified for a particular Visual_appearance (see 4.2.560).

4.2.560.7 transparency

The transparency specifies the grade of transparency of the surface.

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The transparency need not be specified for a particular Visual_appearance (see 4.2.560).

4.2.561 Wireframe_model_2d

A Wireframe_model_2d is a collection of Curve_set_2d (see 4.2.111) objects, i.e., Curve (see 4.2.108) and Point (see 4.2.367) objects defined in two-dimensional space.

A Wireframe_model_2d is a type of Geometric_model (see 4.2.238).

The data associated with a Wireframe_model_2d are the following:

— element

The element specifies the set of Curve_set_2d objects that form the Wireframe_model_2d.

See 4.3.1651 for the application assertion.

4.2.562 Wireframe_model_3d

A Wireframe_model_3d is a collection of Curve_set_3d (see 4.2.112) objects, i.e., Curve (see 4.2.108) and Point (see 4.2.367) objects defined in three-dimensional space.

A Wireframe_model_3d is a type of Geometric_model (see 4.2.238).

The data associated with a Wireframe_model_3d are the following:

— element

The element specifies the set of Curve_set_3d objects that form the Wireframe_model_3d.

See 4.3.1652 for the application assertion.

4.2.563 Woodruff_slot_end_type

A Woodruff_slot_end_type is an end condition of a slot defined by a radius tangent to the bottom of the slot and curved towards the surface of the part.

EXAMPLE Figure 78 depicts a Woodruff_slot_end_type.

A Woodruff_slot_end_type is a type of Slot_end_type (see 4.2.457).

The data associated with a Woodruff_slot_end_type are the following:

— radius

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The radius specifies the radius of the Woodruff_slot_end_type.

See 4.3.1653 for the application assertion.

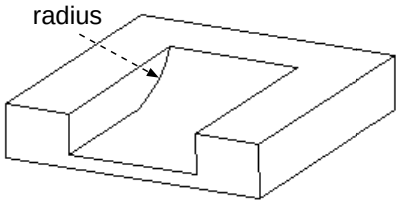


Figure 78 – Parameters defining a Woodruff_slot_end_type

4.2.564 Work_order

A Work_order is the authorization for one or more Activity (see 4.2.2) objects to be performed.

The data associated with a Work_order are the following:

— description;

— id;

— is_controlling;

— version_id;

— work_order_type.

4.2.564.1 description

The description specifies additional information about the Work_order (see 4.2.564).

See 4.3.1655 for the application assertion.

The description need not be specified for a particular Work_order.

If present, there shall be exactly one object that defines the description for a Work_order.

4.2.564.2 id

The id specifies the identifier of the Work_order.

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4.2.564.3 is_controlling

The is_controlling specifies the Activity (see 4.2.2) object that is controlled by this particular Work_order.

See 4.3.1654 for the application assertion.

4.2.564.4 version_id

The version_id specifies the identification of a particular version of a Work_order.

The version_id need not be specified for a particular Work_order (see 4.2.564).

4.2.564.5 work_order_type

The work_order_type specifies the kind of the Work_order. Where applicable, the following values shall be used:

— 'design deviation permit': An authorization for a deviation from the approved design data;

— 'design release': An authorization for the design of a product or of an item or to create a bill of material;

— 'management resolution': An authorization by a committee, such as the board of directors, to design or change an item;

— 'manufacturing release': An authorization for the manufacturing process of a product or of an item;

— 'production deviation permit': An authorization for a deviation from the approved manufacturing process.

4.2.565 Work_request

A Work_request is the solicitation for some work to be done.

The data associated with a Work_request are the following:

— description;

— id;

— notified_person;

— request_type;

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— requestor;

— scope;

— status;

— version_id.

4.2.565.1 description

The description specifies additional information about the Work_request.

See 4.3.1685 for the application assertion.

The description need not be specified for a particular Work_request (see 4.2.565).

If present, there shall be exactly one object that defines the description for a Work_request.

4.2.565.2 id

The id specifies the identifier of the Work_request.

4.2.565.3 notified_person

The notified_person specifies the personnel that shall be informed about the Work_request and the date when the personnel or organization shall be informed.

See 4.3.1666 for the application assertion.

4.2.565.4 request_type

The request_type specifies the intention of the Work_request. Where applicable, the following values shall be used:

— 'change of standard': A request to translate a change to a standard into action;

— 'cost reduction': A request aimed at reducing the engineering and manufacturing costs of an item;

— 'customer rejection': A request resulting from a rejection by a customer;

— 'customer request': A request for an activity that is necessary to solve the request of a customer;

— 'durability improvement': A request aimed at extending the life time of an item;

— 'government regulation': A request resulting from legal requirements;

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— ’procurement alignment’: A request to adjust the purchasing process of different items;

— ’production alignment’: A request to adjust the manufacturing process of different items;

— ’production relief’: A request aimed at achieving a simpler assembly and production process;

— ’production requirement’: A request for an activity that is necessary from a production point of view;

— ’quality improvement’: A request aimed at increasing the quality of an item;

— ’security reason’: A request for an activity that is necessary from a security point of view;

— ’standardization’: A request to unify variants of an item;

— ’supplier request’: A request for an activity necessary to solve the request of a supplier;

— ’technical improvement’: A request aimed at improving the technical aspects of an item;

— ’tool improvement’: A request aimed at increasing the useful life of a tool.

4.2.565.5 requestor

The requestor specifies the person or organization who issued the Work_request and the date when this person or organization issued the Work_request.

See 4.3.1666 for the application assertion.

4.2.565.6 scope

The scope specifies the objects that are subject to the Work_request.

See 4.3.1656, 4.3.1657, 4.3.1658, 4.3.1659, 4.3.1660, 4.3.1661, 4.3.1662, 4.3.1663, 4.3.1664, 4.3.1665, 4.3.1667, 4.3.1668, 4.3.1669, 4.3.1670, 4.3.1671, 4.3.1672, 4.3.1673, 4.3.1674, 4.3.1675, 4.3.1676, 4.3.1677, 4.3.1678, 4.3.1679, 4.3.1680, 4.3.1681, 4.3.1682, 4.3.1683, 4.3.1684, 4.3.1686, 4.3.1687, 4.3.1688, 4.3.1689, 4.3.1690, 4.3.1691, 4.3.1692, 4.3.1693, 4.3.1694, 4.3.1695, 4.3.1696, 4.3.1697, 4.3.1698, 4.3.1699, 4.3.1700, and 4.3.1701 for the application assertions.

4.2.565.7 status

The status specifies the stage of the Work_request. Where applicable, the following values shall be used:

— ’in work’: The request is being developed;

— ’issued’: The request has been completed and reviewed, and immediate action takes place;

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— ’proposed’: The request has been completed and is awaiting review and authorization;

— ’resolved’: The request is resolved; the actions as defined by the request have been completed and no further work is required.

4.2.565.8 version_id

The version_id specifies the identification of a particular version of a Work_request.

The version_id need not be specified for a particular Work_request (see 4.2.565).

4.3 Application assertions

This subclause specifies the application assertions for the Core data for automotive mechanical design processes application protocol. Application assertions specify the relationships between application objects, the cardinality of the relationships, and the rules required for the integrity and validity of the application objects and UoFs. The application assertions and their definitions are given below.

4.3.1 Accuracy to External_geometric_model

Each Accuracy (see 4.2.1) is_defined_for zero or more External_geometric_model (see 4.2.186) objects. Each External_geometric_model is related to zero or more Accuracy objects.

NOTE - This assertion is established through accuracy_select.

4.3.2 Accuracy to Face

Each Accuracy (see 4.2.1) is_defined_for zero or more Face (see 4.2.191) objects. Each Face is related to zero or more Accuracy objects.

NOTE - This assertion is established through accuracy_select.

4.3.3 Accuracy to Geometric_model

Each Accuracy (see 4.2.1) is_defined_for zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to at least one Accuracy object that has an accuracy_type of ’distance’.

NOTE - This assertion is established through accuracy_select.

4.3.4 Accuracy to Multi_language_string

Each Accuracy (see 4.2.1) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Accuracy objects.

NOTE - This assertion is established through string_select.

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4.3.5 Accuracy to Oriented_edge_curve

Each Accuracy (see 4.2.1) is_defined_for zero or more Oriented_edge_curve (see 4.2.334) objects. Each Oriented_edge_curve is related to zero or more Accuracy objects.

NOTE - This assertion is established through accuracy_select.

4.3.6 Accuracy to Vertex_point

Each Accuracy (see 4.2.1) is_defined_for zero or more Vertex_point (see 4.2.553) objects. Each Vertex_point is related to zero or more Accuracy objects.

NOTE - This assertion is established through accuracy_select.

4.3.7 Activity to Activity_method

Each Activity (see 4.2.2) refers to zero or one Activity_method (see 4.2.4) in the role of chosen_method. Each Activity_method acts as chosen_method for zero or more Activity objects.

4.3.8 Activity to Date_and_person_organization

Each Activity (see 4.2.2) refers to zero or one Date_and_person_organization (see 4.2.118) in the role of requestor. Each Date_and_person_organization acts as requestor for zero or more Activity objects.

4.3.9 Activity to Date_time

Each Activity (see 4.2.2) refers to zero or one Date_time (see 4.2.119) in the role of actual_end_date. Each Date_time acts as actual_end_date for zero or more Activity objects.

Each Activity refers to zero or one Date_time in the role of actual_start_date. Each Date_time acts as actual_start_date for zero or more Activity objects.

Each Activity refers to zero or one Date_time in the role of planned_end_date. Each Date_time acts as planned_end_date for zero or more Activity objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Activity refers to zero or one Date_time in the role of planned_start_date. Each Date_time acts as planned_start_date for zero or more Activity objects.

NOTE 2 - This assertion is established through event_or_date_select.

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4.3.10 Activity to Duration

Each Activity (see 4.2.2) refers to zero or one Duration (see 4.2.174) in the role of planned_end_date. Each Duration acts as planned_end_date for zero or more Activity objects.

NOTE - This assertion is established through period_or_date_select.

4.3.11 Activity to Event_reference

Each Activity (see 4.2.2) refers to zero or one Event_reference (see 4.2.184) in the role of planned_end_date. Each Event_reference acts as planned_end_date for zero or more Activity objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Activity refers to zero or one Event_reference in the role of planned_start_date. Each Event_reference acts as planned_start_date for zero or more Activity objects.

NOTE 2 - This assertion is established through event_or_date_select.

4.3.12 Activity to Multi_language_string

Each Activity (see 4.2.2) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Activity objects.

NOTE - This assertion is established through string_select.

4.3.13 Activity to Organization

Each Activity (see 4.2.2) refers to zero or more Organization (see 4.2.331) objects in the role of concerned_organization. Each Organization acts as concerned_organization for zero or more Activity objects.

Each Activity refers to zero or more Organization objects in the role of supplying_organization. Each Organization acts as supplying_organization for zero or more Activity objects.

4.3.14 Activity to Work_request

Each Activity (see 4.2.2) refers to zero or more Work_request (see 4.2.565) objects in the role of resolved_request. Each Work_request acts as resolved_request for zero or more Activity objects.

4.3.15 Activity_element to Activity

Each Activity_element (see 4.2.3) refers to exactly one Activity (see 4.2.2) in the role of associated_activity. Each Activity acts as associated_activity for zero or more Activity_element objects.

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4.3.16 Activity_element to Activity_method

Each Activity_element (see 4.2.3) refers to zero or one Activity_method (see 4.2.4) in the role of element. Each Activity_method acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.17 Activity_element to Alternate_item_relationship

Each Activity_element (see 4.2.3) refers to zero or one Alternate_item_relationship (see 4.2.9) in the role of element. Each Alternate_item_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.18 Activity_element to Assembly_substitute_relationship

Each Activity_element (see 4.2.3) refers to zero or one Assembly_substitute_relationship (see 4.2.28) in the role of element. Each Assembly_substitute_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.19 Activity_element to Class_category_association

Each Activity_element (see 4.2.3) refers to zero or one Class_category_association (see 4.2.64) in the role of element. Each Class_category_association acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.20 Activity_element to Class_condition_association

Each Activity_element (see 4.2.3) refers to zero or one Class_condition_association (see 4.2.65) in the role of element. Each Class_condition_association acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.21 Activity_element to Class_inclusion_association

Each Activity_element (see 4.2.3) refers to zero or one Class_inclusion_association (see 4.2.66) in the role of element. Each Class_inclusion_association acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.22 Activity_element to Class_specification_association

Each Activity_element (see 4.2.3) refers to zero or one Class_specification_association (see 4.2.67) in the role of element. Each Class_specification_association acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.23 Activity_element to Class_structure_relationship

Each Activity_element (see 4.2.3) refers to zero or one Class_structure_relationship (see 4.2.68) in the role of element. Each Class_structure_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.24 Activity_element to Complex_product

Each Activity_element (see 4.2.3) refers to zero or one Complex_product (see 4.2.80) in the role of element. Each Complex_product acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.25 Activity_element to Configuration

Each Activity_element (see 4.2.3) refers to zero or one Configuration (see 4.2.94) in the role of element. Each Configuration acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.26 Activity_element to Design_constraint

Each Activity_element (see 4.2.3) refers to zero or one Design_constraint (see 4.2.138) in the role of element. Each Design_constraint acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.27 Activity_element to Design_discipline_item_definition

Each Activity_element (see 4.2.3) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of element. Each Design_discipline_item_definition acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.28 Activity_element to Document

Each Activity_element (see 4.2.3) refers to zero or one Document (see 4.2.155) in the role of element. Each Document acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.29 Activity_element to Document_file

Each Activity_element (see 4.2.3) refers to zero or one Document_file (see 4.2.159) in the role of element. Each Document_file acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.30 Activity_element to Document_representation

Each Activity_element (see 4.2.3) refers to zero or one Document_representation (see 4.2.163) in the role of element. Each Document_representation acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.31 Activity_element to Document_version

Each Activity_element (see 4.2.3) refers to zero or one Document_version (see 4.2.167) in the role of element. Each Document_version acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.32 Activity_element to Drawing

Each Activity_element (see 4.2.3) refers to zero or one Drawing (see 4.2.170) in the role of element. Each Drawing acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.33 Activity_element to Feature_occurrence

Each Activity_element (see 4.2.3) refers to zero or one Feature_occurrence (see 4.2.200) in the role of element. Each Feature_occurrence acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.34 Activity_element to Geometric_model

Each Activity_element (see 4.2.3) refers to zero or one Geometric_model (see 4.2.238) in the role of element. Each Geometric_model acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.35 Activity_element to Item

Each Activity_element (see 4.2.3) refers to zero or one Item (see 4.2.267) in the role of element. Each Item acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.36 Activity_element to Item_definition_instance_relationship

Each Activity_element (see 4.2.3) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of element. Each Item_definition_instance_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.37 Activity_element to Item_definition_relationship

Each Activity_element (see 4.2.3) refers to zero or one Item_definition_relationship (see 4.2.269) in the role of element. Each Item_definition_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.38 Activity_element to Item_instance

Each Activity_element (see 4.2.3) refers to zero or one Item_instance (see 4.2.271) in the role of element. Each Item_instance acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.39 Activity_element to Item_instance_relationship

Each Activity_element (see 4.2.3) refers to zero or one Item_instance_relationship (see 4.2.272) in the role of element. Each Item_instance_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.40 Activity_element to Item_version

Each Activity_element (see 4.2.3) refers to zero or one Item_version (see 4.2.275) in the role of element. Each Item_version acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.41 Activity_element to Kinematic_simulation_information

Each Activity_element (see 4.2.3) refers to zero or one Kinematic_simulation_information (see 4.2.288) in the role of element. Each Kinematic_simulation_information acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.42 Activity_element to Manufacturing_configuration

Each Activity_element (see 4.2.3) refers to zero or one Manufacturing_configuration (see 4.2.305) in the role of element. Each Manufacturing_configuration acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.43 Activity_element to Material

Each Activity_element (see 4.2.3) refers to zero or one Material (see 4.2.309) in the role of element. Each Material acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.44 Activity_element to Physical_assembly_relationship

Each Activity_element (see 4.2.3) refers to zero or one Physical_assembly_relationship (see 4.2.350) in the role of element. Each Physical_assembly_relationship acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.45 Activity_element to Physical_instance

Each Activity_element (see 4.2.3) refers to zero or one Physical_instance (see 4.2.352) in the role of element. Each Physical_instance acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.46 Activity_element to Process_operation_definition

Each Activity_element (see 4.2.3) refers to zero or one Process_operation_definition (see 4.2.381) in the role of element. Each Process_operation_definition acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.47 Activity_element to Process_operation_occurrence

Each Activity_element (see 4.2.3) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of element. Each Process_operation_occurrence acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.48 Activity_element to Process_plan

Each Activity_element (see 4.2.3) refers to zero or one Process_plan (see 4.2.387) in the role of element. Each Process_plan acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.49 Activity_element to Product_class

Each Activity_element (see 4.2.3) refers to zero or one Product_class (see 4.2.392) in the role of element. Each Product_class acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.50 Activity_element to Product_identification

Each Activity_element (see 4.2.3) refers to zero or one Product_identification (see 4.2.398) in the role of element. Each Product_identification acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.51 Activity_element to Product_structure_relationship

Each Activity_element (see 4.2.3) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of element. Each Product_structure_relationship acts as element for zero or more Activity_-element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.52 Activity_element to Property

Each Activity_element (see 4.2.3) refers to zero or one Property (see 4.2.409) in the role of element. Each Property acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.53 Activity_element to Property_value_association

Each Activity_element (see 4.2.3) refers to zero or one Property_value_association (see 4.2.413) in the role of element. Each Property_value_association acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.54 Activity_element to Specification

Each Activity_element (see 4.2.3) refers to zero or one Specification (see 4.2.467) in the role of element. Each Specification acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.55 Activity_element to Specification_category

Each Activity_element (see 4.2.3) refers to zero or one Specification_category (see 4.2.468) in the role of element. Each Specification_category acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.56 Activity_element to Specification_expression

Each Activity_element (see 4.2.3) refers to zero or one Specification_expression (see 4.2.470) in the role of element. Each Specification_expression acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.57 Activity_element to Specification_inclusion

Each Activity_element (see 4.2.3) refers to zero or one Specification_inclusion (see 4.2.471) in the role of element. Each Specification_inclusion acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

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4.3.58 Activity_element to Styled_model

Each Activity_element (see 4.2.3) refers to zero or one Styled_model (see 4.2.484) in the role of element. Each Styled_model acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.59 Activity_element to View_area

Each Activity_element (see 4.2.3) refers to zero or one View_area (see 4.2.555) in the role of element. Each View_area acts as element for zero or more Activity_element objects.

NOTE - This assertion is established through activity_element_select.

4.3.60 Activity_method to Multi_language_string

Each Activity_method (see 4.2.4) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Activity_method objects.

NOTE 1 - This assertion is established through string_select.

Each Activity_method refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Activity_method objects.

NOTE 2 - This assertion is established through string_select.

4.3.61 Activity_method_assignment to Activity_method

Each Activity_method_assignment (see 4.2.5) refers to exactly one Activity_method (see 4.2.4) in the role of assigned_method. Each Activity_method acts as assigned_method for zero or more Activity_-method_assignment objects.

4.3.62 Activity_method_assignment to Work_request

Each Activity_method_assignment (see 4.2.5) refers to exactly one Work_request (see 4.2.565) in the role of associated_request. Each Work_request acts as associated_request for zero or more Activity_-method_assignment objects.

4.3.63 Activity_relationship to Activity

Each Activity_relationship (see 4.2.6) is related to exactly one Activity (see 4.2.2). Each Activity is referenced by zero or more Activity_relationship objects as related.

NOTE 1 - The related Activity is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

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Each Activity_relationship is relating to exactly one Activity. Each Activity is referenced by zero or more Activity_relationship objects as relating.

NOTE 2 - The relating Activity is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.64 Activity_relationship to Multi_language_string

Each Activity_relationship (see 4.2.6) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Activity_relationship objects.

NOTE - This assertion is established through string_select.

4.3.65 Actuator to Kinematic_pair

Each Actuator (see 4.2.7) is_applied_to exactly one Kinematic_pair (see 4.2.287). Each Kinematic_pair is_referenced_by zero or one Actuator.

4.3.66 Actuator to Multi_language_string

Each Actuator (see 4.2.7) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Actuator objects.

NOTE - This assertion is established through string_select.

4.3.67 Alias_identification to Approval_status

Each Alias_identification (see 4.2.8) is_applied_to zero or one Approval_status (see 4.2.24). Each Approval_status is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.68 Alias_identification to Classification_attribute

Each Alias_identification (see 4.2.8) is_applied_to zero or one Classification_attribute (see 4.2.70). Each Classification_attribute is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.69 Alias_identification to Classification_system

Each Alias_identification (see 4.2.8) is_applied_to zero or one Classification_system (see 4.2.71). Each Classification_system is related to zero or more Alias_identification objects.

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NOTE - This assertion is established through alias_select.

4.3.70 Alias_identification to Complex_product

Each Alias_identification (see 4.2.8) is_applied_to zero or one Complex_product (see 4.2.80). Each Complex_product is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.71 Alias_identification to Design_discipline_item_definition

Each Alias_identification (see 4.2.8) is_applied_to zero or one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.72 Alias_identification to Document

Each Alias_identification (see 4.2.8) is_applied_to zero or one Document (see 4.2.155). Each Document is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.73 Alias_identification to Document_representation

Each Alias_identification (see 4.2.8) is_applied_to zero or one Document_representation (see 4.2.163). Each Document_representation is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.74 Alias_identification to Document_type_property

Each Alias_identification (see 4.2.8) is_applied_to zero or one Document_type_property (see 4.2.166). Each Document_type_property is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.75 Alias_identification to Document_version

Each Alias_identification (see 4.2.8) is_applied_to zero or one Document_version (see 4.2.167). Each Document_version is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

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4.3.76 Alias_identification to General_classification

Each Alias_identification (see 4.2.8) is_applied_to zero or one General_classification (see 4.2.216). Each General_classification is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.77 Alias_identification to Geometric_model

Each Alias_identification (see 4.2.8) is_applied_to zero or one Geometric_model (see 4.2.238). Each Geometric_model is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.78 Alias_identification to Item

Each Alias_identification (see 4.2.8) is_applied_to zero or one Item (see 4.2.267). Each Item is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.79 Alias_identification to Item_instance

Each Alias_identification (see 4.2.8) is_applied_to zero or one Item_instance (see 4.2.271). Each Item_-instance is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.80 Alias_identification to Item_version

Each Alias_identification (see 4.2.8) is_applied_to zero or one Item_version (see 4.2.275). Each Item_-version is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.81 Alias_identification to Multi_language_string

Each Alias_identification (see 4.2.8) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Alias_identification objects.

NOTE - This assertion is established through string_select.

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4.3.82 Alias_identification to Organization

Each Alias_identification (see 4.2.8) refers to zero or one Organization (see 4.2.331) in the role of alias_scope. Each Organization acts as alias_scope for zero or more Alias_identification objects.

Each Alias_identification is_applied_to zero or one Organization. Each Organization is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.83 Alias_identification to Physical_instance

Each Alias_identification (see 4.2.8) is_applied_to zero or one Physical_instance (see 4.2.352). Each Physical_instance is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.84 Alias_identification to Product_class

Each Alias_identification (see 4.2.8) is_applied_to zero or one Product_class (see 4.2.392). Each Product_class is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.85 Alias_identification to Property

Each Alias_identification (see 4.2.8) is_applied_to zero or one Property (see 4.2.409). Each Property is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.86 Alias_identification to Security_level

Each Alias_identification (see 4.2.8) is_applied_to zero or one Security_level (see 4.2.444). Each Security_level is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.87 Alias_identification to Specification

Each Alias_identification (see 4.2.8) is_applied_to zero or one Specification (see 4.2.467). Each Specification is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

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4.3.88 Alias_identification to Specification_category

Each Alias_identification (see 4.2.8) is_applied_to zero or one Specification_category (see 4.2.468). Each Specification_category is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.89 Alias_identification to Styled_model

Each Alias_identification (see 4.2.8) is_applied_to zero or one Styled_model (see 4.2.484). Each Styled_model is related to zero or more Alias_identification objects.

NOTE - This assertion is established through alias_select.

4.3.90 Alternate_item_relationship to Item

Each Alternate_item_relationship (see 4.2.9) refers to exactly one Item (see 4.2.267) in the role of alternate. Each Item acts as alternate for zero or more Alternate_item_relationship objects.

Each Alternate_item_relationship refers to exactly one Item in the role of base. Each Item acts as base for zero or more Alternate_item_relationship objects.

4.3.91 Alternate_item_relationship to Multi_language_string

Each Alternate_item_relationship (see 4.2.9) refers to zero or one Multi_language_string (see 4.2.320) in the role of fulfilled_requirements. Each Multi_language_string acts as fulfilled_requirements for zero or more Alternate_item_relationship objects.

NOTE - This assertion is established through string_select.

4.3.92 Alternative_solution to Alternative_solution

Each Alternative_solution (see 4.2.10) refers to zero or one Alternative_solution in the role of base_element. Each Alternative_solution acts as base_element for zero or more Alternative_solution objects.

NOTE - This assertion is established through complex_product_select.

4.3.93 Alternative_solution to Product_component

Each Alternative_solution (see 4.2.10) refers to zero or one Product_component (see 4.2.394) in the role of base_element. Each Product_component acts as base_element for zero or more Alternative_solution objects.

NOTE - This assertion is established through complex_product_select.

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4.3.94 Alternative_solution to Product_function

Each Alternative_solution (see 4.2.10) refers to zero or one Product_function (see 4.2.397) in the role of base_element. Each Product_function acts as base_element for zero or more Alternative_solution objects.

NOTE - This assertion is established through complex_product_select.

4.3.95 Angle_specification to Feature_parameter

Each Angle_specification (see 4.2.11) refers to exactly one Feature_parameter (see 4.2.201) in the role of angle. Each Feature_parameter acts as angle for zero or more Angle_specification objects.

4.3.96 Angle_taper to Feature_parameter

Each Angle_taper (see 4.2.12) refers to exactly one Feature_parameter (see 4.2.201) in the role of angle. Each Feature_parameter acts as angle for zero or more Angle_taper objects.

4.3.97 Angularity_tolerance to Datum

Each Angularity_tolerance (see 4.2.15) refers to one or two Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Angularity_tolerance objects.

4.3.98 Annotation_symbol to Dimension_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one Dimension_symbol (see 4.2.153) in the role of symbol_definition. Each Dimension_symbol acts as symbol_definition for zero or more Annotation_-symbol objects.

NOTE - This assertion is established through symbol_definition_select.

4.3.99 Annotation_symbol to General_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one General_symbol (see 4.2.233) in the role of symbol_definition. Each General_symbol acts as symbol_definition for zero or more Annotation_symbol objects.

NOTE - This assertion is established through symbol_definition_select.

4.3.100 Annotation_symbol to Geometric_tolerance_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one Geometric_tolerance_symbol (see 4.2.246) in the role of symbol_definition. Each Geometric_tolerance_symbol acts as symbol_definition for zero or more Annotation_symbol objects.

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NOTE - This assertion is established through symbol_definition_select.

4.3.101 Annotation_symbol to Point_marker_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one Point_marker_symbol (see 4.2.372) in the role of symbol_definition. Each Point_marker_symbol acts as symbol_definition for zero or more Annotation_symbol objects.

NOTE - This assertion is established through symbol_definition_select.

4.3.102 Annotation_symbol to Surface_condition_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one Surface_condition_symbol (see 4.2.495) in the role of symbol_definition. Each Surface_condition_symbol acts as symbol_definition for zero or more Annotation_symbol objects.

NOTE - This assertion is established through symbol_definition_select.

4.3.103 Annotation_symbol to Terminator_symbol

Each Annotation_symbol (see 4.2.19) refers to zero or one Terminator_symbol (see 4.2.513) in the role of symbol_definition. Each Terminator_symbol acts as symbol_definition for zero or more Annotation_symbol objects.

NOTE - This assertion is established through symbol_definition_select.

4.3.104 Appearance_assignment to Curve_appearance

Each Appearance_assignment (see 4.2.20) refers to zero or more Curve_appearance (see 4.2.109) objects in the role of component. Each Curve_appearance acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.105 Appearance_assignment to Hatching

Each Appearance_assignment (see 4.2.20) refers to zero or more Hatching (see 4.2.255) objects in the role of component. Each Hatching acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

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4.3.106 Appearance_assignment to Point_appearance

Each Appearance_assignment (see 4.2.20) refers to zero or more Point_appearance (see 4.2.368) objects in the role of component. Each Point_appearance acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.107 Appearance_assignment to Solid_fill_area

Each Appearance_assignment (see 4.2.20) refers to zero or more Solid_fill_area (see 4.2.459) objects in the role of component. Each Solid_fill_area acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.108 Appearance_assignment to Surface_appearance

Each Appearance_assignment (see 4.2.20) refers to zero or more Surface_appearance (see 4.2.490) objects in the role of component. Each Surface_appearance acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.109 Appearance_assignment to Text_appearance

Each Appearance_assignment (see 4.2.20) refers to zero or more Text_appearance (see 4.2.515) objects in the role of component. Each Text_appearance acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.110 Appearance_assignment to Tiling

Each Appearance_assignment (see 4.2.20) refers to zero or more Tiling (see 4.2.521) objects in the role of component. Each Tiling acts as component for one or more Appearance_assignment objects.

NOTE - This assertion is established through appearance_select.

4.3.111 Application_context to Multi_language_string

Each Application_context (see 4.2.21) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Application_context objects.

NOTE - This assertion is established through string_select.

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4.3.112 Approval to Activity

Each Approval (see 4.2.22) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.113 Approval to Activity_element

Each Approval (see 4.2.22) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.114 Approval to Activity_method_assignment

Each Approval (see 4.2.22) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.115 Approval to Alternate_item_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.116 Approval to Approval_status

Each Approval (see 4.2.22) refers to exactly one Approval_status (see 4.2.24) in the role of status. Each Approval_status acts as status for zero or more Approval objects.

4.3.117 Approval to Assembly_substitute_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.118 Approval to Certification

Each Approval (see 4.2.22) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Approval objects.

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NOTE - This assertion is established through approval_element_select.

4.3.119 Approval to Class_category_association

Each Approval (see 4.2.22) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.120 Approval to Class_condition_association

Each Approval (see 4.2.22) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.121 Approval to Class_inclusion_association

Each Approval (see 4.2.22) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.122 Approval to Class_specification_association

Each Approval (see 4.2.22) is_applied_to zero or more Class_specification_association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.123 Approval to Class_structure_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.124 Approval to Classification_association

Each Approval (see 4.2.22) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

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4.3.125 Approval to Classification_system

Each Approval (see 4.2.22) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.126 Approval to Complex_product

Each Approval (see 4.2.22) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.127 Approval to Configuration

Each Approval (see 4.2.22) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.128 Approval to Contract

Each Approval (see 4.2.22) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.129 Approval to Date_and_person_organization

Each Approval (see 4.2.22) is_approved_by zero or more Date_and_person_organization (see 4.2.118) objects. Each Date_and_person_organization is related to zero or more Approval objects.

4.3.130 Approval to Date_time

Each Approval (see 4.2.22) refers to zero or one Date_time (see 4.2.119) in the role of actual_date. Each Date_time acts as actual_date for zero or more Approval objects.

Each Approval refers to zero or one Date_time in the role of planned_date. Each Date_time acts as planned_date for zero or more Approval objects.

4.3.131 Approval to Design_constraint

Each Approval (see 4.2.22) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Approval objects.

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NOTE - This assertion is established through approval_element_select.

4.3.132 Approval to Design_discipline_item_definition

Each Approval (see 4.2.22) is_applied_to zero or more Design_discipline_item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.133 Approval to Document

Each Approval (see 4.2.22) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.134 Approval to Document_file

Each Approval (see 4.2.22) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.135 Approval to Document_representation

Each Approval (see 4.2.22) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.136 Approval to Document_version

Each Approval (see 4.2.22) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.137 Approval to Drawing

Each Approval (see 4.2.22) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

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4.3.138 Approval to Drawing_sheet

Each Approval (see 4.2.22) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.139 Approval to General_classification

Each Approval (see 4.2.22) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.140 Approval to Geometric_model

Each Approval (see 4.2.22) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.141 Approval to Item_definition_instance_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Item_definition_instance_relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.142 Approval to Item_definition_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.143 Approval to Item_instance

Each Approval (see 4.2.22) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

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4.3.144 Approval to Item_instance_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.145 Approval to Item_version

Each Approval (see 4.2.22) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.146 Approval to Kinematic_simulation_information

Each Approval (see 4.2.22) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.147 Approval to Manufacturing_configuration

Each Approval (see 4.2.22) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.148 Approval to Material

Each Approval (see 4.2.22) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.149 Approval to Organization

Each Approval (see 4.2.22) refers to zero or more Organization (see 4.2.331) objects in the role of scope. Each Organization acts as scope for zero or more Approval objects.

4.3.150 Approval to Physical_assembly_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Approval objects.

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NOTE - This assertion is established through approval_element_select.

4.3.151 Approval to Physical_instance

Each Approval (see 4.2.22) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.152 Approval to Physical_instance_test_result

Each Approval (see 4.2.22) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.153 Approval to Process_plan

Each Approval (see 4.2.22) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.154 Approval to Product_class

Each Approval (see 4.2.22) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.155 Approval to Product_structure_relationship

Each Approval (see 4.2.22) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.156 Approval to Project

Each Approval (see 4.2.22) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

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4.3.157 Approval to Property

Each Approval (see 4.2.22) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.158 Approval to Property_value_association

Each Approval (see 4.2.22) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.159 Approval to Specification

Each Approval (see 4.2.22) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.160 Approval to Specification_category

Each Approval (see 4.2.22) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.161 Approval to Specification_expression

Each Approval (see 4.2.22) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.162 Approval to Specification_inclusion

Each Approval (see 4.2.22) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

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4.3.163 Approval to Styled_model

Each Approval (see 4.2.22) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_-model is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.164 Approval to View_area

Each Approval (see 4.2.22) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.165 Approval to Work_order

Each Approval (see 4.2.22) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_-order is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.166 Approval to Work_request

Each Approval (see 4.2.22) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_-request is related to zero or more Approval objects.

NOTE - This assertion is established through approval_element_select.

4.3.167 Approval_relationship to Approval

Each Approval_relationship (see 4.2.23) is related to exactly one Approval (see 4.2.22). Each Approval is referenced by zero or more Approval_relationship objects as related.

NOTE 1 - The related Approval is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Approval_relationship is relating to exactly one Approval. Each Approval is referenced by zero or more Approval_relationship objects as relating.

NOTE 2 - The relating Approval is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.168 Approval_relationship to Multi_language_string

Each Approval_relationship (see 4.2.23) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Approval_-relationship objects.

NOTE - This assertion is established through string_select.

4.3.169 Approval_status to Classification_system

Each Approval_status (see 4.2.24) refers to zero or one Classification_system (see 4.2.71) in the role of used_classification_system. Each Classification_system acts as used_classification_system for zero or more Approval_status objects.

4.3.170 Area_placed_annotation to Annotation_element

Each Area_placed_annotation (see 4.2.25) refers to zero or one Annotation_element (see 4.2.17) in the role of element. Each Annotation_element acts as element for zero or more Area_placed_annotation objects.

NOTE - This assertion is established through annotation_select.

4.3.171 Area_placed_annotation to Draughting_callout

Each Area_placed_annotation (see 4.2.25) refers to zero or one Draughting_callout (see 4.2.169) in the role of element. Each Draughting_callout acts as element for zero or more Area_placed_annotation objects.

NOTE - This assertion is established through annotation_select.

4.3.172 Area_placed_annotation to Drawing_sheet

Each Area_placed_annotation (see 4.2.25) refers to zero or one Drawing_sheet (see 4.2.173) in the role of reference_area. Each Drawing_sheet acts as reference_area for zero or more Area_placed_annotation objects.

NOTE - This assertion is established through area_select.

4.3.173 Area_placed_annotation to View_area

Each Area_placed_annotation (see 4.2.25) refers to zero or one View_area (see 4.2.555) in the role of reference_area. Each View_area acts as reference_area for zero or more Area_placed_annotation objects.

NOTE - This assertion is established through area_select.

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4.3.174 Assembly_component_relationship to Assembly_definition

Each Assembly_component_relationship (see 4.2.26) is relating to exactly one Assembly_definition (see 4.2.27). Each Assembly_definition is referenced by zero or more Assembly_component_relationship objects as relating.

NOTE - The relating Assembly_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.175 Assembly_component_relationship to Geometric_model_relationship_with_transformation

Each Assembly_component_relationship (see 4.2.26) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_transformation acts as placement for zero or more Assembly_component_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.176 Assembly_component_relationship to Template_instance

Each Assembly_component_relationship (see 4.2.26) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each template_instance acts as transformation for zero or more assembly_component_relationship objects. If it acts as transformation for more than one assembly_component_relationship, the relating assembly_definition objects shall refer to the same item_version and the related item_instance objects shall refer to the same item_version as definition (through design_discipline_item_definition).

NOTE 1 - This constraint ensures that a given template_instance represents the placement of a unique object in the coordinate space of a unique assembly.

NOTE 2 - This assertion is established through transformation_select.

4.3.177 Assembly_substitute_relationship to Assembly_component_relationship

Each Assembly_substitute_relationship (see 4.2.28) refers to exactly one Assembly_component_relationship (see 4.2.26) in the role of base. Each Assembly_component_relationship acts as base for zero or more Assembly_substitute_relationship objects.

Each Assembly_substitute_relationship refers to exactly one Assembly_component_relationship in the role of substitute. Each Assembly_component_relationship acts as substitute for zero or more Assembly_substitute_relationship objects.

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4.3.178 Assembly_substitute_relationship to Multi_language_string

Each Assembly_substitute_relationship (see 4.2.28) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Assembly_substitute_relationship objects.

NOTE - This assertion is established through string_select.

4.3.179 Associated_draughting_callout to Annotation_element

Each Associated_draughting_callout (see 4.2.29) is_associated_to zero or more Annotation_element (see 4.2.17) objects. Each Annotation_element is related to zero or more Associated_draughting_callout objects.

NOTE - This assertion is established through associated_element_select.

4.3.180 Associated_draughting_callout to Detailed_geometric_model_element

Each Associated_draughting_callout (see 4.2.29) is_associated_to zero or more Detailed_geometric_model_element (see 4.2.144) objects. Each Detailed_geometric_model_element is related to zero or more Associated_draughting_callout objects.

NOTE - This assertion is established through associated_element_select.

4.3.181 Associated_fill_area to Annotation_curve

Each Associated_fill_area (see 4.2.30) is_derived_from zero or more Annotation_curve (see 4.2.16) objects. Each Annotation_curve is related to zero or more Associated_fill_area objects.

NOTE - This assertion is established through fill_area_associated_element_select.

4.3.182 Associated_fill_area to Detailed_geometric_model_element

Each Associated_fill_area (see 4.2.30) is_derived_from zero or more Detailed_geometric_model_element (see 4.2.144) objects. Each Detailed_geometric_model_element is related to zero or more Associated_fill_area objects.

NOTE - This assertion is established through fill_area_associated_element_select.

4.3.183 Associated_leader to Annotation_element

Each Associated_leader (see 4.2.31) refers to zero or one Annotation_element (see 4.2.17) in the role of target. Each Annotation_element acts as target for zero or more Associated_leader objects.

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NOTE - This assertion is established through associated_element_select.

4.3.184 Associated_leader to Detailed_geometric_model_element

Each Associated_leader (see 4.2.31) refers to zero or one Detailed_geometric_model_element (see 4.2.144) in the role of target. Each Detailed_geometric_model_element acts as target for zero or more Associated_leader objects.

NOTE - This assertion is established through associated_element_select.

4.3.185 Associated_projection_curve to Annotation_element

Each Associated_projection_curve (see 4.2.32) is_projected_to zero or one Annotation_element (see 4.2.17). Each Annotation_element is related to zero or more Associated_projection_curve objects.

NOTE - This assertion is established through associated_element_select.

4.3.186 Associated_projection_curve to Detailed_geometric_model_element

Each Associated_projection_curve (see 4.2.32) is_projected_to zero or one Detailed_geometric_model_element (see 4.2.144). Each Detailed_geometric_model_element is related to zero or more Associated_projection_curve objects.

NOTE - This assertion is established through associated_element_select.

4.3.187 B_rep to Closed_shell

Each B_rep (see 4.2.34) refers to exactly one Closed_shell (see 4.2.74) in the role of outer. Each Closed_shell acts as outer for zero or more B_rep objects.

Each B_rep refers to zero or more Closed_shell objects in the role of void. Each Closed_shell acts as void for zero or more B_rep objects.

4.3.188 B_rep_model to B_rep

Each B_rep_model (see 4.2.35) refers to zero or more B_rep (see 4.2.34) objects in the role of element. Each B_rep acts as element for zero or more B_rep_model objects.

4.3.189 Bead_feature to Bead_end_type

Each Bead_feature (see 4.2.39) refers to exactly two Bead_end_type (see 4.2.38) objects in the role of end_condition. Each Bead_end_type acts as end_condition for zero or more Bead_feature objects.

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4.3.190 Bead_feature to Feature_parameter

Each Bead_feature (see 4.2.39) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Bead_feature objects.

4.3.191 Bead_feature to Open_profile_usage

Each Bead_feature (see 4.2.39) refers to exactly one Open_profile_usage (see 4.2.329) in the role of bead_profile. Each Open_profile_usage acts as bead_profile for zero or more Bead_feature objects.

4.3.192 Bead_feature to Path

Each Bead_feature (see 4.2.39) refers to exactly one Path (see 4.2.342) in the role of sweep_path. Each Path acts as sweep_path for zero or more Bead_feature objects.

4.3.193 Boolean_result to B_rep_model

Each Boolean_result (see 4.2.41) refers to zero or one B_rep_model (see 4.2.35) in the role of first_operand. Each B_rep_model acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_solid_select.

Each Boolean_result refers to zero or one B_rep_model in the role of second_operand. Each B_rep_model acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_solid_select.

4.3.194 Boolean_result to Boolean_result

Each Boolean_result (see 4.2.41) refers to zero or one Boolean_result in the role of first_operand. Each Boolean_result acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select and csg_select.

Each Boolean_result refers to zero or one Boolean_result in the role of second_operand. Each Boolean_result acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select and csg_select.

4.3.195 Boolean_result to Csg_primitive

Each Boolean_result (see 4.2.41) refers to zero or one Csg_primitive (see 4.2.107) in the role of first_operand. Each Csg_primitive acts as first_operand for zero or more Boolean_result objects.

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NOTE 1 - This assertion is established through boolean_operand_select and csg_select.

Each Boolean_result refers to zero or one Csg_primitive in the role of second_operand. Each Csg_-primitive acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select and csg_select.

4.3.196 Boolean_result to Faceted_b_rep_model

Each Boolean_result (see 4.2.41) refers to zero or one Faceted_b_rep_model (see 4.2.196) in the role of first_operand. Each Faceted_b_rep_model acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

Each Boolean_result refers to zero or one Faceted_b_rep_model in the role of second_operand. Each Faceted_b_rep_model acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

4.3.197 Boolean_result to Half_space_solid

Each Boolean_result (see 4.2.41) refers to zero or one Half_space_solid (see 4.2.252) in the role of first_operand. Each Half_space_solid acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select.

Each Boolean_result refers to zero or one Half_space_solid in the role of second_operand. Each Half_-space_solid acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select.

4.3.198 Boolean_result to Solid_replica

Each Boolean_result (see 4.2.41) refers to zero or one Solid_replica (see 4.2.462) in the role of first_-operand. Each Solid_replica acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

Each Boolean_result refers to zero or one Solid_replica in the role of second_operand. Each Solid_-replica acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

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4.3.199 Boolean_result to Swept_face_solid

Each Boolean_result (see 4.2.41) refers to zero or one Swept_face_solid (see 4.2.502) in the role of first_operand. Each Swept_face_solid acts as first_operand for zero or more Boolean_result objects.

NOTE 1 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

Each Boolean_result refers to zero or one Swept_face_solid in the role of second_operand. Each Swept_-face_solid acts as second_operand for zero or more Boolean_result objects.

NOTE 2 - This assertion is established through boolean_operand_select, csg_select, and non_primitive_-solid_select.

4.3.200 Boss_feature to Angle_taper

Each Boss_feature (see 4.2.42) refers to zero or one Angle_taper (see 4.2.12) in the role of taper. Each Angle_taper acts as taper for zero or more Boss_feature objects.

NOTE - This assertion is established through taper_select.

4.3.201 Boss_feature to Boss_top_condition

Each Boss_feature (see 4.2.42) refers to exactly one Boss_top_condition (see 4.2.43) in the role of top_-condition. Each Boss_top_condition acts as top_condition for zero or more Boss_feature objects.

4.3.202 Boss_feature to Closed_profile_usage

Each Boss_feature (see 4.2.42) refers to exactly one Closed_profile_usage (see 4.2.73) in the role of boundary. Each Closed_profile_usage acts as boundary for zero or more Boss_feature objects.

4.3.203 Boss_feature to Diameter_taper

Each Boss_feature (see 4.2.42) refers to zero or one Diameter_taper (see 4.2.146) in the role of taper. Each Diameter_taper acts as taper for zero or more Boss_feature objects.

NOTE - This assertion is established through taper_select.

4.3.204 Boss_feature to Directed_taper

Each Boss_feature (see 4.2.42) refers to zero or one Directed_taper (see 4.2.154) in the role of taper. Each Directed_taper acts as taper for zero or more Boss_feature objects.

NOTE - This assertion is established through taper_select.

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4.3.205 Boss_feature to Feature_parameter

Each Boss_feature (see 4.2.42) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Boss_feature objects.

4.3.206 Boss_feature to Linear_path

Each Boss_feature (see 4.2.42) refers to exactly one Linear_path (see 4.2.300) in the role of boss_height. Each Linear_path acts as boss_height for zero or more Boss_feature objects.

4.3.207 Boss_top_condition to Feature_parameter

Each Boss_top_condition (see 4.2.43) refers to zero or one Feature_parameter (see 4.2.201) in the role of top_radius. Each Feature_parameter acts as top_radius for zero or more Boss_top_condition objects.

4.3.208 Cartesian_coordinate_space to Unit

Each Cartesian_coordinate_space (see 4.2.44) refers to zero or more Unit (see 4.2.541) objects in the role of unit_of_values. Each Unit acts as unit_of_values for zero or more Cartesian_coordinate_space objects.

4.3.209 Centre_of_mass to Cartesian_coordinate_space

Each Centre_of_mass (see 4.2.49) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Centre_of_mass objects.

4.3.210 Certification to Item_instance

Each Certification (see 4.2.50) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Certification objects.

NOTE - This assertion is established through certified_element_select.

4.3.211 Certification to Item_version

Each Certification (see 4.2.50) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Certification objects.

NOTE - This assertion is established through certified_element_select.

4.3.212 Certification to Item_version_relationship

Each Certification (see 4.2.50) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Certification objects.

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NOTE - This assertion is established through certified_element_select.

4.3.213 Certification to Multi_language_string

Each Certification (see 4.2.50) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Certification objects.

NOTE 1 - This assertion is established through string_select.

Each Certification refers to zero or one Multi_language_string in the role of purpose. Each Multi_-language_string acts as purpose for zero or more Certification objects.

NOTE 2 - This assertion is established through string_select.

4.3.214 Certification to Supplier_solution

Each Certification (see 4.2.50) is_applied_to zero or more Supplier_solution (see 4.2.488) objects. Each Supplier_solution is related to zero or more Certification objects.

NOTE - This assertion is established through certified_element_select.

4.3.215 Chamfer to Chamfer_definition

Each Chamfer (see 4.2.51) is_defined_by exactly one Chamfer_definition (see 4.2.53). Each Chamfer_-definition is related to zero or more Chamfer objects.

4.3.216 Chamfer to Face

Each Chamfer (see 4.2.51) refers to exactly one Face (see 4.2.191) in the role of chamfer_face. Each Face acts as chamfer_face for zero or more Chamfer objects.

4.3.217 Chamfer_angle to Feature_parameter

Each Chamfer_angle (see 4.2.52) refers to exactly one Feature_parameter (see 4.2.201) in the role of angle. Each Feature_parameter acts as angle for zero or more Chamfer_angle objects.

4.3.218 Chamfer_definition to Chamfer_angle

Each Chamfer_definition (see 4.2.53) refers to zero or one Chamfer_angle (see 4.2.52) in the role of value_2. Each Chamfer_angle acts as value_2 for zero or more Chamfer_definition objects.

NOTE - This assertion is established through chamfer_value_select.

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4.3.219 Chamfer_definition to Chamfer_offset

Each Chamfer_definition (see 4.2.53) refers to exactly one Chamfer_offset (see 4.2.54) in the role of offset_1. Each Chamfer_offset acts as offset_1 for zero or more Chamfer_definition objects.

Each Chamfer_definition refers to zero or one Chamfer_offset in the role of value_2. Each Chamfer_-offset acts as value_2 for zero or more Chamfer_definition objects.

NOTE - This assertion is established through chamfer_value_select.

4.3.220 Chamfer_offset to Feature_parameter

Each Chamfer_offset (see 4.2.54) refers to exactly one Feature_parameter (see 4.2.201) in the role of offset. Each Feature_parameter acts as offset for zero or more Chamfer_offset objects.

4.3.221 Change to Complex_product_relationship

Each Change (see 4.2.55) refers to zero or one Complex_product_relationship (see 4.2.81) in the role of described_change. Each Complex_product_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.222 Change to Design_constraint_relationship

Each Change (see 4.2.55) refers to zero or one Design_constraint_relationship (see 4.2.140) in the role of described_change. Each Design_constraint_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.223 Change to Item_version_relationship

Each Change (see 4.2.55) refers to zero or one Item_version_relationship (see 4.2.276) in the role of described_change. Each Item_version_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.224 Change to Multi_language_string

Each Change (see 4.2.55) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Change objects.

NOTE - This assertion is established through string_select.

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4.3.225 Change to Process_operation_occurrence_relationship

Each Change (see 4.2.55) refers to zero or one Process_operation_occurrence_relationship (see 4.2.385) in the role of described_change. Each Process_operation_occurrence_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.226 Change to Process_plan_relationship

Each Change (see 4.2.55) refers to zero or one Process_plan_relationship (see 4.2.388) in the role of described_change. Each Process_plan_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.227 Change to Replaced_definition_relationship

Each Change (see 4.2.55) refers to zero or one Replaced_definition_relationship (see 4.2.430) in the role of described_change. Each Replaced_definition_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.228 Change to Replaced_usage_relationship

Each Change (see 4.2.55) refers to zero or one Replaced_usage_relationship (see 4.2.431) in the role of described_change. Each Replaced_usage_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.229 Change to Shape_element_relationship

Each Change (see 4.2.55) refers to zero or one Shape_element_relationship (see 4.2.450) in the role of described_change. Each Shape_element_relationship acts as described_change for zero or more Change objects.

NOTE - This assertion is established through change_relationship_select.

4.3.230 Circular_closed_profile to Feature_parameter

Each Circular_closed_profile (see 4.2.58) refers to exactly one Feature_parameter (see 4.2.201) in the role of diameter. Each Feature_parameter acts as diameter for zero or more Circular_closed_profile objects.

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4.3.231 Circular_path to Feature_parameter

Each Circular_path (see 4.2.61) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius. Each Feature_parameter acts as radius for zero or more Circular_path objects.

4.3.232 Circular_pattern to Circular_offset_pattern

Each Circular_pattern (see 4.2.62) refers to zero or more Circular_offset_pattern (see 4.2.59) objects in the role of relocated_feature. Each Circular_offset_pattern has base_feature defined by one or more Circular_pattern objects.

4.3.233 Circular_pattern to Circular_omit_pattern

Each Circular_pattern (see 4.2.62) refers to zero or more Circular_omit_pattern (see 4.2.60) objects in the role of missing_feature. Each Circular_omit_pattern has base_feature defined by one or more Circular_pattern objects.

4.3.234 Circular_pattern to Feature_parameter

Each Circular_pattern (see 4.2.62) refers to exactly one Feature_parameter (see 4.2.201) in the role of angular_spacing. Each Feature_parameter acts as angular_spacing for zero or more Circular_pattern objects.

Each Circular_pattern refers to zero or one Feature_parameter in the role of diameter. Each Feature_-parameter acts as diameter for zero or more Circular_pattern objects.

Each Circular_pattern refers to zero or one Feature_parameter in the role of rotation. Each Feature_-parameter acts as rotation for zero or more Circular_pattern objects.

4.3.235 Circular_runout_tolerance to Datum

Each Circular_runout_tolerance (see 4.2.63) refers to one or two Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Circular_runout_tolerance objects.

4.3.236 Class_category_association to Product_class

Each Class_category_association (see 4.2.64) refers to exactly one Product_class (see 4.2.392) in the role of associated_product_class. Each Product_class acts as associated_product_class for zero or more Class_category_association objects.

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4.3.237 Class_category_association to Specification_category

Each Class_category_association (see 4.2.64) refers to exactly one Specification_category (see 4.2.468) in the role of associated_category. Each Specification_category acts as associated_category for zero or more Class_category_association objects.

4.3.238 Class_condition_association to Multi_language_string

Each Class_condition_association (see 4.2.65) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Class_-condition_association objects.

NOTE - This assertion is established through string_select.

4.3.239 Class_condition_association to Product_class

Each Class_condition_association (see 4.2.65) refers to exactly one Product_class (see 4.2.392) in the role of associated_product_class. Each Product_class acts as associated_product_class for zero or more Class_condition_association objects.

4.3.240 Class_condition_association to Specification_expression

Each Class_condition_association (see 4.2.65) refers to exactly one Specification_expression (see 4.2.470) in the role of associated_condition. Each Specification_expression acts as associated_condition for zero or more Class_condition_association objects.

4.3.241 Class_inclusion_association to Multi_language_string

Each Class_inclusion_association (see 4.2.66) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Class_-inclusion_association objects.

NOTE - This assertion is established through string_select.

4.3.242 Class_inclusion_association to Product_class

Each Class_inclusion_association (see 4.2.66) refers to exactly one Product_class (see 4.2.392) in the role of associated_product_class. Each Product_class acts as associated_product_class for zero or more Class_inclusion_association objects.

4.3.243 Class_inclusion_association to Specification_inclusion

Each Class_inclusion_association (see 4.2.66) refers to exactly one Specification_inclusion (see 4.2.471) in the role of associated_inclusion. Each Specification_inclusion acts as associated_inclusion for zero or more Class_inclusion_association objects.

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4.3.244 Class_specification_association to Product_class

Each Class_specification_association (see 4.2.67) refers to exactly one Product_class (see 4.2.392) in the role of associated_product_class. Each Product_class acts as associated_product_class for zero or more Class_specification_association objects.

4.3.245 Class_specification_association to Specification

Each Class_specification_association (see 4.2.67) refers to exactly one Specification (see 4.2.467) in the role of associated_specification. Each Specification acts as associated_specification for zero or more Class_specification_association objects.

4.3.246 Class_structure_relationship to Multi_language_string

Each Class_structure_relationship (see 4.2.68) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Class_-structure_relationship objects.

NOTE - This assertion is established through string_select.

4.3.247 Class_structure_relationship to Product_class

Each Class_structure_relationship (see 4.2.68) is relating to exactly one Product_class (see 4.2.392). Each Product_class is referenced by zero or more Class_structure_relationship objects as relating.

NOTE - The relating Product_class is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.248 Class_structure_relationship to Product_component

Each Class_structure_relationship (see 4.2.68) is related to zero or one Product_component (see 4.2.394). Each Product_component is referenced by zero or more Class_structure_relationship objects as related.

NOTE 1 - The related Product_component is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

NOTE 2 - This assertion is established through product_function_component_select.

4.3.249 Class_structure_relationship to Product_function

Each Class_structure_relationship (see 4.2.68) is related to zero or one Product_function (see 4.2.397). Each Product_function is referenced by zero or more Class_structure_relationship objects as related.

NOTE 1 - The related Product_function is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

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NOTE 2 - This assertion is established through product_function_component_select.

4.3.250 Classification_association to Activity

Each Classification_association (see 4.2.69) refers to zero or one Activity (see 4.2.2) in the role of classified_element. Each Activity acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.251 Classification_association to Activity_method

Each Classification_association (see 4.2.69) refers to zero or one Activity_method (see 4.2.4) in the role of classified_element. Each Activity_method acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.252 Classification_association to Approval_status

Each Classification_association (see 4.2.69) refers to zero or one Approval_status (see 4.2.24) in the role of classified_element. Each Approval_status acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.253 Classification_association to Catalogue_thread

Each Classification_association (see 4.2.69) refers to zero or one Catalogue_thread (see 4.2.48) in the role of classified_element. Each Catalogue_thread acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.254 Classification_association to Complex_product

Each Classification_association (see 4.2.69) refers to zero or one Complex_product (see 4.2.80) in the role of classified_element. Each Complex_product acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

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4.3.255 Classification_association to Contract

Each Classification_association (see 4.2.69) refers to zero or one Contract (see 4.2.104) in the role of classified_element. Each Contract acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.256 Classification_association to Design_constraint

Each Classification_association (see 4.2.69) refers to zero or one Design_constraint (see 4.2.138) in the role of classified_element. Each Design_constraint acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.257 Classification_association to Design_discipline_item_definition

Each Classification_association (see 4.2.69) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of classified_element. Each Design_discipline_item_definition acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.258 Classification_association to Document

Each Classification_association (see 4.2.69) refers to zero or one Document (see 4.2.155) in the role of classified_element. Each Document acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.259 Classification_association to Document_file

Each Classification_association (see 4.2.69) refers to zero or one Document_file (see 4.2.159) in the role of classified_element. Each Document_file acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.260 Classification_association to Document_representation

Each Classification_association (see 4.2.69) refers to zero or one Document_representation (see 4.2.163) in the role of classified_element. Each Document_representation acts as classified_element for zero or more Classification_association objects.

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NOTE - This assertion is established through classified_element_select.

4.3.261 Classification_association to Document_version

Each Classification_association (see 4.2.69) refers to zero or one Document_version (see 4.2.167) in the role of classified_element. Each Document_version acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.262 Classification_association to Feature_definition

Each Classification_association (see 4.2.69) refers to zero or one Feature_definition (see 4.2.199) in the role of classified_element. Each Feature_definition acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.263 Classification_association to General_classification

Each Classification_association (see 4.2.69) refers to exactly one General_classification (see 4.2.216) in the role of associated_classification. Each General_classification acts as associated_classification for zero or more Classification_association objects.

4.3.264 Classification_association to General_feature

Each Classification_association (see 4.2.69) refers to zero or one General_feature (see 4.2.221) in the role of classified_element. Each General_feature acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.265 Classification_association to Item

Each Classification_association (see 4.2.69) refers to zero or one Item (see 4.2.267) in the role of classified_element. Each Item acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.266 Classification_association to Item_instance

Each Classification_association (see 4.2.69) refers to zero or one Item_instance (see 4.2.271) in the role of classified_element. Each Item_instance acts as classified_element for zero or more Classification_association objects.

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NOTE - This assertion is established through classified_element_select.

4.3.267 Classification_association to Item_version

Each Classification_association (see 4.2.69) refers to zero or one Item_version (see 4.2.275) in the role of classified_element. Each Item_version acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.268 Classification_association to Material

Each Classification_association (see 4.2.69) refers to zero or one Material (see 4.2.309) in the role of classified_element. Each Material acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.269 Classification_association to Process_operation_definition

Each Classification_association (see 4.2.69) refers to zero or one Process_operation_definition (see 4.2.381) in the role of classified_element. Each Process_operation_definition acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.270 Classification_association to Process_operation_occurrence

Each Classification_association (see 4.2.69) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of classified_element. Each Process_operation_occurrence acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.271 Classification_association to Process_plan

Each Classification_association (see 4.2.69) refers to zero or one Process_plan (see 4.2.387) in the role of classified_element. Each Process_plan acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

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4.3.272 Classification_association to Product_class

Each Classification_association (see 4.2.69) refers to zero or one Product_class (see 4.2.392) in the role of classified_element. Each Product_class acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.273 Classification_association to Product_identification

Each Classification_association (see 4.2.69) refers to zero or one Product_identification (see 4.2.398) in the role of classified_element. Each Product_identification acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.274 Classification_association to Project

Each Classification_association (see 4.2.69) refers to zero or one Project (see 4.2.404) in the role of classified_element. Each Project acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.275 Classification_association to Property

Each Classification_association (see 4.2.69) refers to zero or one Property (see 4.2.409) in the role of classified_element. Each Property acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.276 Classification_association to Property_value_association

Each Classification_association (see 4.2.69) refers to zero or one Property_value_association (see 4.2.413) in the role of classified_element. Each Property_value_association acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.277 Classification_association to Security_level

Each Classification_association (see 4.2.69) refers to zero or one Security_level (see 4.2.444) in the role of classified_element. Each Security_level acts as classified_element for zero or more Classification_association objects.

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NOTE - This assertion is established through classified_element_select.

4.3.278 Classification_association to Shape_element

Each Classification_association (see 4.2.69) refers to zero or one Shape_element (see 4.2.449) in the role of classified_element. Each Shape_element acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.279 Classification_association to Specification_category

Each Classification_association (see 4.2.69) refers to zero or one Specification_category (see 4.2.468) in the role of classified_element. Each Specification_category acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.280 Classification_association to Thread_feature

Each Classification_association (see 4.2.69) refers to zero or one Thread_feature (see 4.2.517) in the role of classified_element. Each Thread_feature acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.281 Classification_association to Transition_feature

Each Classification_association (see 4.2.69) refers to zero or one Transition_feature (see 4.2.537) in the role of classified_element. Each Transition_feature acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.282 Classification_association to Work_order

Each Classification_association (see 4.2.69) refers to zero or one Work_order (see 4.2.564) in the role of classified_element. Each Work_order acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

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4.3.283 Classification_association to Work_request

Each Classification_association (see 4.2.69) refers to zero or one Work_request (see 4.2.565) in the role of classified_element. Each Work_request acts as classified_element for zero or more Classification_association objects.

NOTE - This assertion is established through classified_element_select.

4.3.284 Classification_attribute to General_classification

Each Classification_attribute (see 4.2.70) refers to exactly one General_classification (see 4.2.216) in the role of associated_classification. Each General_classification acts as associated_classification for zero or more Classification_attribute objects.

4.3.285 Classification_attribute to Multi_language_string

Each Classification_attribute (see 4.2.70) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Classification_attribute objects.

NOTE 1 - This assertion is established through string_select.

Each Classification_attribute refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Classification_attribute objects.

NOTE 2 - This assertion is established through string_select.

4.3.286 Classification_attribute to Property

Each Classification_attribute (see 4.2.70) refers to exactly one Property (see 4.2.409) in the role of attribute_definition. Each Property acts as attribute_definition for zero or more Classification_attribute objects.

4.3.287 Classification_attribute to Property_value_representation

Each Classification_attribute (see 4.2.70) refers to zero or more Property_value_representation (see 4.2.414) objects in the role of allowed_value. Each Property_value_representation acts as allowed_value for zero or more Classification_attribute objects.

4.3.288 Classification_system to Multi_language_string

Each Classification_system (see 4.2.71) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Classification_system objects.

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NOTE - This assertion is established through string_select.

4.3.289 Closed_profile_usage to Closed_profile

Each Closed_profile_usage (see 4.2.73) refers to exactly one Closed_profile (see 4.2.72) in the role of used_profile. Each Closed_profile acts as used_profile for zero or more Closed_profile_usage objects.

4.3.290 Closed_shell to Face

Each Closed_shell (see 4.2.74) refers to one or more Face (see 4.2.191) objects in the role of shell_boundary. Each Face acts as shell_boundary for zero or more Closed_shell objects.

4.3.291 Coating_layer to Material

Each Coating_layer (see 4.2.75) refers to exactly one Material (see 4.2.309) in the role of used_material. Each Material acts as used_material for zero or more Coating_layer objects.

4.3.292 Coating_layer to Thickness_dimension

Each Coating_layer (see 4.2.75) refers to zero or one Thickness_dimension (see 4.2.516) in the role of thickness. Each Thickness_dimension acts as thickness for zero or more Coating_layer objects.

4.3.293 Coaxiality_tolerance to Datum

Each Coaxiality_tolerance (see 4.2.76) refers to one or two Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Coaxiality_tolerance objects.

4.3.294 Collected_item_association to Collection_definition

Each Collected_item_association (see 4.2.77) is relating to exactly one Collection_definition (see 4.2.78). Each Collection_definition has collected_items defined by two or more Collected_item_association objects.

NOTE - The relating Collection_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.295 Collection_definition to Multi_language_string

Each Collection_definition (see 4.2.78) refers to zero or one Multi_language_string (see 4.2.320) in the role of purpose. Each Multi_language_string acts as purpose for zero or more Collection_definition objects.

NOTE - This assertion is established through string_select.

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4.3.296 Complex_product_relationship to Complex_product

Each Complex_product_relationship (see 4.2.81) is related to exactly one Complex_product (see 4.2.80). Each Complex_product is referenced by zero or more Complex_product_relationship objects as related.

NOTE 1 - The related Complex_product is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Complex_product_relationship is relating to exactly one Complex_product. Each Complex_product is referenced by zero or more Complex_product_relationship objects as relating.

NOTE 2 - The relating Complex_product is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.297 Complex_product_relationship to Multi_language_string

Each Complex_product_relationship (see 4.2.81) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Complex_product_relationship objects.

NOTE - This assertion is established through string_select.

4.3.298 Component_placement to Geometric_model_relationship_with_transformation

Each Component_placement (see 4.2.82) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_transformation acts as placement for zero or more Component_placement objects.

NOTE - This assertion is established through transformation_select.

4.3.299 Component_placement to Product_component

Each Component_placement (see 4.2.82) refers to exactly one Product_component (see 4.2.394) in the role of placed_component. Each Product_component acts as placed_component for zero or more Component_placement objects.

Each Component_placement refers to exactly one Product_component in the role of reference_product_component. Each Product_component acts as reference_product_component for zero or more Component_placement objects.

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4.3.300 Component_placement to Template_instance

Each Component_placement (see 4.2.82) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each Template_instance acts as placement for zero or more Component_placement objects.

NOTE - This assertion is established through transformation_select.

4.3.301 Compound_datum to Single_datum

Each Compound_datum (see 4.2.84) is_made_up_by exactly two Single_datum (see 4.2.454) objects. Each Single_datum is related to zero or more Compound_datum objects.

4.3.302 Compound_feature_in_panel_element to Compound_feature_in_panel

Each Compound_feature_in_panel_element (see 4.2.86) is_element_for exactly one Compound_feature_in_panel (see 4.2.85). Each Compound_feature_in_panel has element defined by two or more Compound_feature_in_panel_element objects.

4.3.303 Compound_feature_in_panel_element to Process_feature_in_panel

Each Compound_feature_in_panel_element (see 4.2.86) refers to zero or one Process_feature_in_panel (see 4.2.379) in the role of feature. Each Process_feature_in_panel acts as feature for zero or more Compound_feature_in_panel_element objects.

NOTE - This assertion is established through compound_in_panel_select.

4.3.304 Compound_feature_in_panel_element to Transformation

Each Compound_feature_in_panel_element (see 4.2.86) refers to zero or one Transformation (see 4.2.533) in the role of element_placement. Each Transformation acts as element_placement for zero or more Compound_feature_in_panel_element objects.

4.3.305 Compound_feature_in_panel_element to Transition_feature

Each Compound_feature_in_panel_element (see 4.2.86) refers to zero or one Transition_feature (see 4.2.537) in the role of feature. Each Transition_feature acts as feature for zero or more Compound_-feature_in_panel_element objects.

NOTE - This assertion is established through compound_in_panel_select.

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4.3.306 Compound_feature_in_panel_element_relationship to Compound_feature_in_panel_element

Each Compound_feature_in_panel_element_relationship (see 4.2.87) refers to exactly one Compound_feature_in_panel_element (see 4.2.86) in the role of predecessor. Each Compound_feature_in_panel_element acts as predecessor for zero or more Compound_feature_in_panel_element_relationship objects.

Each Compound_feature_in_panel_element_relationship refers to exactly one Compound_feature_in_panel_element in the role of successor. Each Compound_feature_in_panel_element acts as successor for zero or more Compound_feature_in_panel_element_relationship objects.

4.3.307 Compound_feature_in_solid_element to Compound_feature_in_solid

Each Compound_feature_in_solid_element (see 4.2.89) is_element_for exactly one Compound_feature_in_solid (see 4.2.88). Each Compound_feature_in_solid has element defined by two or more Compound_feature_in_solid_element objects.

4.3.308 Compound_feature_in_solid_element to Process_feature_in_solid

Each Compound_feature_in_solid_element (see 4.2.89) refers to zero or one Process_feature_in_solid (see 4.2.380) in the role of feature. Each Process_feature_in_solid acts as feature for zero or more Compound_feature_in_solid_element objects.

NOTE - This assertion is established through compound_in_solid_select.

4.3.309 Compound_feature_in_solid_element to Thread_feature

Each Compound_feature_in_solid_element (see 4.2.89) refers to zero or one Thread_feature (see 4.2.517) in the role of feature. Each Thread_feature acts as feature for zero or more Compound_feature_in_solid_element objects.

NOTE - This assertion is established through compound_in_solid_select.

4.3.310 Compound_feature_in_solid_element to Transformation

Each Compound_feature_in_solid_element (see 4.2.89) refers to zero or one Transformation (see 4.2.533) in the role of element_placement. Each Transformation acts as element_placement for zero or more Compound_feature_in_solid_element objects.

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4.3.311 Compound_feature_in_solid_element to Transition_feature

Each Compound_feature_in_solid_element (see 4.2.89) refers to zero or one Transition_feature (see 4.2.537) in the role of feature. Each Transition_feature acts as feature for zero or more Compound_-feature_in_solid_element objects.

NOTE - This assertion is established through compound_in_solid_select.

4.3.312 Compound_feature_in_solid_element_relationship to Compound_feature_in_solid_element

Each Compound_feature_in_solid_element_relationship (see 4.2.90) refers to exactly one Compound_-feature_in_solid_element (see 4.2.89) in the role of predecessor. Each Compound_feature_in_solid_-element acts as predecessor for zero or more Compound_feature_in_solid_element_relationship objects.

Each Compound_feature_in_solid_element_relationship refers to exactly one Compound_feature_in_-solid_element in the role of successor. Each Compound_feature_in_solid_element acts as successor for zero or more Compound_feature_in_solid_element_relationship objects.

4.3.313 Compound_model to Topologically_connected_set

Each Compound_model (see 4.2.92) refers to zero or more Topologically_connected_set (see 4.2.529) objects in the role of element. Each Topologically_connected_set acts as element for zero or more Compound_model objects.

4.3.314 Concentricity_tolerance to Datum

Each Concentricity_tolerance (see 4.2.93) refers to exactly one Datum (see 4.2.123) in the role of reference_datum. Each Datum acts as reference_datum for zero or more Concentricity_tolerance objects.

4.3.315 Configuration to Alternative_solution

Each Configuration (see 4.2.94) refers to zero or one Alternative_solution (see 4.2.10) in the role of configured_element. Each Alternative_solution acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select and complex_product_select.

4.3.316 Configuration to Class_condition_association

Each Configuration (see 4.2.94) is_solution_for zero or one Class_condition_association (see 4.2.65). Each Class_condition_association is related to zero or more Configuration objects.

NOTE - This assertion is established through configured_specification_select.

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4.3.317 Configuration to Class_specification_association

Each Configuration (see 4.2.94) is_solution_for zero or one Class_specification_association (see 4.2.67). Each Class_specification_association is related to zero or more Configuration objects.

NOTE - This assertion is established through configured_specification_select.

4.3.318 Configuration to Item_instance

Each Configuration (see 4.2.94) refers to zero or one Item_instance (see 4.2.271) in the role of configured_element. Each Item_instance acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select.

4.3.319 Configuration to Process_operation_occurrence

Each Configuration (see 4.2.94) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of configured_element. Each Process_operation_occurrence acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select.

4.3.320 Configuration to Process_plan

Each Configuration (see 4.2.94) refers to zero or one Process_plan (see 4.2.387) in the role of configured_element. Each Process_plan acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select.

4.3.321 Configuration to Product_component

Each Configuration (see 4.2.94) refers to zero or one Product_component (see 4.2.394) in the role of configured_element. Each Product_component acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select and complex_product_select.

4.3.322 Configuration to Product_function

Each Configuration (see 4.2.94) refers to zero or one Product_function (see 4.2.397) in the role of configured_element. Each Product_function acts as configured_element for zero or more Configuration objects.

NOTE - This assertion is established through configured_item_select and complex_product_select.

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4.3.323 Conical_bottom to Feature_parameter

Each Conical_bottom (see 4.2.95) refers to exactly one Feature_parameter (see 4.2.201) in the role of tip_angle. Each Feature_parameter acts as tip_angle for zero or more Conical_bottom objects.

Each Conical_bottom refers to zero or one Feature_parameter in the role of tip_radius. Each Feature_-parameter acts as tip_radius for zero or more Conical_bottom objects.

4.3.324 Constant_radius_edge_round to Feature_parameter

Each Constant_radius_edge_round (see 4.2.97) refers to zero or one Feature_parameter (see 4.2.201) in the role of first_offset. Each Feature_parameter acts as first_offset for zero or more Constant_radius_-edge_round objects.

Each Constant_radius_edge_round refers to exactly one Feature_parameter in the role of radius. Each Feature_parameter acts as radius for zero or more Constant_radius_edge_round objects.

Each Constant_radius_edge_round refers to zero or one Feature_parameter in the role of second_offset. Each Feature_parameter acts as second_offset for zero or more Constant_radius_edge_round objects.

4.3.325 Constant_radius_fillet to Feature_parameter

Each Constant_radius_fillet (see 4.2.98) refers to zero or one Feature_parameter (see 4.2.201) in the role of first_offset. Each Feature_parameter acts as first_offset for zero or more Constant_radius_fillet objects.

Each Constant_radius_fillet refers to exactly one Feature_parameter in the role of radius. Each Feature_-parameter acts as radius for zero or more Constant_radius_fillet objects.

Each Constant_radius_fillet refers to zero or one Feature_parameter in the role of second_offset. Each Feature_parameter acts as second_offset for zero or more Constant_radius_fillet objects.

4.3.326 Constructive_geometric_element to Axis_placement

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Axis_placement (see 4.2.33) in the role of element. Each Axis_placement acts as element for zero or more Constructive_geometric_-element objects.

NOTE - This assertion is established through constructive_element_select.

4.3.327 Constructive_geometric_element to Curve

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Curve (see 4.2.108) in the role of element. Each Curve acts as element for zero or more Constructive_geometric_element objects.

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NOTE - This assertion is established through constructive_element_select.

4.3.328 Constructive_geometric_element to Face

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Face (see 4.2.191) in the role of element. Each Face acts as element for zero or more Constructive_geometric_element objects.

NOTE - This assertion is established through constructive_element_select.

4.3.329 Constructive_geometric_element to Multi_language_string

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Constructive_geometric_element objects.

NOTE - This assertion is established through string_select.

4.3.330 Constructive_geometric_element to Oriented_edge_curve

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Oriented_edge_curve (see 4.2.334) in the role of element. Each Oriented_edge_curve acts as element for zero or more Constructive_geometric_element objects.

NOTE - This assertion is established through constructive_element_select.

4.3.331 Constructive_geometric_element to Point

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Point (see 4.2.367) in the role of element. Each Point acts as element for zero or more Constructive_geometric_element objects.

NOTE - This assertion is established through constructive_element_select.

4.3.332 Constructive_geometric_element to Surface

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Surface (see 4.2.489) in the role of element. Each Surface acts as element for zero or more Constructive_geometric_element objects.

NOTE - This assertion is established through constructive_element_select.

4.3.333 Constructive_geometric_element to Vertex_point

Each Constructive_geometric_element (see 4.2.99) refers to zero or one Vertex_point (see 4.2.553) in the role of element. Each Vertex_point acts as element for zero or more Constructive_geometric_element objects.

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NOTE - This assertion is established through constructive_element_select.

4.3.334 Constructive_geometry to Constructive_geometric_element

Each Constructive_geometry (see 4.2.100) refers to one or more Constructive_geometric_element (see 4.2.99) objects in the role of element. Each Constructive_geometric_element has geometry defined by one or more Constructive_geometry objects.

4.3.335 Constructive_geometry to Multi_language_string

Each Constructive_geometry (see 4.2.100) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Constructive_geometry objects.

NOTE - This assertion is established through string_select.

4.3.336 Constructive_geometry_association to Constructive_geometry

Each Constructive_geometry_association (see 4.2.101) refers to exactly one Constructive_geometry (see 4.2.100) in the role of auxiliary_geometry. Each Constructive_geometry has associated_model defined by one or more Constructive_geometry_association objects.

Each Constructive_geometry_association refers to zero or one Constructive_geometry in the role of base_geometry. Each Constructive_geometry has associated_model defined by one or more Constructive_geometry_association objects.

NOTE - This assertion is established through constructive_geometry_select.

4.3.337 Constructive_geometry_association to Geometric_model

Each Constructive_geometry_association (see 4.2.101) refers to zero or one Geometric_model (see 4.2.238) in the role of base_geometry. Each Geometric_model acts as base_geometry for zero or more Constructive_geometry_association objects.

NOTE - This assertion is established through constructive_geometry_select.

4.3.338 Constructive_geometry_association to Multi_language_string

Each Constructive_geometry_association (see 4.2.101) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Constructive_geometry_association objects.

NOTE - This assertion is established through string_select.

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4.3.339 Contact_ratio to Physical_model

Each Contact_ratio (see 4.2.102) refers to exactly one Physical_model (see 4.2.354) in the role of measuring_gauge. Each Physical_model acts as measuring_gauge for zero or more Contact_ratio objects.

4.3.340 Contact_ratio to Value_with_unit

Each Contact_ratio (see 4.2.102) refers to exactly one Value_with_unit (see 4.2.549) in the role of ratio_value. Each Value_with_unit acts as ratio_value for zero or more Contact_ratio objects.

4.3.341 Context_dependent_appearance_assignment to Drawing_sheet

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one Drawing_sheet (see 4.2.173) in the role of appearance_context. Each Drawing_sheet acts as appearance_context for zero or more Context_dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select and area_select.

4.3.342 Context_dependent_appearance_assignment to Group

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one Group (see 4.2.250) in the role of appearance_context. Each Group acts as appearance_context for zero or more Context_dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select and structuring_method_select.

4.3.343 Context_dependent_appearance_assignment to Layer

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one Layer (see 4.2.292) in the role of appearance_context. Each Layer acts as appearance_context for zero or more Context_dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select and structuring_method_select.

4.3.344 Context_dependent_appearance_assignment to Model_image

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one Model_image (see 4.2.316) in the role of appearance_context. Each Model_image acts as appearance_context for zero or more Context_dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select.

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4.3.345 Context_dependent_appearance_assignment to View

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one View (see 4.2.554) in the role of appearance_context. Each View acts as appearance_context for zero or more Context_-dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select.

4.3.346 Context_dependent_appearance_assignment to View_area

Each Context_dependent_appearance_assignment (see 4.2.103) refers to zero or one View_area (see 4.2.555) in the role of appearance_context. Each View_area acts as appearance_context for zero or more Context_dependent_appearance_assignment objects.

NOTE - This assertion is established through appearance_context_select and area_select.

4.3.347 Contract to Activity

Each Contract (see 4.2.104) refers to zero or more Activity (see 4.2.2) objects in the role of contracted_-element. Each Activity acts as contracted_element for zero or more Contract objects.

NOTE - This assertion is established through contracted_element_select.

4.3.348 Contract to Drawing

Each Contract (see 4.2.104) refers to zero or more Drawing (see 4.2.170) objects in the role of contracted_element. Each Drawing acts as contracted_element for zero or more Contract objects.

NOTE - This assertion is established through contracted_element_select.

4.3.349 Contract to Item_version

Each Contract (see 4.2.104) refers to zero or more Item_version (see 4.2.275) objects in the role of contracted_element. Each Item_version acts as contracted_element for zero or more Contract objects.

NOTE - This assertion is established through contracted_element_select.

4.3.350 Contract to Multi_language_string

Each Contract (see 4.2.104) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Contract objects.

NOTE - This assertion is established through string_select.

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4.3.351 Csg_model to B_rep_model

Each Csg_model (see 4.2.106) refers to zero or more B_rep_model (see 4.2.35) objects in the role of tree_root_expression. Each B_rep_model acts as tree_root_expression for zero or more Csg_model objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.352 Csg_model to Boolean_result

Each Csg_model (see 4.2.106) refers to zero or more Boolean_result (see 4.2.41) objects in the role of tree_root_expression. Each Boolean_result acts as tree_root_expression for zero or more Csg_model objects.

NOTE - This assertion is established through csg_select.

4.3.353 Csg_model to Csg_primitive

Each Csg_model (see 4.2.106) refers to zero or more Csg_primitive (see 4.2.107) objects in the role of tree_root_expression. Each Csg_primitive acts as tree_root_expression for zero or more Csg_model objects.

NOTE - This assertion is established through csg_select.

4.3.354 Csg_model to Faceted_b_rep_model

Each Csg_model (see 4.2.106) refers to zero or more Faceted_b_rep_model (see 4.2.196) objects in the role of tree_root_expression. Each Faceted_b_rep_model acts as tree_root_expression for zero or more Csg_model objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.355 Csg_model to Solid_replica

Each Csg_model (see 4.2.106) refers to zero or more Solid_replica (see 4.2.462) objects in the role of tree_root_expression. Each Solid_replica acts as tree_root_expression for zero or more Csg_model objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.356 Csg_model to Swept_face_solid

Each Csg_model (see 4.2.106) refers to zero or more Swept_face_solid (see 4.2.502) objects in the role of tree_root_expression. Each Swept_face_solid acts as tree_root_expression for zero or more Csg_model objects.

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NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.357 Curve_set_2d to Curve

Each Curve_set_2d (see 4.2.111) refers to zero or more Curve (see 4.2.108) objects in the role of element. Each Curve acts as element for zero or more Curve_set_2d objects.

NOTE - This assertion is established through point_or_curve_select.

4.3.358 Curve_set_2d to Point

Each Curve_set_2d (see 4.2.111) refers to zero or more Point (see 4.2.367) objects in the role of element. Each Point acts as element for zero or more Curve_set_2d objects.

NOTE - This assertion is established through point_or_curve_select.

4.3.359 Curve_set_3d to Curve

Each Curve_set_3d (see 4.2.112) refers to zero or more Curve (see 4.2.108) objects in the role of element. Each Curve acts as element for zero or more Curve_set_3d objects.

NOTE - This assertion is established through point_or_curve_select.

4.3.360 Curve_set_3d to Point

Each Curve_set_3d (see 4.2.112) refers to zero or more Point (see 4.2.367) objects in the role of element. Each Point acts as element for zero or more Curve_set_3d objects.

NOTE - This assertion is established through point_or_curve_select.

4.3.361 Curved_distance_dimension to Measurement_path

Each Curved_distance_dimension (see 4.2.113) refers to exactly one Measurement_path (see 4.2.314) in the role of used_path. Each Measurement_path acts as used_path for zero or more Curved_distance_-dimension objects.

4.3.362 Data_environment to Multi_language_string

Each Data_environment (see 4.2.116) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Data_environment objects.

NOTE - This assertion is established through string_select.

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4.3.363 Date_and_person_assignment to Activity

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.364 Date_and_person_assignment to Activity_element

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.365 Date_and_person_assignment to Activity_method_assignment

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.366 Date_and_person_assignment to Alternate_item_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Date_and_person_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.367 Date_and_person_assignment to Approval_status

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Approval_status (see 4.2.24) objects. Each Approval_status is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.368 Date_and_person_assignment to Assembly_substitute_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.369 Date_and_person_assignment to Certification

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.370 Date_and_person_assignment to Class_category_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.371 Date_and_person_assignment to Class_condition_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.372 Date_and_person_assignment to Class_inclusion_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.373 Date_and_person_assignment to Class_specification_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Class_specification_association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.374 Date_and_person_assignment to Class_structure_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.375 Date_and_person_assignment to Classification_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.376 Date_and_person_assignment to Classification_system

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.377 Date_and_person_assignment to Complex_product

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.378 Date_and_person_assignment to Complex_product_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Complex_product_relationship (see 4.2.81) objects. Each Complex_product_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.379 Date_and_person_assignment to Configuration

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.380 Date_and_person_assignment to Contract

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.381 Date_and_person_assignment to Date_and_person_organization

Each Date_and_person_assignment (see 4.2.117) refers to exactly one Date_and_person_organization (see 4.2.118) in the role of assigned_date_and_person. Each Date_and_person_organization acts as assigned_date_and_person for zero or more Date_and_person_assignment objects.

4.3.382 Date_and_person_assignment to Design_constraint

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.383 Date_and_person_assignment to Design_discipline_item_definition

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Design_discipline_item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.384 Date_and_person_assignment to Document

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.385 Date_and_person_assignment to Document_file

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.386 Date_and_person_assignment to Document_representation

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.387 Date_and_person_assignment to Document_version

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.388 Date_and_person_assignment to Drawing

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.389 Date_and_person_assignment to Drawing_sheet

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.390 Date_and_person_assignment to Event_reference

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Event_reference (see 4.2.184) objects. Each Event_reference is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select.

4.3.391 Date_and_person_assignment to General_classification

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.392 Date_and_person_assignment to Geometric_model

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.393 Date_and_person_assignment to Item

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Date_and_person_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.394 Date_and_person_assignment to Item_definition_instance_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_definition_instance_-relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.395 Date_and_person_assignment to Item_definition_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.396 Date_and_person_assignment to Item_instance

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.397 Date_and_person_assignment to Item_instance_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Date_and_person_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.398 Date_and_person_assignment to Item_version

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.399 Date_and_person_assignment to Item_version_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Date_and_person_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.400 Date_and_person_assignment to Kinematic_simulation_information

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Kinematic_simulation_-information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.401 Date_and_person_assignment to Manufacturing_configuration

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.402 Date_and_person_assignment to Material

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.403 Date_and_person_assignment to Multi_language_string

Each Date_and_person_assignment (see 4.2.117) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Date_and_-person_assignment objects.

NOTE - This assertion is established through string_select.

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4.3.404 Date_and_person_assignment to Organization_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Organization_relationship (see 4.2.333) objects. Each Organization_relationship is related to zero or more Date_and_person_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.405 Date_and_person_assignment to Person_in_organization

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Person_in_organization (see 4.2.347) objects. Each Person_in_organization is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.406 Date_and_person_assignment to Person_in_organization_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Person_in_organization_-relationship (see 4.2.348) objects. Each Person_in_organization_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.407 Date_and_person_assignment to Physical_assembly_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Date_-and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.408 Date_and_person_assignment to Physical_instance

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.409 Date_and_person_assignment to Physical_instance_test_result

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Physical_instance_test_-result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Date_and_-person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.410 Date_and_person_assignment to Process_operation_definition

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Process_operation_definition (see 4.2.381) objects. Each Process_operation_definition is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.411 Date_and_person_assignment to Process_operation_occurrence

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Process_operation_occurrence (see 4.2.384) objects. Each Process_operation_occurrence is related to zero or more Date_and_-person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.412 Date_and_person_assignment to Process_operation_resource_assignment

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Process_operation_resource_-assignment (see 4.2.386) objects. Each Process_operation_resource_assignment is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.413 Date_and_person_assignment to Process_plan

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.414 Date_and_person_assignment to Product_class

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.415 Date_and_person_assignment to Product_identification

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Product_identification (see 4.2.398) objects. Each Product_identification is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.416 Date_and_person_assignment to Product_structure_relationship

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.417 Date_and_person_assignment to Project

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.418 Date_and_person_assignment to Property

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

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4.3.419 Date_and_person_assignment to Property_value_association

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Date_and_person_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.420 Date_and_person_assignment to Security_classification

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Security_classification (see 4.2.443) objects. Each Security_classification is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.421 Date_and_person_assignment to Security_level

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Security_level (see 4.2.444) objects. Each Security_level is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.422 Date_and_person_assignment to Specification

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.423 Date_and_person_assignment to Specification_category

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

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4.3.424 Date_and_person_assignment to Specification_expression

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.425 Date_and_person_assignment to Specification_inclusion

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.426 Date_and_person_assignment to Styled_model

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.427 Date_and_person_assignment to View_area

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.428 Date_and_person_assignment to Work_order

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Date_and_person_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.429 Date_and_person_assignment to Work_request

Each Date_and_person_assignment (see 4.2.117) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Date_and_person_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.430 Date_and_person_organization to Date_time

Each Date_and_person_organization (see 4.2.118) refers to exactly one Date_time (see 4.2.119) in the role of actual_date. Each Date_time acts as actual_date for zero or more Date_and_person_organization objects.

4.3.431 Date_and_person_organization to Organization

Each Date_and_person_organization (see 4.2.118) refers to zero or one Organization (see 4.2.331) in the role of person_or_organization. Each Organization acts as person_or_organization for zero or more Date_and_person_organization objects.

NOTE - This assertion is established through person_organization_select.

4.3.432 Date_and_person_organization to Person_in_organization

Each Date_and_person_organization (see 4.2.118) refers to zero or one Person_in_organization (see 4.2.347) in the role of person_or_organization. Each Person_in_organization acts as person_or_organization for zero or more Date_and_person_organization objects.

NOTE - This assertion is established through person_organization_select.

4.3.433 Date_time_assignment to Activity

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.434 Date_time_assignment to Activity_element

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.435 Date_time_assignment to Activity_method_assignment

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.436 Date_time_assignment to Alternate_item_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.437 Date_time_assignment to Approval_status

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Approval_status (see 4.2.24) objects. Each Approval_status is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.438 Date_time_assignment to Assembly_substitute_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.439 Date_time_assignment to Certification

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.440 Date_time_assignment to Class_category_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.441 Date_time_assignment to Class_condition_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.442 Date_time_assignment to Class_inclusion_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.443 Date_time_assignment to Class_specification_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Class_specification_association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.444 Date_time_assignment to Class_structure_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.445 Date_time_assignment to Classification_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.446 Date_time_assignment to Classification_system

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.447 Date_time_assignment to Complex_product

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.448 Date_time_assignment to Complex_product_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Complex_product_relationship (see 4.2.81) objects. Each Complex_product_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.449 Date_time_assignment to Configuration

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.450 Date_time_assignment to Contract

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Date_time_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.451 Date_time_assignment to Date_time

Each Date_time_assignment (see 4.2.120) refers to exactly one Date_time (see 4.2.119) in the role of assigned_date_time. Each Date_time acts as assigned_date_time for zero or more Date_time_assignment objects.

4.3.452 Date_time_assignment to Design_constraint

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.453 Date_time_assignment to Design_discipline_item_definition

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Design_discipline_item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Date_time_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.454 Date_time_assignment to Document

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.455 Date_time_assignment to Document_file

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.456 Date_time_assignment to Document_representation

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.457 Date_time_assignment to Document_version

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.458 Date_time_assignment to Drawing

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.459 Date_time_assignment to Drawing_sheet

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.460 Date_time_assignment to Event_reference

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Event_reference (see 4.2.184) objects. Each Event_reference is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select.

4.3.461 Date_time_assignment to General_classification

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Date_time_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.462 Date_time_assignment to Geometric_model

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.463 Date_time_assignment to Item

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.464 Date_time_assignment to Item_definition_instance_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_definition_instance_relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.465 Date_time_assignment to Item_definition_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.466 Date_time_assignment to Item_instance

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.467 Date_time_assignment to Item_instance_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.468 Date_time_assignment to Item_version

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.469 Date_time_assignment to Item_version_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.470 Date_time_assignment to Kinematic_simulation_information

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.471 Date_time_assignment to Manufacturing_configuration

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.472 Date_time_assignment to Material

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.473 Date_time_assignment to Multi_language_string

Each Date_time_assignment (see 4.2.120) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Date_time_-assignment objects.

NOTE - This assertion is established through string_select.

4.3.474 Date_time_assignment to Organization_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Organization_relationship (see 4.2.333) objects. Each Organization_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.475 Date_time_assignment to Person_in_organization

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Person_in_organization (see 4.2.347) objects. Each Person_in_organization is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.476 Date_time_assignment to Person_in_organization_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Person_in_organization_relationship (see 4.2.348) objects. Each Person_in_organization_relationship is related to zero or more Date_-time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.477 Date_time_assignment to Physical_assembly_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.478 Date_time_assignment to Physical_instance

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.479 Date_time_assignment to Physical_instance_test_result

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.480 Date_time_assignment to Process_operation_definition

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Process_operation_definition (see 4.2.381) objects. Each Process_operation_definition is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.481 Date_time_assignment to Process_operation_occurrence

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Process_operation_occurrence (see 4.2.384) objects. Each Process_operation_occurrence is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.482 Date_time_assignment to Process_operation_resource_assignment

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Process_operation_resource_assignment (see 4.2.386) objects. Each Process_operation_resource_assignment is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.483 Date_time_assignment to Process_plan

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.484 Date_time_assignment to Product_class

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.485 Date_time_assignment to Product_identification

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Product_identification (see 4.2.398) objects. Each Product_identification is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.486 Date_time_assignment to Product_structure_relationship

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.487 Date_time_assignment to Project

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.488 Date_time_assignment to Property

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.489 Date_time_assignment to Property_value_association

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.490 Date_time_assignment to Security_classification

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Security_classification (see 4.2.443) objects. Each Security_classification is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.491 Date_time_assignment to Security_level

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Security_level (see 4.2.444) objects. Each Security_level is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.492 Date_time_assignment to Specification

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Date_time_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.493 Date_time_assignment to Specification_category

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.494 Date_time_assignment to Specification_expression

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.495 Date_time_assignment to Specification_inclusion

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.496 Date_time_assignment to Styled_model

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.497 Date_time_assignment to View_area

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

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4.3.498 Date_time_assignment to Work_order

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.499 Date_time_assignment to Work_request

Each Date_time_assignment (see 4.2.120) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Date_time_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.500 Date_time_interval_assignment to Activity

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.501 Date_time_interval_assignment to Activity_element

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.502 Date_time_interval_assignment to Activity_method_assignment

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.503 Date_time_interval_assignment to Alternate_item_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Date_time_interval_assignment objects.

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NOTE - This assertion is established through general_organizational_data_select.

4.3.504 Date_time_interval_assignment to Approval_status

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Approval_status (see 4.2.24) objects. Each Approval_status is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.505 Date_time_interval_assignment to Assembly_substitute_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.506 Date_time_interval_assignment to Certification

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.507 Date_time_interval_assignment to Class_category_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.508 Date_time_interval_assignment to Class_condition_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.509 Date_time_interval_assignment to Class_inclusion_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.510 Date_time_interval_assignment to Class_specification_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Class_specification_association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.511 Date_time_interval_assignment to Class_structure_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.512 Date_time_interval_assignment to Classification_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.513 Date_time_interval_assignment to Classification_system

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.514 Date_time_interval_assignment to Complex_product

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.515 Date_time_interval_assignment to Complex_product_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Complex_product_relationship (see 4.2.81) objects. Each Complex_product_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.516 Date_time_interval_assignment to Configuration

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.517 Date_time_interval_assignment to Contract

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.518 Date_time_interval_assignment to Design_constraint

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.519 Date_time_interval_assignment to Design_discipline_item_definition

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Design_discipline_item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Date_time_interval_assignment objects.

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NOTE - This assertion is established through general_organizational_data_select.

4.3.520 Date_time_interval_assignment to Document

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.521 Date_time_interval_assignment to Document_file

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.522 Date_time_interval_assignment to Document_representation

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Date_time_interval_-assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.523 Date_time_interval_assignment to Document_version

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.524 Date_time_interval_assignment to Drawing

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.525 Date_time_interval_assignment to Drawing_sheet

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.526 Date_time_interval_assignment to General_classification

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.527 Date_time_interval_assignment to Geometric_model

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.528 Date_time_interval_assignment to Interval_of_time

Each Date_time_interval_assignment (see 4.2.121) refers to exactly one Interval_of_time (see 4.2.266) in the role of assigned_time_interval. Each Interval_of_time acts as assigned_time_interval for zero or more Date_time_interval_assignment objects.

4.3.529 Date_time_interval_assignment to Item

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.530 Date_time_interval_assignment to Item_definition_instance_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_definition_instance_relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.531 Date_time_interval_assignment to Item_definition_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Date_time_interval_assignment objects.

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NOTE - This assertion is established through general_organizational_data_select.

4.3.532 Date_time_interval_assignment to Item_instance

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.533 Date_time_interval_assignment to Item_instance_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.534 Date_time_interval_assignment to Item_version

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.535 Date_time_interval_assignment to Item_version_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.536 Date_time_interval_assignment to Kinematic_simulation_information

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.537 Date_time_interval_assignment to Manufacturing_configuration

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.538 Date_time_interval_assignment to Material

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.539 Date_time_interval_assignment to Multi_language_string

Each Date_time_interval_assignment (see 4.2.121) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through string_select.

4.3.540 Date_time_interval_assignment to Organization_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Organization_relationship (see 4.2.333) objects. Each Organization_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.541 Date_time_interval_assignment to Person_in_organization

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Person_in_organization (see 4.2.347) objects. Each Person_in_organization is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.542 Date_time_interval_assignment to Person_in_organization_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Person_in_organization_relationship (see 4.2.348) objects. Each Person_in_organization_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.543 Date_time_interval_assignment to Physical_assembly_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.544 Date_time_interval_assignment to Physical_instance

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.545 Date_time_interval_assignment to Physical_instance_test_result

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.546 Date_time_interval_assignment to Process_operation_definition

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Process_operation_definition (see 4.2.381) objects. Each Process_operation_definition is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.547 Date_time_interval_assignment to Process_operation_occurrence

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Process_operation_occurrence (see 4.2.384) objects. Each Process_operation_occurrence is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.548 Date_time_interval_assignment to Process_operation_resource_assignment

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Process_operation_resource_assignment (see 4.2.386) objects. Each Process_operation_resource_assignment is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.549 Date_time_interval_assignment to Process_plan

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.550 Date_time_interval_assignment to Product_class

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.551 Date_time_interval_assignment to Product_identification

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Product_identification (see 4.2.398) objects. Each Product_identification is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.552 Date_time_interval_assignment to Product_structure_relationship

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.553 Date_time_interval_assignment to Project

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.554 Date_time_interval_assignment to Property

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.555 Date_time_interval_assignment to Property_value_association

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.556 Date_time_interval_assignment to Security_classification

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Security_classification (see 4.2.443) objects. Each Security_classification is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

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4.3.557 Date_time_interval_assignment to Security_level

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Security_level (see 4.2.444) objects. Each Security_level is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.558 Date_time_interval_assignment to Specification

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.559 Date_time_interval_assignment to Specification_category

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.560 Date_time_interval_assignment to Specification_expression

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.561 Date_time_interval_assignment to Specification_inclusion

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

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4.3.562 Date_time_interval_assignment to Styled_model

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.563 Date_time_interval_assignment to View_area

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.564 Date_time_interval_assignment to Work_order

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.565 Date_time_interval_assignment to Work_request

Each Date_time_interval_assignment (see 4.2.121) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Date_time_interval_assignment objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.566 Datum_target_set to Datum_target

Each Datum_target_set (see 4.2.127) refers to one or more Datum_target (see 4.2.125) objects in the role of target. Each Datum_target acts as target for zero or more Datum_target_set objects.

4.3.567 Datum_target_set to Multi_language_string

Each Datum_target_set (see 4.2.127) refers to zero or one Multi_language_string (see 4.2.320) in the role of rule_description. Each Multi_language_string acts as rule_description for zero or more Datum_target_set objects.

NOTE - This assertion is established through string_select.

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4.3.568 Default_chamfer to Feature_parameter

Each Default_chamfer (see 4.2.128) refers to exactly one Feature_parameter (see 4.2.201) in the role of offset_value. Each Feature_parameter acts as offset_value for zero or more Default_chamfer objects.

4.3.569 Default_chamfer to Multi_language_string

Each Default_chamfer (see 4.2.128) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Default_chamfer objects.

NOTE - This assertion is established through string_select.

4.3.570 Default_draft_angle to Feature_parameter

Each Default_draft_angle (see 4.2.129) refers to exactly one Feature_parameter (see 4.2.201) in the role of draft_angle_value. Each Feature_parameter acts as draft_angle_value for zero or more Default_-draft_angle objects.

4.3.571 Default_draft_angle to Multi_language_string

Each Default_draft_angle (see 4.2.129) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Default_draft_angle objects.

NOTE - This assertion is established through string_select.

4.3.572 Default_edge_round to Feature_parameter

Each Default_edge_round (see 4.2.130) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius_value. Each Feature_parameter acts as radius_value for zero or more Default_edge_round objects.

4.3.573 Default_edge_round to Multi_language_string

Each Default_edge_round (see 4.2.130) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Default_edge_round objects.

NOTE - This assertion is established through string_select.

4.3.574 Default_fillet to Feature_parameter

Each Default_fillet (see 4.2.131) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius_value. Each Feature_parameter acts as radius_value for zero or more Default_fillet objects.

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4.3.575 Default_fillet to Multi_language_string

Each Default_fillet (see 4.2.131) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Default_fillet objects.

NOTE - This assertion is established through string_select.

4.3.576 Default_setting_association to Default_chamfer

Each Default_setting_association (see 4.2.132) refers to zero or more Default_chamfer (see 4.2.128) objects in the role of default_value. Each Default_chamfer acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.577 Default_setting_association to Default_draft_angle

Each Default_setting_association (see 4.2.132) refers to zero or more Default_draft_angle (see 4.2.129) objects in the role of default_value. Each Default_draft_angle acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.578 Default_setting_association to Default_edge_round

Each Default_setting_association (see 4.2.132) refers to zero or more Default_edge_round (see 4.2.130) objects in the role of default_value. Each Default_edge_round acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.579 Default_setting_association to Default_fillet

Each Default_setting_association (see 4.2.132) refers to zero or more Default_fillet (see 4.2.131) objects in the role of default_value. Each Default_fillet acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.580 Default_setting_association to Default_surface_texture

Each Default_setting_association (see 4.2.132) refers to zero or more Default_surface_texture (see 4.2.133) objects in the role of default_value. Each Default_surface_texture acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

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4.3.581 Default_setting_association to Default_thickness

Each Default_setting_association (see 4.2.132) refers to zero or more Default_thickness (see 4.2.134) objects in the role of default_value. Each Default_thickness acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.582 Default_setting_association to Digital_document

Each Default_setting_association (see 4.2.132) refers to zero or one Digital_document (see 4.2.147) in the role of default_context. Each Digital_document acts as default_context for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_context_select.

4.3.583 Default_setting_association to Digital_file

Each Default_setting_association (see 4.2.132) refers to zero or one Digital_file (see 4.2.148) in the role of default_context. Each Digital_file acts as default_context for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_context_select.

4.3.584 Default_setting_association to Drawing_sheet

Each Default_setting_association (see 4.2.132) refers to zero or one Drawing_sheet (see 4.2.173) in the role of default_context. Each Drawing_sheet acts as default_context for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_context_select and area_select.

4.3.585 Default_setting_association to General_tolerances

Each Default_setting_association (see 4.2.132) refers to zero or more General_tolerances (see 4.2.235) objects in the role of default_value. Each General_tolerances acts as default_value for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_setting_select.

4.3.586 Default_setting_association to Item_shape

Each Default_setting_association (see 4.2.132) refers to zero or one Item_shape (see 4.2.274) in the role of default_context. Each Item_shape acts as default_context for zero or more Default_setting_association objects.

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NOTE - This assertion is established through default_context_select.

4.3.587 Default_setting_association to View_area

Each Default_setting_association (see 4.2.132) refers to zero or one View_area (see 4.2.555) in the role of default_context. Each View_area acts as default_context for zero or more Default_setting_association objects.

NOTE - This assertion is established through default_context_select and area_select.

4.3.588 Default_thickness to Multi_language_string

Each Default_thickness (see 4.2.134) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Default_thickness objects.

NOTE - This assertion is established through string_select.

4.3.589 Default_thickness to Value_with_unit

Each Default_thickness (see 4.2.134) refers to exactly one Value_with_unit (see 4.2.549) in the role of thickness_value. Each Value_with_unit acts as thickness_value for zero or more Default_thickness objects.

4.3.590 Defined_thread to Feature_parameter

Each Defined_thread (see 4.2.135) refers to zero or one Feature_parameter (see 4.2.201) in the role of crest. Each Feature_parameter acts as crest for zero or more Defined_thread objects.

Each Defined_thread refers to zero or one Feature_parameter in the role of minor_diameter. Each Feature_parameter acts as minor_diameter for zero or more Defined_thread objects.

Each Defined_thread refers to exactly one Feature_parameter in the role of pitch_diameter. Each Feature_parameter acts as pitch_diameter for zero or more Defined_thread objects.

4.3.591 Derived_geometry to Constructive_geometric_element

Each Derived_geometry (see 4.2.136) refers to exactly one Constructive_geometric_element (see 4.2.99) in the role of geometry. Each Constructive_geometric_element acts as geometry for zero or more Derived_geometry objects.

4.3.592 Derived_geometry to Shape_element

Each Derived_geometry (see 4.2.136) is_derived_from one or more Shape_element (see 4.2.449) objects. Each Shape_element is related to zero or more Derived_geometry objects.

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4.3.593 Descriptive_specification to Multi_language_string

Each Descriptive_specification (see 4.2.137) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Descriptive_-specification objects.

NOTE - This assertion is established through string_select.

4.3.594 Design_constraint to Multi_language_string

Each Design_constraint (see 4.2.138) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Design_constraint objects.

NOTE 1 - This assertion is established through string_select.

Each Design_constraint refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Design_constraint objects.

NOTE 2 - This assertion is established through string_select.

4.3.595 Design_constraint to Product_class

Each Design_constraint (see 4.2.138) is_valid for zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Design_constraint objects.

4.3.596 Design_constraint_association to Complex_product

Each Design_constraint_association (see 4.2.139) is_constraining exactly one Complex_product (see 4.2.80). Each Complex_product is related to zero or more Design_constraint_association objects.

4.3.597 Design_constraint_association to Design_constraint

Each Design_constraint_association (see 4.2.139) is_based_on exactly one Design_constraint (see 4.2.138). Each Design_constraint is related to zero or more Design_constraint_association objects.

4.3.598 Design_constraint_association to Multi_language_string

Each Design_constraint_association (see 4.2.139) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Design_constraint_asso-ciation objects.

NOTE - This assertion is established through string_select.

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4.3.599 Design_constraint_relationship to Design_constraint

Each Design_constraint_relationship (see 4.2.140) is related to exactly one Design_constraint (see 4.2.138). Each Design_constraint is referenced by zero or more Design_constraint_relationship objects as related.

NOTE 1 - The related Design_constraint is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Design_constraint_relationship is relating to exactly one Design_constraint. Each Design_constraint is referenced by zero or more Design_constraint_relationship objects as relating.

NOTE 2 - The relating Design_constraint is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.600 Design_constraint_relationship to Multi_language_string

Each Design_constraint_relationship (see 4.2.140) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Design_constraint_relationship objects.

NOTE - This assertion is established through string_select.

4.3.601 Design_discipline_item_definition to Application_context

Each Design_discipline_item_definition (see 4.2.142) refers to zero or more Application_context (see 4.2.21) objects in the role of additional_context. Each Application_context acts as additional_context for zero or more Design_discipline_item_definition objects.

Each Design_discipline_item_definition refers to exactly one Application_context in the role of initial_context. Each Application_context acts as initial_context for zero or more Design_discipline_item_definition objects.

4.3.602 Design_discipline_item_definition to Item_version

Each Design_discipline_item_definition (see 4.2.142) refers to exactly one Item_version (see 4.2.275) in the role of associated_item_version. Each Item_version acts as associated_item_version for zero or more Design_discipline_item_definition objects.

4.3.603 Design_discipline_item_definition to Multi_language_string

Each Design_discipline_item_definition (see 4.2.142) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Design_discipline_item_definition objects.

NOTE - This assertion is established through string_select.

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4.3.604 Detailed_element to Multi_language_string

Each Detailed_element (see 4.2.143) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Detailed_element objects.

NOTE - This assertion is established through string_select.

4.3.605 Diameter_taper to Feature_parameter

Each Diameter_taper (see 4.2.146) refers to exactly one Feature_parameter (see 4.2.201) in the role of final_diameter. Each Feature_parameter acts as final_diameter for zero or more Diameter_taper objects.

4.3.606 Digital_document to Digital_file

Each Digital_document (see 4.2.147) refers to zero or more Digital_file (see 4.2.148) objects in the role of file. Each Digital_file acts as file for zero or more Digital_document objects.

4.3.607 Dimension to Dimension_callout

Each Dimension (see 4.2.149) refers to exactly one Dimension_callout (see 4.2.150) in the role of primary_callout. Each Dimension_callout acts as primary_callout for zero or more Dimension objects.

Each Dimension refers to zero or one Dimension_callout in the role of secondary_callout. Each Dimension_callout acts as secondary_callout for zero or more Dimension objects.

4.3.608 Dimension_callout to Dimension_symbol

Each Dimension_callout (see 4.2.150) refers to zero or more Dimension_symbol (see 4.2.153) objects in the role of callout_element. Each Dimension_symbol acts as callout_element for zero or more Dimension_callout objects.

NOTE - This assertion is established through dimension_callout_select.

4.3.609 Dimension_callout to Geometric_dimension

Each Dimension_callout (see 4.2.150) is_displaying zero or one Geometric_dimension (see 4.2.237). Each Geometric_dimension is related to zero or more Dimension_callout objects.

4.3.610 Dimension_callout to Text

Each Dimension_callout (see 4.2.150) refers to zero or more Text (see 4.2.514) objects in the role of callout_element. Each Text acts as callout_element for zero or more Dimension_callout objects.

NOTE - This assertion is established through dimension_callout_select.

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4.3.611 Dimension_curve to Terminator_symbol

Each Dimension_curve (see 4.2.151) refers to zero, one, or two Terminator_symbol (see 4.2.513) objects in the role of terminator. Each Terminator_symbol acts as terminator for zero or more Dimension_curve objects.

4.3.612 Dimension_sequence_pair to Dimension

Each Dimension_sequence_pair (see 4.2.152) refers to exactly one Dimension (see 4.2.149) in the role of predecessor. Each Dimension acts as predecessor for zero or more Dimension_sequence_pair objects.

Each Dimension_sequence_pair refers to exactly one Dimension in the role of successor. Each Dimension acts as successor for zero or more Dimension_sequence_pair objects.

4.3.613 Directed_taper to Feature_parameter

Each Directed_taper (see 4.2.154) refers to exactly one Feature_parameter (see 4.2.201) in the role of angle. Each Feature_parameter acts as angle for zero or more Directed_taper objects.

4.3.614 Document to Multi_language_string

Each Document (see 4.2.155) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document objects.

NOTE 1 - This assertion is established through string_select.

Each Document refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Document objects.

NOTE 2 - This assertion is established through string_select.

4.3.615 Document_assignment to Activity

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Activity (see 4.2.2). Each Activity is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.616 Document_assignment to Activity_element

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Activity_element (see 4.2.3). Each Activity_element is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.617 Document_assignment to Activity_method

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Activity_method (see 4.2.4). Each Activity_method is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.618 Document_assignment to Approval

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Approval (see 4.2.22). Each Approval is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.619 Document_assignment to Catalogue_thread

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Catalogue_thread (see 4.2.48). Each Catalogue_thread is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.620 Document_assignment to Certification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Certification (see 4.2.50). Each Certification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.621 Document_assignment to Change

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Change (see 4.2.55). Each Change is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.622 Document_assignment to Class_structure_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Class_structure_relationship (see 4.2.68). Each Class_structure_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.623 Document_assignment to Classification_attribute

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Classification_attribute (see 4.2.70). Each Classification_attribute is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.624 Document_assignment to Classification_system

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Classification_system (see 4.2.71). Each Classification_system is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.625 Document_assignment to Complex_product

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Complex_product (see 4.2.80). Each Complex_product is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.626 Document_assignment to Contract

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Contract (see 4.2.104). Each Contract is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.627 Document_assignment to Descriptive_specification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Descriptive_specification (see 4.2.137). Each Descriptive_specification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.628 Document_assignment to Design_constraint

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Design_constraint (see 4.2.138). Each Design_constraint is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.629 Document_assignment to Design_discipline_item_definition

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.630 Document_assignment to Document

Each Document_assignment (see 4.2.156) refers to zero or one Document (see 4.2.155) in the role of assigned_document. Each Document acts as assigned_document for zero or more Document_assignment objects.

NOTE - This assertion is established through assigned_document_select.

4.3.631 Document_assignment to Document_file

Each Document_assignment (see 4.2.156) refers to zero or one Document_file (see 4.2.159) in the role of assigned_document. Each Document_file acts as assigned_document for zero or more Document_assignment objects.

NOTE - This assertion is established through assigned_document_select.

4.3.632 Document_assignment to Document_representation

Each Document_assignment (see 4.2.156) refers to zero or one Document_representation (see 4.2.163) in the role of assigned_document. Each Document_representation acts as assigned_document for zero or more Document_assignment objects.

NOTE - This assertion is established through assigned_document_select.

4.3.633 Document_assignment to Document_version

Each Document_assignment (see 4.2.156) refers to zero or one Document_version (see 4.2.167) in the role of assigned_document. Each Document_version acts as assigned_document for zero or more Document_assignment objects.

NOTE - This assertion is established through assigned_document_select.

4.3.634 Document_assignment to Drawing_sheet

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Drawing_sheet (see 4.2.173). Each Drawing_sheet is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.635 Document_assignment to Feature_definition

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Feature_definition (see 4.2.199). Each Feature_definition is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.636 Document_assignment to General_classification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one General_classification (see 4.2.216). Each General_classification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.637 Document_assignment to General_feature

Each Document_assignment (see 4.2.156) is_assigned_to zero or one General_feature (see 4.2.221). Each General_feature is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.638 Document_assignment to Item

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item (see 4.2.267). Each Item is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.639 Document_assignment to Item_definition_instance_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_definition_instance_relationship (see 4.2.268). Each Item_definition_instance_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.640 Document_assignment to Item_definition_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_definition_relationship (see 4.2.269). Each Item_definition_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.641 Document_assignment to Item_instance

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_instance (see 4.2.271). Each Item_instance is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.642 Document_assignment to Item_instance_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_instance_relationship (see 4.2.272). Each Item_instance_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.643 Document_assignment to Item_shape

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_shape (see 4.2.274). Each Item_shape is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.644 Document_assignment to Item_version

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Item_version (see 4.2.275). Each Item_version is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.645 Document_assignment to Material

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Material (see 4.2.309). Each Material is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.646 Document_assignment to Organization

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Organization (see 4.2.331). Each Organization is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.647 Document_assignment to Path

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Path (see 4.2.342). Each Path is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.648 Document_assignment to Person

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Person (see 4.2.346). Each Person is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.649 Document_assignment to Physical_assembly_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Physical_assembly_relationship (see 4.2.350). Each Physical_assembly_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.650 Document_assignment to Physical_instance

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Physical_instance (see 4.2.352). Each Physical_instance is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.651 Document_assignment to Physical_instance_test_result

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Physical_instance_test_result (see 4.2.353). Each Physical_instance_test_result is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.652 Document_assignment to Process_operation_occurrence

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Process_operation_occurrence (see 4.2.384). Each Process_operation_occurrence is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.653 Document_assignment to Process_plan

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Process_plan (see 4.2.387). Each Process_plan is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.654 Document_assignment to Product_class

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Product_class (see 4.2.392). Each Product_class is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.655 Document_assignment to Product_identification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Product_identification (see 4.2.398). Each Product_identification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.656 Document_assignment to Product_structure_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Product_structure_relationship (see 4.2.400). Each Product_structure_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.657 Document_assignment to Profile

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Profile (see 4.2.401). Each Profile is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.658 Document_assignment to Project

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Project (see 4.2.404). Each Project is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

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4.3.659 Document_assignment to Property

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Property (see 4.2.409). Each Property is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select.

4.3.660 Document_assignment to Retention_period

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Retention_period (see 4.2.434). Each Retention_period is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.661 Document_assignment to Security_classification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Security_classification (see 4.2.443). Each Security_classification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.662 Document_assignment to Shape_element

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Shape_element (see 4.2.449). Each Shape_element is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.663 Document_assignment to Shape_element_relationship

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Shape_element_relationship (see 4.2.450). Each Shape_element_relationship is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.664 Document_assignment to Specific_item_classification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Specific_item_classification (see 4.2.465). Each Specific_item_classification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

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4.3.665 Document_assignment to Specification

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Specification (see 4.2.467). Each Specification is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.666 Document_assignment to Specification_category

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Specification_category (see 4.2.468). Each Specification_category is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.667 Document_assignment to Surface_condition

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Surface_condition (see 4.2.492). Each Surface_condition is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.668 Document_assignment to Thread_feature

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Thread_feature (see 4.2.517). Each Thread_feature is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.669 Document_assignment to Transition_feature

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Transition_feature (see 4.2.537). Each Transition_feature is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.670 Document_assignment to View_area

Each Document_assignment (see 4.2.156) is_assigned_to zero or one View_area (see 4.2.555). Each View_area is related to zero or more Document_assignment objects.

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NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.671 Document_assignment to Work_order

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Work_order (see 4.2.564). Each Work_order is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.672 Document_assignment to Work_request

Each Document_assignment (see 4.2.156) is_assigned_to zero or one Work_request (see 4.2.565). Each Work_request is related to zero or more Document_assignment objects.

NOTE - This assertion is established through documented_element_select and documented_element_sub_-select.

4.3.673 Document_content_property to Language

Each Document_content_property (see 4.2.157) refers to zero or more Language (see 4.2.291) objects in the role of languages. Each Language acts as languages for zero or more Document_content_property objects.

4.3.674 Document_content_property to Numerical_value

Each Document_content_property (see 4.2.157) refers to zero or one Numerical_value (see 4.2.324) in the role of real_world_scale. Each Numerical_value acts as real_world_scale for zero or more Document_content_property objects.

4.3.675 Document_file to Document_content_property

Each Document_file (see 4.2.159) refers to zero or one Document_content_property (see 4.2.157) in the role of content. Each Document_content_property acts as content for zero or more Document_file objects.

4.3.676 Document_file to Document_creation_property

Each Document_file (see 4.2.159) refers to zero or one Document_creation_property (see 4.2.158) in the role of creation. Each Document_creation_property acts as creation for zero or more Document_file objects.

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4.3.677 Document_file to Document_format_property

Each Document_file (see 4.2.159) refers to zero or one Document_format_property (see 4.2.161) in the role of file_format. Each Document_format_property acts as file_format for zero or more Document_file objects.

4.3.678 Document_file to Document_size_property

Each Document_file (see 4.2.159) refers to zero or one Document_size_property (see 4.2.164) in the role of size. Each Document_size_property acts as size for zero or more Document_file objects.

4.3.679 Document_file to Document_type_property

Each Document_file (see 4.2.159) refers to zero or one Document_type_property (see 4.2.166) in the role of document_file_type. Each Document_type_property acts as document_file_type for zero or more Document_file objects.

4.3.680 Document_file to External_file_id_and_location

Each Document_file (see 4.2.159) refers to zero or more External_file_id_and_location (see 4.2.185) objects in the role of external_id_and_location. Each External_file_id_and_location acts as external_-id_and_location for zero or more Document_file objects.

4.3.681 Document_file_relationship to Document_file

Each Document_file_relationship (see 4.2.160) is related to exactly one Document_file (see 4.2.159). Each Document_file is referenced by zero or more Document_file_relationship objects as related.

NOTE 1 - The related Document_file is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Document_file_relationship is relating to exactly one Document_file. Each Document_file is referenced by zero or more Document_file_relationship objects as relating.

NOTE 2 - The relating Document_file is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.682 Document_file_relationship to Multi_language_string

Each Document_file_relationship (see 4.2.160) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document_-file_relationship objects.

NOTE - This assertion is established through string_select.

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4.3.683 Document_format_property to Rectangular_size

Each Document_format_property (see 4.2.161) refers to zero or one Rectangular_size (see 4.2.427) in the role of size_format. Each Rectangular_size acts as size_format for zero or more Document_format_-property objects.

4.3.684 Document_representation to Document_content_property

Each Document_representation (see 4.2.163) refers to zero or one Document_content_property (see 4.2.157) in the role of content. Each Document_content_property acts as content for zero or more Document_representation objects.

4.3.685 Document_representation to Document_creation_property

Each Document_representation (see 4.2.163) refers to zero or one Document_creation_property (see 4.2.158) in the role of creation. Each Document_creation_property acts as creation for zero or more Document_representation objects.

4.3.686 Document_representation to Document_format_property

Each Document_representation (see 4.2.163) refers to zero or one Document_format_property (see 4.2.161) in the role of representation_format. Each Document_format_property acts as representation_format for zero or more Document_representation objects.

4.3.687 Document_representation to Document_location_property

Each Document_representation (see 4.2.163) refers to zero or more Document_location_property (see 4.2.162) objects in the role of common_location. Each Document_location_property acts as common_-location for zero or more Document_representation objects.

4.3.688 Document_representation to Document_size_property

Each Document_representation (see 4.2.163) refers to zero or one Document_size_property (see 4.2.164) in the role of size. Each Document_size_property acts as size for zero or more Document_representation objects.

4.3.689 Document_representation to Document_version

Each Document_representation (see 4.2.163) refers to exactly one Document_version (see 4.2.167) in the role of associated_document_version. Each Document_version acts as associated_document_version for zero or more Document_representation objects.

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4.3.690 Document_representation to Multi_language_string

Each Document_representation (see 4.2.163) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document_representation objects.

NOTE - This assertion is established through string_select.

4.3.691 Document_size_property to Value_with_unit

Each Document_size_property (see 4.2.164) refers to zero or one Value_with_unit (see 4.2.549) in the role of file_size. Each Value_with_unit acts as file_size for zero or more Document_size_property objects.

Each Document_size_property refers to zero or one Value_with_unit in the role of page_count. Each Value_with_unit acts as page_count for zero or more Document_size_property objects.

4.3.692 Document_structure to Document_representation

Each Document_structure (see 4.2.165) is related to exactly one Document_representation (see 4.2.163). Each Document_representation is referenced by zero or more Document_structure objects as related.

NOTE 1 - The related Document_representation is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Document_structure is relating to exactly one Document_representation. Each Document_representation is referenced by zero or more Document_structure objects as relating.

NOTE 2 - The relating Document_representation is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.693 Document_structure to Multi_language_string

Each Document_structure (see 4.2.165) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document_structure objects.

NOTE - This assertion is established through string_select.

4.3.694 Document_type_property to Classification_system

Each Document_type_property (see 4.2.166) refers to zero or one Classification_system (see 4.2.71) in the role of used_classification_system. Each Classification_system acts as used_classification_system for zero or more Document_type_property objects.

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4.3.695 Document_version to Document

Each Document_version (see 4.2.167) refers to exactly one Document (see 4.2.155) in the role of associated_document. Each Document has associated_version defined by one or more Document_version objects.

4.3.696 Document_version to Multi_language_string

Each Document_version (see 4.2.167) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document_version objects.

NOTE - This assertion is established through string_select.

4.3.697 Document_version_relationship to Document_version

Each Document_version_relationship (see 4.2.168) is related to exactly one Document_version (see 4.2.167). Each Document_version is referenced by zero or more Document_version_relationship objects as related.

NOTE 1 - The related Document_version is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Document_version_relationship is relating to exactly one Document_version. Each Document_version is referenced by zero or more Document_version_relationship objects as relating.

NOTE 2 - The relating Document_version is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.698 Document_version_relationship to Multi_language_string

Each Document_version_relationship (see 4.2.168) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Document_version_relationship objects.

NOTE - This assertion is established through string_select.

4.3.699 Draughting_callout to Annotation_curve

Each Draughting_callout (see 4.2.169) refers to zero or more Annotation_curve (see 4.2.16) objects in the role of contents. Each Annotation_curve acts as contents for zero or more Draughting_callout objects.

NOTE - This assertion is established through draughting_callout_content_select.

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4.3.700 Draughting_callout to Annotation_subfigure

Each Draughting_callout (see 4.2.169) refers to zero or more Annotation_subfigure (see 4.2.18) objects in the role of contents. Each Annotation_subfigure acts as contents for zero or more Draughting_callout objects.

NOTE - This assertion is established through draughting_callout_content_select.

4.3.701 Draughting_callout to Annotation_symbol

Each Draughting_callout (see 4.2.169) refers to zero or more Annotation_symbol (see 4.2.19) objects in the role of contents. Each Annotation_symbol acts as contents for zero or more Draughting_callout objects.

NOTE - This assertion is established through draughting_callout_content_select.

4.3.702 Draughting_callout to Text

Each Draughting_callout (see 4.2.169) refers to zero or more Text (see 4.2.514) objects in the role of contents. Each Text acts as contents for zero or more Draughting_callout objects.

NOTE - This assertion is established through draughting_callout_content_select.

4.3.703 Drawing to Multi_language_string

Each Drawing (see 4.2.170) refers to zero or one Multi_language_string (see 4.2.320) in the role of title. Each Multi_language_string acts as title for zero or more Drawing objects.

NOTE - This assertion is established through string_select.

4.3.704 Drawing_assignment to Complex_product

Each Drawing_assignment (see 4.2.171) is_describing zero or one Complex_product (see 4.2.80). Each Complex_product is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.705 Drawing_assignment to Design_constraint

Each Drawing_assignment (see 4.2.171) is_describing zero or one Design_constraint (see 4.2.138). Each Design_constraint is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

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4.3.706 Drawing_assignment to Design_discipline_item_definition

Each Drawing_assignment (see 4.2.171) is_describing zero or one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.707 Drawing_assignment to Drawing

Each Drawing_assignment (see 4.2.171) refers to exactly one Drawing (see 4.2.170) in the role of associated_drawing. Each Drawing acts as associated_drawing for zero or more Drawing_assignment objects.

4.3.708 Drawing_assignment to Item_definition_instance_relationship

Each Drawing_assignment (see 4.2.171) is_describing zero or one Item_definition_instance_relationship (see 4.2.268). Each Item_definition_instance_relationship is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.709 Drawing_assignment to Item_definition_relationship

Each Drawing_assignment (see 4.2.171) is_describing zero or one Item_definition_relationship (see 4.2.269). Each Item_definition_relationship is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.710 Drawing_assignment to Item_instance

Each Drawing_assignment (see 4.2.171) is_describing zero or one Item_instance (see 4.2.271). Each Item_instance is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.711 Drawing_assignment to Item_instance_relationship

Each Drawing_assignment (see 4.2.171) is_describing zero or one Item_instance_relationship (see 4.2.272). Each Item_instance_relationship is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

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4.3.712 Drawing_assignment to Item_version

Each Drawing_assignment (see 4.2.171) is_describing zero or one Item_version (see 4.2.275). Each Item_version is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.713 Drawing_assignment to Process_operation_definition

Each Drawing_assignment (see 4.2.171) is_describing zero or one Process_operation_definition (see 4.2.381). Each Process_operation_definition is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.714 Drawing_assignment to Process_operation_occurrence

Each Drawing_assignment (see 4.2.171) is_describing zero or one Process_operation_occurrence (see 4.2.384). Each Process_operation_occurrence is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.715 Drawing_assignment to Process_plan

Each Drawing_assignment (see 4.2.171) is_describing zero or one Process_plan (see 4.2.387). Each Process_plan is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.716 Drawing_assignment to Product_class

Each Drawing_assignment (see 4.2.171) is_describing zero or one Product_class (see 4.2.392). Each Product_class is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.717 Drawing_assignment to Specification

Each Drawing_assignment (see 4.2.171) is_describing zero or one Specification (see 4.2.467). Each Specification is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

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4.3.718 Drawing_assignment to Specification_category

Each Drawing_assignment (see 4.2.171) is_describing zero or one Specification_category (see 4.2.468). Each Specification_category is related to zero or more Drawing_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.719 Drawing_sequence to Drawing

Each Drawing_sequence (see 4.2.172) refers to exactly one Drawing (see 4.2.170) in the role of preceding_drawing. Each Drawing acts as preceding_drawing for zero or more Drawing_sequence objects.

Each Drawing_sequence refers to exactly one Drawing in the role of succeeding_drawing. Each Drawing acts as succeeding_drawing for zero or more Drawing_sequence objects.

4.3.720 Drawing_sheet to Cartesian_coordinate_space_2d

Each Drawing_sheet (see 4.2.173) refers to exactly one Cartesian_coordinate_space_2d (see 4.2.45) in the role of sheet_space. Each Cartesian_coordinate_space_2d acts as sheet_space for zero or more Drawing_sheet objects.

4.3.721 Drawing_sheet to Drawing

Each Drawing_sheet (see 4.2.173) refers to exactly one Drawing (see 4.2.170) in the role of associated_drawing. Each Drawing has sheet defined by one or more Drawing_sheet objects.

4.3.722 Drawing_sheet to Multi_language_string

Each Drawing_sheet (see 4.2.173) refers to zero or one Multi_language_string (see 4.2.320) in the role of title. Each Multi_language_string acts as title for zero or more Drawing_sheet objects.

NOTE - This assertion is established through string_select.

4.3.723 Edge_loop to Oriented_edge_curve

Each Edge_loop (see 4.2.176) refers to one or more Oriented_edge_curve (see 4.2.334) objects in the role of edge. Each Oriented_edge_curve acts as edge for zero or more Edge_loop objects.

4.3.724 Edge_round to Face

Each Edge_round (see 4.2.177) refers to exactly one Face (see 4.2.191) in the role of edge_round_face. Each Face acts as edge_round_face for zero or more Edge_round objects.

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4.3.725 Edge_transition to Oriented_edge_curve

Each Edge_transition (see 4.2.178) refers to exactly one Oriented_edge_curve (see 4.2.334) in the role of edge_1. Each Oriented_edge_curve acts as edge_1 for zero or more Edge_transition objects.

Each Edge_transition refers to exactly one Oriented_edge_curve in the role of edge_2. Each Oriented_edge_curve acts as edge_2 for zero or more Edge_transition objects.

4.3.726 Edge_transition to Vertex_point

Each Edge_transition (see 4.2.178) refers to exactly one Vertex_point (see 4.2.553) in the role of vertex_joint. Each Vertex_point acts as vertex_joint for zero or more Edge_transition objects.

4.3.727 Effectivity to Date_time

Each Effectivity (see 4.2.179) refers to zero or one Date_time (see 4.2.119) in the role of end_definition. Each Date_time acts as end_definition for zero or more Effectivity objects.

NOTE 1 - This assertion is established through event_or_date_select.

Each Effectivity refers to zero or one Date_time in the role of start_definition. Each Date_time acts as start_definition for zero or more Effectivity objects.

NOTE 2 - This assertion is established through event_or_date_select.

4.3.728 Effectivity to Duration

Each Effectivity (see 4.2.179) refers to zero or one Duration (see 4.2.174) in the role of period. Each Duration acts as period for zero or more Effectivity objects.

4.3.729 Effectivity to Event_reference

Each Effectivity (see 4.2.179) refers to zero or one Event_reference (see 4.2.184) in the role of end_definition. Each Event_reference acts as end_definition for zero or more Effectivity objects.

NOTE 1 - This assertion is established through event_or_date_select.

Each Effectivity refers to zero or one Event_reference in the role of start_definition. Each Event_reference acts as start_definition for zero or more Effectivity objects.

NOTE 2 - This assertion is established through event_or_date_select.

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4.3.730 Effectivity to Multi_language_string

Each Effectivity (see 4.2.179) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Effectivity objects.

NOTE - This assertion is established through string_select.

4.3.731 Effectivity to Organization

Each Effectivity (see 4.2.179) refers to zero or more Organization (see 4.2.331) objects in the role of concerned_organization. Each Organization acts as concerned_organization for zero or more Effectivity objects.

4.3.732 Effectivity_assignment to Assembly_substitute_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Assembly_substitute_relationship (see 4.2.28) in the role of effective_element. Each Assembly_substitute_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.733 Effectivity_assignment to Class_category_association

Each Effectivity_assignment (see 4.2.180) refers to zero or one Class_category_association (see 4.2.64) in the role of effective_element. Each Class_category_association acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.734 Effectivity_assignment to Class_condition_association

Each Effectivity_assignment (see 4.2.180) refers to zero or one Class_condition_association (see 4.2.65) in the role of effective_element. Each Class_condition_association acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.735 Effectivity_assignment to Class_inclusion_association

Each Effectivity_assignment (see 4.2.180) refers to zero or one Class_inclusion_association (see 4.2.66) in the role of effective_element. Each Class_inclusion_association acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

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4.3.736 Effectivity_assignment to Class_specification_association

Each Effectivity_assignment (see 4.2.180) refers to zero or one Class_specification_association (see 4.2.67) in the role of effective_element. Each Class_specification_association acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.737 Effectivity_assignment to Class_structure_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Class_structure_relationship (see 4.2.68) in the role of effective_element. Each Class_structure_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.738 Effectivity_assignment to Classification_system

Each Effectivity_assignment (see 4.2.180) refers to zero or one Classification_system (see 4.2.71) in the role of effective_element. Each Classification_system acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.739 Effectivity_assignment to Complex_product

Each Effectivity_assignment (see 4.2.180) refers to zero or one Complex_product (see 4.2.80) in the role of effective_element. Each Complex_product acts as effective_element for zero or more Effectivity_-assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.740 Effectivity_assignment to Complex_product_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Complex_product_relationship (see 4.2.81) in the role of effective_element. Each Complex_product_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.741 Effectivity_assignment to Configuration

Each Effectivity_assignment (see 4.2.180) refers to zero or one Configuration (see 4.2.94) in the role of effective_element. Each Configuration acts as effective_element for zero or more Effectivity_assignment objects.

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NOTE - This assertion is established through effective_element_select.

4.3.742 Effectivity_assignment to Design_constraint

Each Effectivity_assignment (see 4.2.180) refers to zero or one Design_constraint (see 4.2.138) in the role of effective_element. Each Design_constraint acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.743 Effectivity_assignment to Document

Each Effectivity_assignment (see 4.2.180) refers to zero or one Document (see 4.2.155) in the role of effective_element. Each Document acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.744 Effectivity_assignment to Document_file

Each Effectivity_assignment (see 4.2.180) refers to zero or one Document_file (see 4.2.159) in the role of effective_element. Each Document_file acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.745 Effectivity_assignment to Document_representation

Each Effectivity_assignment (see 4.2.180) refers to zero or one Document_representation (see 4.2.163) in the role of effective_element. Each Document_representation acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.746 Effectivity_assignment to Document_version

Each Effectivity_assignment (see 4.2.180) refers to zero or one Document_version (see 4.2.167) in the role of effective_element. Each Document_version acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

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4.3.747 Effectivity_assignment to Drawing

Each Effectivity_assignment (see 4.2.180) refers to zero or one Drawing (see 4.2.170) in the role of effective_element. Each Drawing acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.748 Effectivity_assignment to Effectivity

Each Effectivity_assignment (see 4.2.180) refers to exactly one Effectivity (see 4.2.179) in the role of assigned_effectivity. Each Effectivity acts as assigned_effectivity for zero or more Effectivity_assignment objects.

4.3.749 Effectivity_assignment to Feature_occurrence

Each Effectivity_assignment (see 4.2.180) refers to zero or one Feature_occurrence (see 4.2.200) in the role of effective_element. Each Feature_occurrence acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.750 Effectivity_assignment to Geometric_model

Each Effectivity_assignment (see 4.2.180) refers to zero or one Geometric_model (see 4.2.238) in the role of effective_element. Each Geometric_model acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.751 Effectivity_assignment to Item

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item (see 4.2.267) in the role of effective_element. Each Item acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.752 Effectivity_assignment to Item_definition_instance_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of effective_element. Each Item_definition_instance_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

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4.3.753 Effectivity_assignment to Item_definition_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item_definition_relationship (see 4.2.269) in the role of effective_element. Each Item_definition_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.754 Effectivity_assignment to Item_instance

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item_instance (see 4.2.271) in the role of effective_element. Each Item_instance acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.755 Effectivity_assignment to Item_instance_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item_instance_relationship (see 4.2.272) in the role of effective_element. Each Item_instance_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.756 Effectivity_assignment to Item_version

Each Effectivity_assignment (see 4.2.180) refers to zero or one Item_version (see 4.2.275) in the role of effective_element. Each Item_version acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.757 Effectivity_assignment to Kinematic_simulation_information

Each Effectivity_assignment (see 4.2.180) refers to zero or one Kinematic_simulation_information (see 4.2.288) in the role of effective_element. Each Kinematic_simulation_information acts as effective_-element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.758 Effectivity_assignment to Material

Each Effectivity_assignment (see 4.2.180) refers to zero or one Material (see 4.2.309) in the role of effective_element. Each Material acts as effective_element for zero or more Effectivity_assignment objects.

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NOTE - This assertion is established through effective_element_select.

4.3.759 Effectivity_assignment to Process_operation_definition

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_operation_definition (see 4.2.381) in the role of effective_element. Each Process_operation_definition acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.760 Effectivity_assignment to Process_operation_definition_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_operation_definition_relationship (see 4.2.382) in the role of effective_element. Each Process_operation_definition_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.761 Effectivity_assignment to Process_operation_occurrence

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of effective_element. Each Process_operation_occurrence acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.762 Effectivity_assignment to Process_operation_occurrence_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_operation_occurrence_relationship (see 4.2.385) in the role of effective_element. Each Process_operation_occurrence_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.763 Effectivity_assignment to Process_operation_resource_assignment

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_operation_resource_assignment (see 4.2.386) in the role of effective_element. Each Process_operation_resource_assignment acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

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4.3.764 Effectivity_assignment to Process_plan

Each Effectivity_assignment (see 4.2.180) refers to zero or one Process_plan (see 4.2.387) in the role of effective_element. Each Process_plan acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.765 Effectivity_assignment to Product_class

Each Effectivity_assignment (see 4.2.180) refers to zero or one Product_class (see 4.2.392) in the role of effective_element. Each Product_class acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.766 Effectivity_assignment to Product_identification

Each Effectivity_assignment (see 4.2.180) refers to zero or one Product_identification (see 4.2.398) in the role of effective_element. Each Product_identification acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.767 Effectivity_assignment to Product_structure_relationship

Each Effectivity_assignment (see 4.2.180) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of effective_element. Each Product_structure_relationship acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.768 Effectivity_assignment to Property

Each Effectivity_assignment (see 4.2.180) refers to zero or one Property (see 4.2.409) in the role of effective_element. Each Property acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.769 Effectivity_assignment to Property_value_association

Each Effectivity_assignment (see 4.2.180) refers to zero or one Property_value_association (see 4.2.413) in the role of effective_element. Each Property_value_association acts as effective_element for zero or more Effectivity_assignment objects.

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NOTE - This assertion is established through effective_element_select.

4.3.770 Effectivity_assignment to Security_classification

Each Effectivity_assignment (see 4.2.180) refers to zero or one Security_classification (see 4.2.443) in the role of effective_element. Each Security_classification acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.771 Effectivity_assignment to Specification

Each Effectivity_assignment (see 4.2.180) refers to zero or one Specification (see 4.2.467) in the role of effective_element. Each Specification acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.772 Effectivity_assignment to Specification_category

Each Effectivity_assignment (see 4.2.180) refers to zero or one Specification_category (see 4.2.468) in the role of effective_element. Each Specification_category acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.773 Effectivity_assignment to Specification_expression

Each Effectivity_assignment (see 4.2.180) refers to zero or one Specification_expression (see 4.2.470) in the role of effective_element. Each Specification_expression acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.774 Effectivity_assignment to Specification_inclusion

Each Effectivity_assignment (see 4.2.180) refers to zero or one Specification_inclusion (see 4.2.471) in the role of effective_element. Each Specification_inclusion acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

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4.3.775 Effectivity_assignment to Styled_model

Each Effectivity_assignment (see 4.2.180) refers to zero or one Styled_model (see 4.2.484) in the role of effective_element. Each Styled_model acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.776 Effectivity_assignment to View_area

Each Effectivity_assignment (see 4.2.180) refers to zero or one View_area (see 4.2.555) in the role of effective_element. Each View_area acts as effective_element for zero or more Effectivity_assignment objects.

NOTE - This assertion is established through effective_element_select.

4.3.777 Effectivity_relationship to Effectivity

Each Effectivity_relationship (see 4.2.181) is related to exactly one Effectivity (see 4.2.179). Each Effectivity is referenced by zero or more Effectivity_relationship objects as related.

NOTE 1 - The related Effectivity is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Effectivity_relationship is relating to exactly one Effectivity. Each Effectivity is referenced by zero or more Effectivity_relationship objects as relating.

NOTE 2 - The relating Effectivity is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.778 Effectivity_relationship to Multi_language_string

Each Effectivity_relationship (see 4.2.181) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Effectivity_relationship objects.

NOTE - This assertion is established through string_select.

4.3.779 Element_delivery to Activity_element

Each Element_delivery (see 4.2.182) refers to exactly one Activity_element (see 4.2.3) in the role of deliverable_element. Each Activity_element acts as deliverable_element for zero or more Element_delivery objects.

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4.3.780 Element_delivery to Organization

Each Element_delivery (see 4.2.182) refers to exactly one Organization (see 4.2.331) in the role of destination. Each Organization acts as destination for zero or more Element_delivery objects.

4.3.781 Element_delivery to Value_with_unit

Each Element_delivery (see 4.2.182) refers to exactly one Value_with_unit (see 4.2.549) in the role of quantity. Each Value_with_unit acts as quantity for zero or more Element_delivery objects.

4.3.782 Event_reference to Activity

Each Event_reference (see 4.2.184) refers to zero or one Activity (see 4.2.2) in the role of event_context. Each Activity acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.783 Event_reference to Activity_element

Each Event_reference (see 4.2.184) refers to zero or one Activity_element (see 4.2.3) in the role of event_context. Each Activity_element acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.784 Event_reference to Activity_method_assignment

Each Event_reference (see 4.2.184) refers to zero or one Activity_method_assignment (see 4.2.5) in the role of event_context. Each Activity_method_assignment acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.785 Event_reference to Alternate_item_relationship

Each Event_reference (see 4.2.184) refers to zero or one Alternate_item_relationship (see 4.2.9) in the role of event_context. Each Alternate_item_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.786 Event_reference to Approval_status

Each Event_reference (see 4.2.184) refers to zero or one Approval_status (see 4.2.24) in the role of event_context. Each Approval_status acts as event_context for zero or more Event_reference objects.

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NOTE - This assertion is established through general_organizational_data_select.

4.3.787 Event_reference to Assembly_substitute_relationship

Each Event_reference (see 4.2.184) refers to zero or one Assembly_substitute_relationship (see 4.2.28) in the role of event_context. Each Assembly_substitute_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.788 Event_reference to Certification

Each Event_reference (see 4.2.184) refers to zero or one Certification (see 4.2.50) in the role of event_context. Each Certification acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.789 Event_reference to Class_category_association

Each Event_reference (see 4.2.184) refers to zero or one Class_category_association (see 4.2.64) in the role of event_context. Each Class_category_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.790 Event_reference to Class_condition_association

Each Event_reference (see 4.2.184) refers to zero or one Class_condition_association (see 4.2.65) in the role of event_context. Each Class_condition_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.791 Event_reference to Class_inclusion_association

Each Event_reference (see 4.2.184) refers to zero or one Class_inclusion_association (see 4.2.66) in the role of event_context. Each Class_inclusion_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.792 Event_reference to Class_specification_association

Each Event_reference (see 4.2.184) refers to zero or one Class_specification_association (see 4.2.67) in the role of event_context. Each Class_specification_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.793 Event_reference to Class_structure_relationship

Each Event_reference (see 4.2.184) refers to zero or one Class_structure_relationship (see 4.2.68) in the role of event_context. Each Class_structure_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.794 Event_reference to Classification_association

Each Event_reference (see 4.2.184) refers to zero or one Classification_association (see 4.2.69) in the role of event_context. Each Classification_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.795 Event_reference to Classification_system

Each Event_reference (see 4.2.184) refers to zero or one Classification_system (see 4.2.71) in the role of event_context. Each Classification_system acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.796 Event_reference to Complex_product

Each Event_reference (see 4.2.184) refers to zero or one Complex_product (see 4.2.80) in the role of event_context. Each Complex_product acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.797 Event_reference to Complex_product_relationship

Each Event_reference (see 4.2.184) refers to zero or one Complex_product_relationship (see 4.2.81) in the role of event_context. Each Complex_product_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.798 Event_reference to Configuration

Each Event_reference (see 4.2.184) refers to zero or one Configuration (see 4.2.94) in the role of event_-context. Each Configuration acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.799 Event_reference to Contract

Each Event_reference (see 4.2.184) refers to zero or one Contract (see 4.2.104) in the role of event_-context. Each Contract acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.800 Event_reference to Design_constraint

Each Event_reference (see 4.2.184) refers to zero or one Design_constraint (see 4.2.138) in the role of event_context. Each Design_constraint acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.801 Event_reference to Design_discipline_item_definition

Each Event_reference (see 4.2.184) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of event_context. Each Design_discipline_item_definition acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.802 Event_reference to Document

Each Event_reference (see 4.2.184) refers to zero or one Document (see 4.2.155) in the role of event_-context. Each Document acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.803 Event_reference to Document_file

Each Event_reference (see 4.2.184) refers to zero or one Document_file (see 4.2.159) in the role of event_context. Each Document_file acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.804 Event_reference to Document_representation

Each Event_reference (see 4.2.184) refers to zero or one Document_representation (see 4.2.163) in the role of event_context. Each Document_representation acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.805 Event_reference to Document_version

Each Event_reference (see 4.2.184) refers to zero or one Document_version (see 4.2.167) in the role of event_context. Each Document_version acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.806 Event_reference to Drawing

Each Event_reference (see 4.2.184) refers to zero or one Drawing (see 4.2.170) in the role of event_context. Each Drawing acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.807 Event_reference to Drawing_sheet

Each Event_reference (see 4.2.184) refers to zero or one Drawing_sheet (see 4.2.173) in the role of event_context. Each Drawing_sheet acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.808 Event_reference to Duration

Each Event_reference (see 4.2.184) refers to zero or one Duration (see 4.2.174) in the role of offset. Each Duration acts as offset for zero or more Event_reference objects.

4.3.809 Event_reference to General_classification

Each Event_reference (see 4.2.184) refers to zero or one General_classification (see 4.2.216) in the role of event_context. Each General_classification acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.810 Event_reference to Geometric_model

Each Event_reference (see 4.2.184) refers to zero or one Geometric_model (see 4.2.238) in the role of event_context. Each Geometric_model acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.811 Event_reference to Item

Each Event_reference (see 4.2.184) refers to zero or one Item (see 4.2.267) in the role of event_context. Each Item acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.812 Event_reference to Item_definition_instance_relationship

Each Event_reference (see 4.2.184) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of event_context. Each Item_definition_instance_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.813 Event_reference to Item_definition_relationship

Each Event_reference (see 4.2.184) refers to zero or one Item_definition_relationship (see 4.2.269) in the role of event_context. Each Item_definition_relationship acts as event_context for zero or more Event_-reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.814 Event_reference to Item_instance

Each Event_reference (see 4.2.184) refers to zero or one Item_instance (see 4.2.271) in the role of event_-context. Each Item_instance acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.815 Event_reference to Item_instance_relationship

Each Event_reference (see 4.2.184) refers to zero or one Item_instance_relationship (see 4.2.272) in the role of event_context. Each Item_instance_relationship acts as event_context for zero or more Event_-reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.816 Event_reference to Item_version

Each Event_reference (see 4.2.184) refers to zero or one Item_version (see 4.2.275) in the role of event_context. Each Item_version acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.817 Event_reference to Item_version_relationship

Each Event_reference (see 4.2.184) refers to zero or one Item_version_relationship (see 4.2.276) in the role of event_context. Each Item_version_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.818 Event_reference to Kinematic_simulation_information

Each Event_reference (see 4.2.184) refers to zero or one Kinematic_simulation_information (see 4.2.288) in the role of event_context. Each Kinematic_simulation_information acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.819 Event_reference to Manufacturing_configuration

Each Event_reference (see 4.2.184) refers to zero or one Manufacturing_configuration (see 4.2.305) in the role of event_context. Each Manufacturing_configuration acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.820 Event_reference to Material

Each Event_reference (see 4.2.184) refers to zero or one Material (see 4.2.309) in the role of event_context. Each Material acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.821 Event_reference to Multi_language_string

Each Event_reference (see 4.2.184) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Event_reference objects.

NOTE - This assertion is established through string_select.

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4.3.822 Event_reference to Organization_relationship

Each Event_reference (see 4.2.184) refers to zero or one Organization_relationship (see 4.2.333) in the role of event_context. Each Organization_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.823 Event_reference to Person_in_organization

Each Event_reference (see 4.2.184) refers to zero or one Person_in_organization (see 4.2.347) in the role of event_context. Each Person_in_organization acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.824 Event_reference to Person_in_organization_relationship

Each Event_reference (see 4.2.184) refers to zero or one Person_in_organization_relationship (see 4.2.348) in the role of event_context. Each Person_in_organization_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.825 Event_reference to Physical_assembly_relationship

Each Event_reference (see 4.2.184) refers to zero or one Physical_assembly_relationship (see 4.2.350) in the role of event_context. Each Physical_assembly_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.826 Event_reference to Physical_instance

Each Event_reference (see 4.2.184) refers to zero or one Physical_instance (see 4.2.352) in the role of event_context. Each Physical_instance acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.827 Event_reference to Physical_instance_test_result

Each Event_reference (see 4.2.184) refers to zero or one Physical_instance_test_result (see 4.2.353) in the role of event_context. Each Physical_instance_test_result acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.828 Event_reference to Process_operation_definition

Each Event_reference (see 4.2.184) refers to zero or one Process_operation_definition (see 4.2.381) in the role of event_context. Each Process_operation_definition acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.829 Event_reference to Process_operation_occurrence

Each Event_reference (see 4.2.184) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of event_context. Each Process_operation_occurrence acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.830 Event_reference to Process_operation_resource_assignment

Each Event_reference (see 4.2.184) refers to zero or one Process_operation_resource_assignment (see 4.2.386) in the role of event_context. Each Process_operation_resource_assignment acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.831 Event_reference to Process_plan

Each Event_reference (see 4.2.184) refers to zero or one Process_plan (see 4.2.387) in the role of event_context. Each Process_plan acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.832 Event_reference to Product_class

Each Event_reference (see 4.2.184) refers to zero or one Product_class (see 4.2.392) in the role of event_context. Each Product_class acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.833 Event_reference to Product_identification

Each Event_reference (see 4.2.184) refers to zero or one Product_identification (see 4.2.398) in the role of event_context. Each Product_identification acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.834 Event_reference to Product_structure_relationship

Each Event_reference (see 4.2.184) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of event_context. Each Product_structure_relationship acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.835 Event_reference to Project

Each Event_reference (see 4.2.184) refers to zero or one Project (see 4.2.404) in the role of event_context. Each Project acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.836 Event_reference to Property

Each Event_reference (see 4.2.184) refers to zero or one Property (see 4.2.409) in the role of event_context. Each Property acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.837 Event_reference to Property_value_association

Each Event_reference (see 4.2.184) refers to zero or one Property_value_association (see 4.2.413) in the role of event_context. Each Property_value_association acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.838 Event_reference to Security_classification

Each Event_reference (see 4.2.184) refers to zero or one Security_classification (see 4.2.443) in the role of event_context. Each Security_classification acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.839 Event_reference to Security_level

Each Event_reference (see 4.2.184) refers to zero or one Security_level (see 4.2.444) in the role of event_context. Each Security_level acts as event_context for zero or more Event_reference objects.

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NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.840 Event_reference to Specification

Each Event_reference (see 4.2.184) refers to zero or one Specification (see 4.2.467) in the role of event_context. Each Specification acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.841 Event_reference to Specification_category

Each Event_reference (see 4.2.184) refers to zero or one Specification_category (see 4.2.468) in the role of event_context. Each Specification_category acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.842 Event_reference to Specification_expression

Each Event_reference (see 4.2.184) refers to zero or one Specification_expression (see 4.2.470) in the role of event_context. Each Specification_expression acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.843 Event_reference to Specification_inclusion

Each Event_reference (see 4.2.184) refers to zero or one Specification_inclusion (see 4.2.471) in the role of event_context. Each Specification_inclusion acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.844 Event_reference to Styled_model

Each Event_reference (see 4.2.184) refers to zero or one Styled_model (see 4.2.484) in the role of event_context. Each Styled_model acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

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4.3.845 Event_reference to View_area

Each Event_reference (see 4.2.184) refers to zero or one View_area (see 4.2.555) in the role of event_context. Each View_area acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.846 Event_reference to Work_order

Each Event_reference (see 4.2.184) refers to zero or one Work_order (see 4.2.564) in the role of event_context. Each Work_order acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.847 Event_reference to Work_request

Each Event_reference (see 4.2.184) refers to zero or one Work_request (see 4.2.565) in the role of event_context. Each Work_request acts as event_context for zero or more Event_reference objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.848 External_file_id_and_location to Document_location_property

Each External_file_id_and_location (see 4.2.185) refers to exactly one Document_location_property (see 4.2.162) in the role of location. Each Document_location_property acts as location for zero or more External_file_id_and_location objects.

4.3.849 External_geometric_model_with_parameters to General_parameter

Each External_geometric_model_with_parameters (see 4.2.187) refers to one or more General_parameter (see 4.2.226) objects in the role of parameter_value. Each General_parameter acts as parameter_value for zero or more External_geometric_model_with_parameters objects.

4.3.850 External_library_reference to Multi_language_string

Each External_library_reference (see 4.2.188) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more External_library_reference objects.

NOTE - This assertion is established through string_select.

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4.3.851 External_model to Cartesian_coordinate_space

Each External_model (see 4.2.189) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more External_model objects.

4.3.852 External_model to Digital_file

Each External_model (see 4.2.189) is_defined_as exactly one Digital_file (see 4.2.148). Each Digital_file has associated_model_space defined by zero or one External_model.

4.3.853 External_model to Multi_language_string

Each External_model (see 4.2.189) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more External_model objects.

NOTE - This assertion is established through string_select.

4.3.854 External_picture to Cartesian_coordinate_space_2d

Each External_picture (see 4.2.190) is_defined_in exactly one Cartesian_coordinate_space_2d (see 4.2.45). Each Cartesian_coordinate_space_2d is related to zero or more External_picture objects.

4.3.855 Face to Face_bound

Each Face (see 4.2.191) refers to one or more Face_bound (see 4.2.192) objects in the role of bound. Each Face_bound acts as bound for zero or more Face objects.

4.3.856 Face to Surface

Each Face (see 4.2.191) refers to exactly one Surface (see 4.2.489) in the role of face_geometry. Each Surface acts as face_geometry for zero or more Face objects.

4.3.857 Face_bound to Edge_loop

Each Face_bound (see 4.2.192) refers to zero or one Edge_loop (see 4.2.176) in the role of loop. Each Edge_loop acts as loop for zero or more Face_bound objects.

NOTE - This assertion is established through loop_select.

4.3.858 Face_bound to Vertex_loop

Each Face_bound (see 4.2.192) refers to zero or one Vertex_loop (see 4.2.552) in the role of loop. Each Vertex_loop acts as loop for zero or more Face_bound objects.

NOTE - This assertion is established through loop_select.

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4.3.859 Face_transition to Face

Each Face_transition (see 4.2.194) refers to exactly one Face (see 4.2.191) in the role of face_1. Each Face acts as face_1 for zero or more Face_transition objects.

Each Face_transition refers to exactly one Face in the role of face_2. Each Face acts as face_2 for zero or more Face_transition objects.

4.3.860 Face_transition to Oriented_edge_curve

Each Face_transition (see 4.2.194) refers to exactly one Oriented_edge_curve (see 4.2.334) in the role of edge_joint. Each Oriented_edge_curve acts as edge_joint for zero or more Face_transition objects.

4.3.861 Faceted_b_rep to Faceted_closed_shell

Each Faceted_b_rep (see 4.2.195) refers to exactly one Faceted_closed_shell (see 4.2.197) in the role of outer. Each Faceted_closed_shell acts as outer for zero or more Faceted_b_rep objects.

Each Faceted_b_rep refers to zero or more Faceted_closed_shell objects in the role of void. Each Faceted_closed_shell acts as void for zero or more Faceted_b_rep objects.

4.3.862 Faceted_b_rep_model to Faceted_b_rep

Each Faceted_b_rep_model (see 4.2.196) refers to zero or more Faceted_b_rep (see 4.2.195) objects in the role of element. Each Faceted_b_rep acts as element for zero or more Faceted_b_rep_model objects.

4.3.863 Faceted_closed_shell to Faceted_face

Each Faceted_closed_shell (see 4.2.197) refers to four or more Faceted_face (see 4.2.198) objects in the role of shell_boundary. Each Faceted_face acts as shell_boundary for zero or more Faceted_closed_shell objects.

4.3.864 Faceted_face to Plane

Each Faceted_face (see 4.2.198) refers to exactly one Plane (see 4.2.360) in the role of face_geometry. Each Plane acts as face_geometry for zero or more Faceted_face objects.

4.3.865 Faceted_face to Poly_loop

Each Faceted_face (see 4.2.198) refers to one or more Poly_loop (see 4.2.376) objects in the role of bound. Each Poly_loop is_bound_for exactly one Faceted_face.

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4.3.866 Feature_definition to Axis_placement

Each Feature_definition (see 4.2.199) refers to zero or one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more Feature_definition objects.

4.3.867 Feature_definition to Cartesian_coordinate_space_3d

Each Feature_definition (see 4.2.199) is_defined_in exactly one Cartesian_coordinate_space_3d (see 4.2.46). Each Cartesian_coordinate_space_3d is related to zero or more Feature_definition objects.

4.3.868 Feature_occurrence to Plane

Each Feature_occurrence (see 4.2.200) refers to exactly one Plane (see 4.2.360) in the role of maximum_feature_limit. Each Plane acts as maximum_feature_limit for zero or more Feature_occurrence objects.

4.3.869 Feature_parameter to Value_with_unit

Each Feature_parameter (see 4.2.201) refers to exactly one Value_with_unit (see 4.2.549) in the role of parameter_value. Each Value_with_unit acts as parameter_value for zero or more Feature_parameter objects.

4.3.870 Feature_placement to Feature_definition

Each Feature_placement (see 4.2.202) refers to exactly one Feature_definition (see 4.2.199) in the role of placed_definition. Each Feature_definition acts as placed_definition for zero or more Feature_placement objects.

4.3.871 Feature_placement to Geometric_model

Each Feature_placement (see 4.2.202) refers to exactly one Geometric_model (see 4.2.238) in the role of placement_reference. Each Geometric_model acts as placement_reference for zero or more Feature_placement objects.

4.3.872 Feature_placement to Transformation

Each Feature_placement (see 4.2.202) refers to exactly one Transformation (see 4.2.533) in the role of placement. Each Transformation acts as placement for zero or more Feature_placement objects.

4.3.873 Featured_shape to Item_shape

Each Featured_shape (see 4.2.203) refers to exactly one Item_shape (see 4.2.274) in the role of base_shape. Each Item_shape acts as base_shape for zero or more Featured_shape objects.

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4.3.874 Fill_area to Annotation_curve

Each Fill_area (see 4.2.204) refers to one or more Annotation_curve (see 4.2.16) objects in the role of boundary. Each Annotation_curve acts as boundary for zero or more Fill_area objects.

4.3.875 Fillet to Face

Each Fillet (see 4.2.205) refers to exactly one Face (see 4.2.191) in the role of fillet_face. Each Face acts as fillet_face for zero or more Fillet objects.

4.3.876 Final_solution to Descriptive_specification

Each Final_solution (see 4.2.206) refers to zero or more Descriptive_specification (see 4.2.137) objects in the role of final_specification. Each Descriptive_specification acts as final_specification for zero or more Final_solution objects.

NOTE - This assertion is established through final_definition_select.

4.3.877 Final_solution to Design_discipline_item_definition

Each Final_solution (see 4.2.206) refers to zero or more Design_discipline_item_definition (see 4.2.142) objects in the role of final_specification. Each Design_discipline_item_definition acts as final_specification for zero or more Final_solution objects.

NOTE - This assertion is established through final_definition_select.

4.3.878 Final_solution to Physical_instance

Each Final_solution (see 4.2.206) refers to zero or more Physical_instance (see 4.2.352) objects in the role of final_specification. Each Physical_instance acts as final_specification for zero or more Final_solution objects.

NOTE - This assertion is established through final_definition_select.

4.3.879 Flat_slot_end_type to Feature_parameter

Each Flat_slot_end_type (see 4.2.208) refers to exactly one Feature_parameter (see 4.2.201) in the role of first_radius. Each Feature_parameter acts as first_radius for zero or more Flat_slot_end_type objects.

Each Flat_slot_end_type refers to exactly one Feature_parameter in the role of second_radius. Each Feature_parameter acts as second_radius for zero or more Flat_slot_end_type objects.

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4.3.880 Flat_with_radius_bottom to Feature_parameter

Each Flat_with_radius_bottom (see 4.2.209) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius. Each Feature_parameter acts as radius for zero or more Flat_with_radius_bottom objects.

4.3.881 Flat_with_taper_bottom to Feature_parameter

Each Flat_with_taper_bottom (see 4.2.210) refers to exactly one Feature_parameter (see 4.2.201) in the role of final_diameter. Each Feature_parameter acts as final_diameter for zero or more Flat_with_taper_-bottom objects.

Each Flat_with_taper_bottom refers to exactly one Feature_parameter in the role of taper_angle. Each Feature_parameter acts as taper_angle for zero or more Flat_with_taper_bottom objects.

4.3.882 Form_feature_in_panel to Angle_specification

Each Form_feature_in_panel (see 4.2.212) refers to zero or one Angle_specification (see 4.2.11) in the role of base_boundary_defined_by. Each Angle_specification acts as base_boundary_defined_by for zero or more Form_feature_in_panel objects.

NOTE 1 - This assertion is established through profile_or_angle_select.

Each Form_feature_in_panel refers to zero or one Angle_specification in the role of target_boundary_-defined_by. Each Angle_specification acts as target_boundary_defined_by for zero or more Form_-feature_in_panel objects.

NOTE 2 - This assertion is established through profile_or_angle_select.

4.3.883 Form_feature_in_panel to Closed_profile_usage

Each Form_feature_in_panel (see 4.2.212) refers to zero or one Closed_profile_usage (see 4.2.73) in the role of base_boundary_defined_by. Each Closed_profile_usage acts as base_boundary_defined_by for zero or more Form_feature_in_panel objects.

NOTE 1 - This assertion is established through profile_or_angle_select.

Each Form_feature_in_panel refers to zero or one Closed_profile_usage in the role of target_boundary_-defined_by. Each Closed_profile_usage acts as target_boundary_defined_by for zero or more Form_-feature_in_panel objects.

NOTE 2 - This assertion is established through profile_or_angle_select.

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4.3.884 Form_feature_in_panel to Feature_parameter

Each Form_feature_in_panel (see 4.2.212) refers to exactly one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Form_feature_in_panel objects.

Each Form_feature_in_panel refers to exactly one Feature_parameter in the role of target_radius. Each Feature_parameter acts as target_radius for zero or more Form_feature_in_panel objects.

4.3.885 Form_feature_in_panel to Shell

Each Form_feature_in_panel (see 4.2.212) refers to zero or one Shell (see 4.2.451) in the role of target_face. Each Shell acts as target_face for zero or more Form_feature_in_panel objects.

NOTE - This assertion is established through general_end_select.

4.3.886 Form_feature_in_panel to Surface

Each Form_feature_in_panel (see 4.2.212) refers to zero or one Surface (see 4.2.489) in the role of target_face. Each Surface acts as target_face for zero or more Form_feature_in_panel objects.

NOTE - This assertion is established through general_end_select.

4.3.887 Full_model_change to Detailed_element

Each Full_model_change (see 4.2.213) refers to zero or more Detailed_element (see 4.2.143) objects in the role of added_element. Each Detailed_element acts as added_element for zero or more Full_model_change objects.

4.3.888 Full_model_change to Geometric_model_relationship

Each Full_model_change (see 4.2.213) refers to zero or one Geometric_model_relationship (see 4.2.239) in the role of related_description. Each Geometric_model_relationship acts as related_description for zero or more Full_model_change objects.

NOTE - This assertion is established through model_change_select.

4.3.889 Full_model_change to Styled_model_relationship

Each Full_model_change (see 4.2.213) refers to zero or one Styled_model_relationship (see 4.2.486) in the role of related_description. Each Styled_model_relationship acts as related_description for zero or more Full_model_change objects.

NOTE - This assertion is established through model_change_select.

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4.3.890 Full_model_change to View_area_relationship

Each Full_model_change (see 4.2.213) refers to zero or one View_area_relationship (see 4.2.557) in the role of related_description. Each View_area_relationship acts as related_description for zero or more Full_model_change objects.

NOTE - This assertion is established through model_change_select.

4.3.891 Full_model_change to View_relationship

Each Full_model_change (see 4.2.213) refers to zero or one View_relationship (see 4.2.559) in the role of related_description. Each View_relationship acts as related_description for zero or more Full_model_change objects.

NOTE - This assertion is established through model_change_select.

4.3.892 General_bottom_condition to Feature_parameter

Each General_bottom_condition (see 4.2.215) refers to zero or one Feature_parameter (see 4.2.201) in the role of floor_radius. Each Feature_parameter acts as floor_radius for zero or more General_bottom_condition objects.

4.3.893 General_bottom_condition to Shell

Each General_bottom_condition (see 4.2.215) refers to zero or one Shell (see 4.2.451) in the role of floor_face. Each Shell acts as floor_face for zero or more General_bottom_condition objects.

NOTE - This assertion is established through general_end_select.

4.3.894 General_bottom_condition to Surface

Each General_bottom_condition (see 4.2.215) refers to zero or one Surface (see 4.2.489) in the role of floor_face. Each Surface acts as floor_face for zero or more General_bottom_condition objects.

NOTE - This assertion is established through general_end_select.

4.3.895 General_classification to Classification_system

Each General_classification (see 4.2.216) refers to zero or one Classification_system (see 4.2.71) in the role of used_classification_system. Each Classification_system has allowed_classification defined by zero or more General_classification objects.

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4.3.896 General_classification to External_library_reference

Each General_classification (see 4.2.216) refers to zero or one External_library_reference (see 4.2.188) in the role of classification_source. Each External_library_reference acts as classification_source for zero or more General_classification objects.

NOTE - This assertion is established through class_source_select.

4.3.897 General_classification to Multi_language_string

Each General_classification (see 4.2.216) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more General_classification objects.

NOTE - This assertion is established through string_select.

4.3.898 General_classification to Plib_class_reference

Each General_classification (see 4.2.216) refers to zero or one Plib_class_reference (see 4.2.361) in the role of classification_source. Each Plib_class_reference acts as classification_source for zero or more General_classification objects.

NOTE - This assertion is established through class_source_select.

4.3.899 General_classification_hierarchy to General_classification

Each General_classification_hierarchy (see 4.2.217) refers to exactly one General_classification (see 4.2.216) in the role of sub_classification. Each General_classification acts as sub_classification for zero or more General_classification_hierarchy objects.

Each General_classification_hierarchy refers to exactly one General_classification in the role of super_classification. Each General_classification acts as super_classification for zero or more General_classification_hierarchy objects.

4.3.900 General_closed_profile to Curve

Each General_closed_profile (see 4.2.218) refers to exactly one Curve (see 4.2.108) in the role of profile_shape. Each Curve acts as profile_shape for zero or more General_closed_profile objects.

4.3.901 General_compound_feature to Feature_definition

Each General_compound_feature (see 4.2.219) refers to zero or more Feature_definition (see 4.2.199) objects in the role of elements. Each Feature_definition acts as elements for zero or more General_compound_feature objects.

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NOTE - This assertion is established through feature_definition_select.

4.3.902 General_compound_feature to General_feature

Each General_compound_feature (see 4.2.219) refers to zero or more General_feature (see 4.2.221) objects in the role of elements. Each General_feature acts as elements for zero or more General_compound_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.903 General_compound_feature to Thread_feature

Each General_compound_feature (see 4.2.219) refers to zero or more Thread_feature (see 4.2.517) objects in the role of elements. Each Thread_feature acts as elements for zero or more General_compound_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.904 General_compound_feature to Transition_feature

Each General_compound_feature (see 4.2.219) refers to zero or more Transition_feature (see 4.2.537) objects in the role of elements. Each Transition_feature acts as elements for zero or more General_compound_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.905 General_feature to Axis_placement

Each General_feature (see 4.2.221) refers to zero or one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more General_feature objects.

4.3.906 General_feature to General_parameter

Each General_feature (see 4.2.221) refers to zero or more General_parameter (see 4.2.226) objects in the role of additional_parameter. Each General_parameter acts as additional_parameter for zero or more General_feature objects.

4.3.907 General_item_definition_instance_relationship to Multi_language_string

Each General_item_definition_instance_relationship (see 4.2.222) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more General_item_definition_instance_relationship objects.

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NOTE - This assertion is established through string_select.

4.3.908 General_item_definition_relationship to Multi_language_string

Each General_item_definition_relationship (see 4.2.223) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more General_item_definition_relationship objects.

NOTE - This assertion is established through string_select.

4.3.909 General_item_instance_relationship to Multi_language_string

Each General_item_instance_relationship (see 4.2.224) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more General_item_instance_relationship objects.

NOTE - This assertion is established through string_select.

4.3.910 General_open_profile to Curve

Each General_open_profile (see 4.2.225) refers to exactly one Curve (see 4.2.108) in the role of profile_-shape. Each Curve acts as profile_shape for zero or more General_open_profile objects.

4.3.911 General_parameter to Feature_parameter

Each General_parameter (see 4.2.226) refers to exactly one Feature_parameter (see 4.2.201) in the role of parameter_value. Each Feature_parameter acts as parameter_value for zero or more General_parameter objects.

4.3.912 General_path to Curve

Each General_path (see 4.2.227) refers to exactly one Curve (see 4.2.108) in the role of path_geometry. Each Curve acts as path_geometry for zero or more General_path objects.

4.3.913 General_pattern to Axis_placement

Each General_pattern (see 4.2.228) refers to one or more Axis_placement (see 4.2.33) objects in the role of added_instance. Each Axis_placement acts as added_instance for zero or more General_pattern objects.

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4.3.914 General_size_dimension to Measurement_path

Each General_size_dimension (see 4.2.232) refers to zero or one Measurement_path (see 4.2.314) in the role of used_path. Each Measurement_path acts as used_path for zero or more General_size_dimension objects.

4.3.915 General_tolerances to Document_file

Each General_tolerances (see 4.2.235) refers to zero or one Document_file (see 4.2.159) in the role of table_definition. Each Document_file acts as table_definition for zero or more General_tolerances objects.

NOTE - This assertion is established through general_tolerance_table_select.

4.3.916 General_tolerances to General_tolerance_table

Each General_tolerances (see 4.2.235) refers to zero or one General_tolerance_table (see 4.2.234) in the role of table_definition. Each General_tolerance_table acts as table_definition for zero or more General_tolerances objects.

NOTE - This assertion is established through general_tolerance_table_select.

4.3.917 General_top_condition to Shell

Each General_top_condition (see 4.2.236) refers to zero or one Shell (see 4.2.451) in the role of top_face. Each Shell acts as top_face for zero or more General_top_condition objects.

NOTE - This assertion is established through general_end_select.

4.3.918 General_top_condition to Surface

Each General_top_condition (see 4.2.236) refers to zero or one Surface (see 4.2.489) in the role of top_face. Each Surface acts as top_face for zero or more General_top_condition objects.

NOTE - This assertion is established through general_end_select.

4.3.919 Geometric_dimension to Value_with_unit

Each Geometric_dimension (see 4.2.237) refers to exactly one Value_with_unit (see 4.2.549) in the role of dimension_value. Each Value_with_unit acts as dimension_value for zero or more Geometric_dimension objects.

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4.3.920 Geometric_model to Cartesian_coordinate_space

Each Geometric_model (see 4.2.238) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Geometric_model objects.

4.3.921 Geometric_model to Multi_language_string

Each Geometric_model (see 4.2.238) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Geometric_model objects.

NOTE - This assertion is established through string_select.

4.3.922 Geometric_model to Template_instance

Each Geometric_model (see 4.2.238) refers to zero or more Template_instance (see 4.2.512) objects in the role of additional_element. Each Template_instance acts as additional_element for zero or more Geometric_model objects.

4.3.923 Geometric_model_relationship to External_model

Each Geometric_model_relationship (see 4.2.239) is related to zero or one External_model (see 4.2.189). Each External_model is referenced by zero or more Geometric_model_relationship objects as related.

NOTE 1 - The related External_model is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

NOTE 2 - This assertion is established through geometric_or_external_model_select.

Each Geometric_model_relationship is relating to zero or one External_model. Each External_model is referenced by zero or more Geometric_model_relationship objects as relating.

NOTE 3 - The relating External_model is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

NOTE 4 - This assertion is established through geometric_or_external_model_select.

4.3.924 Geometric_model_relationship to Geometric_model

Each Geometric_model_relationship (see 4.2.239) is related to zero or one Geometric_model (see 4.2.238). Each Geometric_model is referenced by zero or more Geometric_model_relationship objects as related.

NOTE 1 - The related Geometric_model is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

NOTE 2 - This assertion is established through geometric_or_external_model_select.

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Each Geometric_model_relationship is relating to zero or one Geometric_model. Each Geometric_-model is referenced by zero or more Geometric_model_relationship objects as relating.

NOTE 3 - The relating Geometric_model is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

NOTE 4 - This assertion is established through geometric_or_external_model_select.

4.3.925 Geometric_model_relationship to Multi_language_string

Each Geometric_model_relationship (see 4.2.239) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Geometric_-model_relationship objects.

NOTE - This assertion is established through string_select.

4.3.926 Geometric_model_relationship_with_transformation to Transformation

Each Geometric_model_relationship_with_transformation (see 4.2.240) refers to exactly one Transformation (see 4.2.533) in the role of model_placement. Each Transformation acts as model_placement for zero or more Geometric_model_relationship_with_transformation objects.

4.3.927 Geometric_set_3d to Curve

Each Geometric_set_3d (see 4.2.242) refers to zero or more Curve (see 4.2.108) objects in the role of element. Each Curve acts as element for zero or more Geometric_set_3d objects.

NOTE - This assertion is established through point_or_curve_or_surface_select and point_or_curve_select.

4.3.928 Geometric_set_3d to Point

Each Geometric_set_3d (see 4.2.242) refers to zero or more Point (see 4.2.367) objects in the role of element. Each Point acts as element for zero or more Geometric_set_3d objects.

NOTE - This assertion is established through point_or_curve_or_surface_select and point_or_curve_select.

4.3.929 Geometric_set_3d to Surface

Each Geometric_set_3d (see 4.2.242) refers to zero or more Surface (see 4.2.489) objects in the role of element. Each Surface acts as element for zero or more Geometric_set_3d objects.

NOTE - This assertion is established through point_or_curve_or_surface_select.

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4.3.930 Geometric_tolerance to Annotation_curve

Each Geometric_tolerance (see 4.2.243) is_applied_to zero or one Annotation_curve (see 4.2.16). Each Annotation_curve is related to zero or more Geometric_tolerance objects.

NOTE - This assertion is established through placed_element_select and element_with_dimension_select.

4.3.931 Geometric_tolerance to Constructive_geometric_element

Each Geometric_tolerance (see 4.2.243) is_applied_to zero or one Constructive_geometric_element (see 4.2.99). Each Constructive_geometric_element is related to zero or more Geometric_tolerance objects.

NOTE - This assertion is established through placed_element_select.

4.3.932 Geometric_tolerance to Derived_geometry

Each Geometric_tolerance (see 4.2.243) is_applied_to zero or one Derived_geometry (see 4.2.136). Each Derived_geometry is related to zero or more Geometric_tolerance objects.

NOTE - This assertion is established through placed_element_select.

4.3.933 Geometric_tolerance to Multi_language_string

Each Geometric_tolerance (see 4.2.243) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Geometric_tolerance objects.

NOTE 1 - This assertion is established through string_select.

Each Geometric_tolerance refers to zero or one Multi_language_string in the role of qualifying_note. Each Multi_language_string acts as qualifying_note for zero or more Geometric_tolerance objects.

NOTE 2 - This assertion is established through string_select.

4.3.934 Geometric_tolerance to Shape_element

Each Geometric_tolerance (see 4.2.243) is_applied_to zero or one Shape_element (see 4.2.449). Each Shape_element is related to zero or more Geometric_tolerance objects.

NOTE - This assertion is established through placed_element_select and element_with_dimension_select.

4.3.935 Geometric_tolerance to Tolerance_condition

Each Geometric_tolerance (see 4.2.243) refers to zero or one Tolerance_condition (see 4.2.522) in the role of modification. Each Tolerance_condition acts as modification for zero or more Geometric_tolerance objects.

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4.3.936 Geometric_tolerance_relationship to Geometric_tolerance

Each Geometric_tolerance_relationship (see 4.2.245) is related to exactly one Geometric_tolerance (see 4.2.243). Each Geometric_tolerance is referenced by zero or more Geometric_tolerance_relationship objects as related.

NOTE 1 - The related Geometric_tolerance is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Geometric_tolerance_relationship is relating to exactly one Geometric_tolerance. Each Geometric_tolerance is referenced by zero or more Geometric_tolerance_relationship objects as relating.

NOTE 2 - The relating Geometric_tolerance is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.937 Geometrical_relationship to Geometric_model_relationship_with_transformation

Each Geometrical_relationship (see 4.2.247) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of definition_placement. Each Geometric_model_relationship_with_transformation acts as definition_placement for zero or more Geometrical_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.938 Geometrical_relationship to Multi_language_string

Each Geometrical_relationship (see 4.2.247) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Geometrical_relationship objects.

NOTE - This assertion is established through string_select.

4.3.939 Geometrical_relationship to Template_instance

Each Geometrical_relationship (see 4.2.247) refers to zero or one Template_instance (see 4.2.512) in the role of definition_placement. Each Template_instance acts as definition_placement for zero or more Geometrical_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.940 Geometrically_bounded_surface_model to Geometric_set_3d

Each Geometrically_bounded_surface_model (see 4.2.248) refers to zero or more Geometric_set_3d (see 4.2.242) objects in the role of element. Each Geometric_set_3d acts as element for zero or more Geometrically_bounded_surface_model objects.

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4.3.941 Ground_representation to Geometric_model

Each Ground_representation (see 4.2.249) refers to exactly one Geometric_model (see 4.2.238) in the role of shape_description. Each Geometric_model acts as shape_description for zero or more Ground_-representation objects.

4.3.942 Group to Detailed_element

Each Group (see 4.2.250) refers to zero or more Detailed_element (see 4.2.143) objects in the role of element. Each Detailed_element acts as element for zero or more Group objects.

NOTE - This assertion is established through group_element_select.

4.3.943 Group to Multi_language_string

Each Group (see 4.2.250) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Group objects.

NOTE 1 - This assertion is established through string_select.

Each Group refers to zero or one Multi_language_string in the role of purpose. Each Multi_language_-string acts as purpose for zero or more Group objects.

NOTE 2 - This assertion is established through string_select.

4.3.944 Group to Shape_element

Each Group (see 4.2.250) refers to zero or more Shape_element (see 4.2.449) objects in the role of element. Each Shape_element acts as element for zero or more Group objects.

NOTE - This assertion is established through group_element_select.

4.3.945 Group_relationship to Group

Each Group_relationship (see 4.2.251) is related to exactly one Group (see 4.2.250). Each Group is referenced by zero or more Group_relationship objects as related.

NOTE 1 - The related Group is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Group_relationship is relating to exactly one Group. Each Group is referenced by zero or more Group_relationship objects as relating.

NOTE 2 - The relating Group is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.946 Group_relationship to Multi_language_string

Each Group_relationship (see 4.2.251) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Group_relationship objects.

NOTE - This assertion is established through string_select.

4.3.947 Hardness to Multi_language_string

Each Hardness (see 4.2.254) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Hardness objects.

NOTE - This assertion is established through string_select.

4.3.948 Hardness to Value_with_unit

Each Hardness (see 4.2.254) refers to zero or one Value_with_unit (see 4.2.549) in the role of depth. Each Value_with_unit acts as depth for zero or more Hardness objects.

Each Hardness refers to exactly one Value_with_unit in the role of hardness_value. Each Value_with_-unit acts as hardness_value for zero or more Hardness objects.

4.3.949 Hidden_element_handling to Appearance_assignment

Each Hidden_element_handling (see 4.2.256) refers to zero or one Appearance_assignment (see 4.2.20) in the role of hidden_element_appearance. Each Appearance_assignment acts as hidden_element_ap-pearance for zero or more Hidden_element_handling objects.

4.3.950 Hidden_element_handling to Model_image

Each Hidden_element_handling (see 4.2.256) is_defined_for one or more Model_image (see 4.2.316) objects. Each Model_image has zero or one Hidden_element_handling.

4.3.951 Hole_feature_in_panel to Closed_profile_usage

Each Hole_feature_in_panel (see 4.2.258) refers to exactly one Closed_profile_usage (see 4.2.73) in the role of hole_profile. Each Closed_profile_usage acts as hole_profile for zero or more Hole_feature_in_-panel objects.

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4.3.952 Hybrid_geometric_model_3d to Detailed_geometric_model_element

Each Hybrid_geometric_model_3d (see 4.2.259) refers to zero or more Detailed_geometric_model_element (see 4.2.144) objects in the role of element. Each Detailed_geometric_model_element acts as element for zero or more Hybrid_geometric_model_3d objects.

4.3.953 Included_feature to Feature_definition

Each Included_feature (see 4.2.261) refers to zero or one Feature_definition (see 4.2.199) in the role of definition. Each Feature_definition acts as definition for zero or more Included_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.954 Included_feature to General_feature

Each Included_feature (see 4.2.261) refers to zero or one General_feature (see 4.2.221) in the role of definition. Each General_feature acts as definition for zero or more Included_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.955 Included_feature to Thread_feature

Each Included_feature (see 4.2.261) refers to zero or one Thread_feature (see 4.2.517) in the role of definition. Each Thread_feature acts as definition for zero or more Included_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.956 Included_feature to Transition_feature

Each Included_feature (see 4.2.261) refers to zero or one Transition_feature (see 4.2.537) in the role of definition. Each Transition_feature acts as definition for zero or more Included_feature objects.

NOTE - This assertion is established through feature_definition_select.

4.3.957 Incremental_model_change to Geometric_model

Each Incremental_model_change (see 4.2.262) refers to zero or more Geometric_model (see 4.2.238) objects in the role of added_element. Each Geometric_model acts as added_element for zero or more Incremental_model_change objects.

NOTE 1 - This assertion is established through model_change_element_select.

Each Incremental_model_change refers to zero or one Geometric_model in the role of basis_model. Each Geometric_model acts as basis_model for zero or more Incremental_model_change objects.

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NOTE 2 - This assertion is established through incremental_change_select and model_change_element_-select.

4.3.958 Incremental_model_change to Incremental_model_change

Each Incremental_model_change (see 4.2.262) refers to zero or one Incremental_model_change in the role of basis_model. Each Incremental_model_change acts as basis_model for zero or more Incremental_model_change objects.

NOTE - This assertion is established through incremental_change_select.

4.3.959 Incremental_model_change to Styled_model

Each Incremental_model_change (see 4.2.262) refers to zero or more Styled_model (see 4.2.484) objects in the role of added_element. Each Styled_model acts as added_element for zero or more Incremental_-model_change objects.

NOTE 1 - This assertion is established through model_change_element_select.

Each Incremental_model_change refers to zero or one Styled_model in the role of basis_model. Each Styled_model acts as basis_model for zero or more Incremental_model_change objects.

NOTE 2 - This assertion is established through incremental_change_select and model_change_element_-select.

4.3.960 Initial_configuration to Kinematic_mechanism

Each Initial_configuration (see 4.2.263) is_applied_to exactly one Kinematic_mechanism (see 4.2.286). Each Kinematic_mechanism is related to zero or more Initial_configuration objects.

4.3.961 Initial_configuration to Pair_value

Each Initial_configuration (see 4.2.263) refers to one or more Pair_value (see 4.2.335) objects in the role of initial_pair_values. Each Pair_value acts as initial_pair_values for zero or more Initial_configuration objects.

4.3.962 Instance_placement to Geometric_model_relationship_with_transformation

Each Instance_placement (see 4.2.264) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_transformation acts as placement for zero or more Instance_placement objects.

NOTE - This assertion is established through transformation_select.

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4.3.963 Instance_placement to Product_component

Each Instance_placement (see 4.2.264) refers to exactly one Product_component (see 4.2.394) in the role of reference_product_component. Each Product_component acts as reference_product_component for zero or more Instance_placement objects.

4.3.964 Instance_placement to Single_instance

Each Instance_placement (see 4.2.264) refers to exactly one Single_instance (see 4.2.455) in the role of placed_instance. Each Single_instance acts as placed_instance for zero or more Instance_placement objects.

4.3.965 Instance_placement to Template_instance

Each Instance_placement (see 4.2.264) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each Template_instance acts as placement for zero or more Instance_placement objects.

NOTE - This assertion is established through transformation_select.

4.3.966 Interpolated_configuration_sequence to Kinematic_configuration_interpolation

Each Interpolated_configuration_sequence (see 4.2.265) refers to one or more Kinematic_configuration_interpolation (see 4.2.280) objects in the role of interpolation. Each Kinematic_configuration_interpolation acts as interpolation for zero or more Interpolated_configuration_sequence objects.

4.3.967 Interval_of_time to Date_time

Each Interval_of_time (see 4.2.266) refers to zero or one Date_time (see 4.2.119) in the role of end_definition. Each Date_time acts as end_definition for zero or more Interval_of_time objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Interval_of_time refers to zero or one Date_time in the role of start_definition. Each Date_time acts as start_definition for zero or more Interval_of_time objects.

NOTE 2 - This assertion is established through event_or_date_select.

4.3.968 Interval_of_time to Duration

Each Interval_of_time (see 4.2.266) refers to zero or one Duration (see 4.2.174) in the role of end_definition. Each Duration acts as end_definition for zero or more Interval_of_time objects.

NOTE - This assertion is established through period_or_date_select.

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4.3.969 Interval_of_time to Event_reference

Each Interval_of_time (see 4.2.266) refers to zero or one Event_reference (see 4.2.184) in the role of end_definition. Each Event_reference acts as end_definition for zero or more Interval_of_time objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Interval_of_time refers to zero or one Event_reference in the role of start_definition. Each Event_reference acts as start_definition for zero or more Interval_of_time objects.

NOTE 2 - This assertion is established through event_or_date_select.

4.3.970 Item to Multi_language_string

Each Item (see 4.2.267) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item objects.

NOTE 1 - This assertion is established through string_select.

Each Item refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Item objects.

NOTE 2 - This assertion is established through string_select.

4.3.971 Item_definition_instance_relationship to Design_discipline_item_definition

Each Item_definition_instance_relationship (see 4.2.268) is relating to exactly one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is referenced by zero or more Item_definition_instance_relationship objects as relating.

NOTE - The relating Design_discipline_item_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.972 Item_definition_instance_relationship to Item_instance

Each Item_definition_instance_relationship (see 4.2.268) is related to exactly one Item_instance (see 4.2.271). Each Item_instance is referenced by zero or more Item_definition_instance_relationship objects as related.

NOTE - The related Item_instance is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

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4.3.973 Item_definition_relationship to Design_discipline_item_definition

Each Item_definition_relationship (see 4.2.269) is related to exactly one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is referenced by zero or more Item_definition_relationship objects as related.

NOTE 1 - The related Design_discipline_item_definition is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Item_definition_relationship is relating to exactly one Design_discipline_item_definition. Each Design_discipline_item_definition is referenced by zero or more Item_definition_relationship objects as relating.

NOTE 2 - The relating Design_discipline_item_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.974 Item_function_association to Design_discipline_item_definition

Each Item_function_association (see 4.2.270) refers to exactly one Design_discipline_item_definition (see 4.2.142) in the role of associated_item. Each Design_discipline_item_definition acts as associated_item for zero or more Item_function_association objects.

4.3.975 Item_function_association to Multi_language_string

Each Item_function_association (see 4.2.270) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item_function_association objects.

NOTE - This assertion is established through string_select.

4.3.976 Item_function_association to Product_function

Each Item_function_association (see 4.2.270) refers to exactly one Product_function (see 4.2.397) in the role of associated_function. Each Product_function acts as associated_function for zero or more Item_function_association objects.

4.3.977 Item_instance to Design_discipline_item_definition

Each Item_instance (see 4.2.271) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of definition. Each Design_discipline_item_definition acts as definition for zero or more Item_instance objects.

NOTE - This assertion is established through instance_definition_select.

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4.3.978 Item_instance to Multi_language_string

Each Item_instance (see 4.2.271) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item_instance objects.

NOTE - This assertion is established through string_select.

4.3.979 Item_instance to Product_identification

Each Item_instance (see 4.2.271) refers to zero or one Product_identification (see 4.2.398) in the role of definition. Each Product_identification acts as definition for zero or more Item_instance objects.

NOTE - This assertion is established through instance_definition_select.

4.3.980 Item_instance_relationship to Item_instance

Each Item_instance_relationship (see 4.2.272) is related to exactly one Item_instance (see 4.2.271). Each Item_instance is referenced by zero or more Item_instance_relationship objects as related.

NOTE 1 - The related Item_instance is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Item_instance_relationship is relating to exactly one Item_instance. Each Item_instance is referenced by zero or more Item_instance_relationship objects as relating.

NOTE 2 - The relating Item_instance is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.981 Item_property_association to Catalogue_thread

Each Item_property_association (see 4.2.273) refers to zero or one Catalogue_thread (see 4.2.48) in the role of described_element. Each Catalogue_thread acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.982 Item_property_association to Complex_product

Each Item_property_association (see 4.2.273) refers to zero or one Complex_product (see 4.2.80) in the role of described_element. Each Complex_product acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

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4.3.983 Item_property_association to Design_constraint

Each Item_property_association (see 4.2.273) refers to zero or one Design_constraint (see 4.2.138) in the role of described_element. Each Design_constraint acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.984 Item_property_association to Design_discipline_item_definition

Each Item_property_association (see 4.2.273) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of described_element. Each Design_discipline_item_definition acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.985 Item_property_association to Document_file

Each Item_property_association (see 4.2.273) refers to zero or one Document_file (see 4.2.159) in the role of described_element. Each Document_file acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.986 Item_property_association to Document_representation

Each Item_property_association (see 4.2.273) refers to zero or one Document_representation (see 4.2.163) in the role of described_element. Each Document_representation acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.987 Item_property_association to Feature_definition

Each Item_property_association (see 4.2.273) refers to zero or one Feature_definition (see 4.2.199) in the role of described_element. Each Feature_definition acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

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4.3.988 Item_property_association to General_feature

Each Item_property_association (see 4.2.273) refers to zero or one General_feature (see 4.2.221) in the role of described_element. Each General_feature acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.989 Item_property_association to Item_definition_instance_relationship

Each Item_property_association (see 4.2.273) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of described_element. Each Item_definition_instance_relationship acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.990 Item_property_association to Item_definition_relationship

Each Item_property_association (see 4.2.273) refers to zero or one Item_definition_relationship (see 4.2.269) in the role of described_element. Each Item_definition_relationship acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.991 Item_property_association to Item_instance

Each Item_property_association (see 4.2.273) refers to zero or one Item_instance (see 4.2.271) in the role of described_element. Each Item_instance acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.992 Item_property_association to Item_instance_relationship

Each Item_property_association (see 4.2.273) refers to zero or one Item_instance_relationship (see 4.2.272) in the role of described_element. Each Item_instance_relationship acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

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4.3.993 Item_property_association to Item_shape

Each Item_property_association (see 4.2.273) refers to zero or one Item_shape (see 4.2.274) in the role of described_element. Each Item_shape acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.994 Item_property_association to Product_class

Each Item_property_association (see 4.2.273) refers to zero or one Product_class (see 4.2.392) in the role of described_element. Each Product_class acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.995 Item_property_association to Product_identification

Each Item_property_association (see 4.2.273) refers to zero or one Product_identification (see 4.2.398) in the role of described_element. Each Product_identification acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.996 Item_property_association to Product_structure_relationship

Each Item_property_association (see 4.2.273) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of described_element. Each Product_structure_relationship acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.997 Item_property_association to Shape_element

Each Item_property_association (see 4.2.273) refers to zero or one Shape_element (see 4.2.449) in the role of described_element. Each Shape_element acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.998 Item_property_association to Shape_element_relationship

Each Item_property_association (see 4.2.273) refers to zero or one Shape_element_relationship (see 4.2.450) in the role of described_element. Each Shape_element_relationship acts as described_element for zero or more Item_property_association objects.

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NOTE - This assertion is established through item_property_select.

4.3.999 Item_property_association to Thread_feature

Each Item_property_association (see 4.2.273) refers to zero or one Thread_feature (see 4.2.517) in the role of described_element. Each Thread_feature acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.1000 Item_property_association to Transition_feature

Each Item_property_association (see 4.2.273) refers to zero or one Transition_feature (see 4.2.537) in the role of described_element. Each Transition_feature acts as described_element for zero or more Item_property_association objects.

NOTE - This assertion is established through item_property_select.

4.3.1001 Item_shape to Design_discipline_item_definition

Each Item_shape (see 4.2.274) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of described_object. Each Design_discipline_item_definition acts as described_object for zero or one Item_shape.

NOTE - This assertion is established through item_information_select.

4.3.1002 Item_shape to Item_instance

Each Item_shape (see 4.2.274) refers to zero or one Item_instance (see 4.2.271) in the role of described_object. Each Item_instance acts as described_object for zero or one Item_shape.

NOTE - This assertion is established through item_information_select.

4.3.1003 Item_shape to Multi_language_string

Each Item_shape (see 4.2.274) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item_shape objects.

NOTE - This assertion is established through string_select.

4.3.1004 Item_shape to Physical_instance

Each Item_shape (see 4.2.274) refers to zero or one Physical_instance (see 4.2.352) in the role of described_object. Each Physical_instance acts as described_object for zero or more Item_shape objects.

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NOTE - This assertion is established through item_information_select.

4.3.1005 Item_version to Item

Each Item_version (see 4.2.275) refers to exactly one Item (see 4.2.267) in the role of associated_item. Each Item has associated_version defined by one or more Item_version objects.

4.3.1006 Item_version to Multi_language_string

Each Item_version (see 4.2.275) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item_version objects.

NOTE - This assertion is established through string_select.

4.3.1007 Item_version_relationship to Item_version

Each Item_version_relationship (see 4.2.276) is related to exactly one Item_version (see 4.2.275). Each Item_version is referenced by zero or more Item_version_relationship objects as related.

NOTE 1 - The related Item_version is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Item_version_relationship is relating to exactly one Item_version. Each Item_version is referenced by zero or more Item_version_relationship objects as relating.

NOTE 2 - The relating Item_version is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1008 Item_version_relationship to Multi_language_string

Each Item_version_relationship (see 4.2.276) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Item_version_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1009 Joggle_feature to Feature_parameter

Each Joggle_feature (see 4.2.277) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius_1. Each Feature_parameter acts as base_radius_1 for zero or more Joggle_feature objects.

Each Joggle_feature refers to zero or one Feature_parameter in the role of base_radius_2. Each Feature_parameter acts as base_radius_2 for zero or more Joggle_feature objects.

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Each Joggle_feature refers to exactly one Feature_parameter in the role of direction_angle_1. Each Feature_parameter acts as direction_angle_1 for zero or more Joggle_feature objects.

Each Joggle_feature refers to exactly one Feature_parameter in the role of direction_angle_2. Each Feature_parameter acts as direction_angle_2 for zero or more Joggle_feature objects.

Each Joggle_feature refers to exactly one Feature_parameter in the role of height. Each Feature_parameter acts as height for zero or more Joggle_feature objects.

Each Joggle_feature refers to exactly one Feature_parameter in the role of slope_angle_1. Each Feature_parameter acts as slope_angle_1 for zero or more Joggle_feature objects.

Each Joggle_feature refers to exactly one Feature_parameter in the role of slope_angle_2. Each Feature_parameter acts as slope_angle_2 for zero or more Joggle_feature objects.

Each Joggle_feature refers to zero or one Feature_parameter in the role of top_radius_1. Each Feature_parameter acts as top_radius_1 for zero or more Joggle_feature objects.

Each Joggle_feature refers to zero or one Feature_parameter in the role of top_radius_2. Each Feature_parameter acts as top_radius_2 for zero or more Joggle_feature objects.

4.3.1010 Joggle_feature to Joggle_termination

Each Joggle_feature (see 4.2.277) refers to exactly one Joggle_termination (see 4.2.278) in the role of termination. Each Joggle_termination acts as termination for zero or more Joggle_feature objects.

4.3.1011 Joggle_feature to Linear_path

Each Joggle_feature (see 4.2.277) refers to exactly one Linear_path (see 4.2.300) in the role of defining_path. Each Linear_path acts as defining_path for zero or more Joggle_feature objects.

4.3.1012 Kinematic_configuration_definition to Pair_value

Each Kinematic_configuration_definition (see 4.2.279) refers to one or more Pair_value (see 4.2.335) objects in the role of pair_values. Each Pair_value acts as pair_values for zero or more Kinematic_configuration_definition objects.

4.3.1013 Kinematic_configuration_definition to Path_approximation

Each Kinematic_configuration_definition (see 4.2.279) refers to exactly one Path_approximation (see 4.2.343) in the role of t_parameter. Each Path_approximation acts as t_parameter for zero or more Kinematic_configuration_definition objects.

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4.3.1014 Kinematic_configuration_interpolation to Kinematic_configuration_definition

Each Kinematic_configuration_interpolation (see 4.2.280) refers to exactly one Kinematic_configuration_definition (see 4.2.279) in the role of next_definition. Each Kinematic_configuration_definition acts as next_definition for zero or more Kinematic_configuration_interpolation objects.

Each Kinematic_configuration_interpolation refers to exactly one Kinematic_configuration_definition in the role of previous_definition. Each Kinematic_configuration_definition acts as previous_definition for zero or more Kinematic_configuration_interpolation objects.

4.3.1015 Kinematic_control to Interpolated_configuration_sequence

Each Kinematic_control (see 4.2.281) refers to one or more Interpolated_configuration_sequence (see 4.2.265) objects in the role of program. Each Interpolated_configuration_sequence acts as program for zero or more Kinematic_control objects.

4.3.1016 Kinematic_control to Kinematic_mechanism

Each Kinematic_control (see 4.2.281) is_controlling exactly one Kinematic_mechanism (see 4.2.286). Each Kinematic_mechanism is related to zero or more Kinematic_control objects.

4.3.1017 Kinematic_control to Kinematic_transformation_result

Each Kinematic_control (see 4.2.281) refers to zero or more Kinematic_transformation_result (see 4.2.290) objects in the role of related_result. Each Kinematic_transformation_result acts as related_result for zero or more Kinematic_control objects.

4.3.1018 Kinematic_element to Multi_language_string

Each Kinematic_element (see 4.2.282) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Kinematic_element objects.

NOTE – This assertion is established through string_select.

4.3.1019 Kinematic_joint to Kinematic_link

Each Kinematic_joint (see 4.2.283) refers to exactly one Kinematic_link (see 4.2.284) in the role of first_link. Each Kinematic_link acts as first_link for zero or more Kinematic_joint objects.

Each Kinematic_joint refers to exactly one Kinematic_link in the role of second_link. Each Kinematic_link acts as second_link for zero or more Kinematic_joint objects.

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4.3.1020 Kinematic_joint to Kinematic_pair

Each Kinematic_joint (see 4.2.283) refers to exactly one Kinematic_pair (see 4.2.287) in the role of pair. Each Kinematic_pair has joint defined by exactly one Kinematic_joint.

4.3.1021 Kinematic_link to Kinematic_link_representation

Each Kinematic_link (see 4.2.284) refers to exactly one Kinematic_link_representation (see 4.2.285) in the role of representation. Each Kinematic_link_representation acts as representation for zero or more Kinematic_link objects.

4.3.1022 Kinematic_link_representation to Geometric_model

Each Kinematic_link_representation (see 4.2.285) refers to exactly one Geometric_model (see 4.2.238) in the role of physical_description. Each Geometric_model acts as physical_description for zero or more Kinematic_link_representation objects.

4.3.1023 Kinematic_link_representation to Transformation_to_reference_frame

Each Kinematic_link_representation (see 4.2.285) refers to zero or more Transformation_to_reference_-frame (see 4.2.536) objects in the role of additional_reference_frame. Each Transformation_to_reference_frame acts as additional_reference_frame for zero or more Kinematic_link_representation objects.

4.3.1024 Kinematic_mechanism to Kinematic_link

Each Kinematic_mechanism (see 4.2.286) refers to exactly one Kinematic_link (see 4.2.284) in the role of base_link. Each Kinematic_link acts as base_link for zero or more Kinematic_mechanism objects.

4.3.1025 Kinematic_mechanism to Kinematic_structure

Each Kinematic_mechanism (see 4.2.286) refers to exactly one Kinematic_structure (see 4.2.289) in the role of structure_definition. Each Kinematic_structure is_referenced_by exactly one Kinematic_-mechanism.

4.3.1026 Kinematic_mechanism to Transformation_to_reference_frame

Each Kinematic_mechanism (see 4.2.286) refers to exactly one Transformation_to_reference_frame (see 4.2.536) in the role of base_placement. Each Transformation_to_reference_frame acts as base_placement for zero or more Kinematic_mechanism objects.

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4.3.1027 Kinematic_pair to Transformation_to_reference_frame

Each Kinematic_pair (see 4.2.287) refers to exactly one Transformation_to_reference_frame (see 4.2.536) in the role of transformation_item_1. Each Transformation_to_reference_frame acts as transformation_item_1 for zero or more Kinematic_pair objects.

Each Kinematic_pair refers to exactly one Transformation_to_reference_frame in the role of transformation_item_2. Each Transformation_to_reference_frame acts as transformation_item_2 for zero or more Kinematic_pair objects.

4.3.1028 Kinematic_simulation_information to Complex_product

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Complex_product (see 4.2.80) objects in the role of described_element. Each Complex_product acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1029 Kinematic_simulation_information to Design_discipline_item_definition

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Design_discipline_item_definition (see 4.2.142) objects in the role of described_element. Each Design_discipline_item_definition acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1030 Kinematic_simulation_information to Ground_representation

Each Kinematic_simulation_information (see 4.2.288) refers to exactly one Ground_representation (see 4.2.249) in the role of ground. Each Ground_representation is_referenced_by one or more Kinematic_simulation_information objects.

4.3.1031 Kinematic_simulation_information to Item_definition_instance_relationship

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Item_definition_instance_relationship (see 4.2.268) objects in the role of described_element. Each Item_definition_instance_relationship acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

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4.3.1032 Kinematic_simulation_information to Item_definition_relationship

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Item_definition_relationship (see 4.2.269) objects in the role of described_element. Each Item_definition_relationship acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1033 Kinematic_simulation_information to Item_instance

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Item_instance (see 4.2.271) objects in the role of described_element. Each Item_instance acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1034 Kinematic_simulation_information to Item_instance_relationship

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Item_instance_relationship (see 4.2.272) objects in the role of described_element. Each Item_instance_relationship acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1035 Kinematic_simulation_information to Kinematic_mechanism

Each Kinematic_simulation_information (see 4.2.288) refers to one or more Kinematic_mechanism (see 4.2.286) objects in the role of mechanism. Each Kinematic_mechanism is_referenced_by one or more Kinematic_simulation_information objects.

4.3.1036 Kinematic_simulation_information to Multi_language_string

Each Kinematic_simulation_information (see 4.2.288) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through string_select.

4.3.1037 Kinematic_simulation_information to Product_class

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Product_class (see 4.2.392) objects in the role of described_element. Each Product_class acts as described_element for zero or more Kinematic_simulation_information objects.

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NOTE - This assertion is established through simulation_context_select.

4.3.1038 Kinematic_simulation_information to Product_specification

Each Kinematic_simulation_information (see 4.2.288) refers to zero or more Product_specification (see 4.2.399) objects in the role of described_element. Each Product_specification acts as described_element for zero or more Kinematic_simulation_information objects.

NOTE - This assertion is established through simulation_context_select.

4.3.1039 Kinematic_structure to Kinematic_joint

Each Kinematic_structure (see 4.2.289) refers to one or more Kinematic_joint (see 4.2.283) objects in the role of joint. Each Kinematic_joint is_referenced_by one or more Kinematic_structure objects.

4.3.1040 Kinematic_transformation_result to Interpolated_configuration_sequence

Each Kinematic_transformation_result (see 4.2.290) refers to one or more Interpolated_configuration_-sequence (see 4.2.265) objects in the role of result. Each Interpolated_configuration_sequence acts as result for zero or more Kinematic_transformation_result objects.

4.3.1041 Kinematic_transformation_result to Kinematic_mechanism

Each Kinematic_transformation_result (see 4.2.290) is_applied_to exactly one Kinematic_mechanism (see 4.2.286). Each Kinematic_mechanism is related to zero or more Kinematic_transformation_result objects.

4.3.1042 Layer to Detailed_element

Each Layer (see 4.2.292) refers to one or more Detailed_element (see 4.2.143) objects in the role of element. Each Detailed_element acts as element for zero or more Layer objects.

4.3.1043 Layer to Multi_language_string

Each Layer (see 4.2.292) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Layer objects.

NOTE - This assertion is established through string_select.

4.3.1044 Leader to Terminator_symbol

Each Leader (see 4.2.293) refers to zero or one Terminator_symbol (see 4.2.513) in the role of terminator. Each Terminator_symbol acts as terminator for zero or more Leader objects.

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4.3.1045 Light_source to Model_image

Each Light_source (see 4.2.294) is_defined_for one or more Model_image (see 4.2.316) objects. Each Model_image is related to zero or more Light_source objects.

4.3.1046 Line_profile_tolerance to Datum

Each Line_profile_tolerance (see 4.2.297) refers to zero, one, two, or three Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Line_profile_tolerance objects.

4.3.1047 Line_profile_tolerance to Reference_plane

Each Line_profile_tolerance (see 4.2.297) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Line_profile_tolerance objects.

4.3.1048 Linear_path to Feature_parameter

Each Linear_path (see 4.2.300) refers to exactly one Feature_parameter (see 4.2.201) in the role of distance. Each Feature_parameter acts as distance for zero or more Linear_path objects.

4.3.1049 Location_dimension to Annotation_curve

Each Location_dimension (see 4.2.301) refers to zero or one Annotation_curve (see 4.2.16) in the role of origin. Each Annotation_curve acts as origin for zero or more Location_dimension objects.

NOTE 1 - This assertion is established through placed_element_select and element_with_dimension_select.

Each Location_dimension refers to zero or one Annotation_curve in the role of target. Each Annotation_curve acts as target for zero or more Location_dimension objects.

NOTE 2 - This assertion is established through placed_element_select and element_with_dimension_select.

4.3.1050 Location_dimension to Constructive_geometric_element

Each Location_dimension (see 4.2.301) refers to zero or one Constructive_geometric_element (see 4.2.99) in the role of origin. Each Constructive_geometric_element acts as origin for zero or more Location_dimension objects.

NOTE 1 - This assertion is established through placed_element_select.

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Each Location_dimension refers to zero or one Constructive_geometric_element in the role of target. Each Constructive_geometric_element acts as target for zero or more Location_dimension objects.

NOTE 2 - This assertion is established through placed_element_select.

4.3.1051 Location_dimension to Derived_geometry

Each Location_dimension (see 4.2.301) refers to zero or one Derived_geometry (see 4.2.136) in the role of origin. Each Derived_geometry acts as origin for zero or more Location_dimension objects.

NOTE 1 - This assertion is established through placed_element_select.

Each Location_dimension refers to zero or one Derived_geometry in the role of target. Each Derived_-geometry acts as target for zero or more Location_dimension objects.

NOTE 2 - This assertion is established through placed_element_select.

4.3.1052 Location_dimension to Multi_language_string

Each Location_dimension (see 4.2.301) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Location_dimension objects.

NOTE - This assertion is established through string_select.

4.3.1053 Location_dimension to Shape_element

Each Location_dimension (see 4.2.301) refers to zero or one Shape_element (see 4.2.449) in the role of origin. Each Shape_element acts as origin for zero or more Location_dimension objects.

NOTE 1 - This assertion is established through placed_element_select and element_with_dimension_se-lect.

Each Location_dimension refers to zero or one Shape_element in the role of target. Each Shape_element acts as target for zero or more Location_dimension objects.

NOTE 2 - This assertion is established through placed_element_select and element_with_dimension_se-lect.

4.3.1054 Locator_feature to Feature_parameter

Each Locator_feature (see 4.2.302) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Locator_feature objects.

Each Locator_feature refers to exactly one Feature_parameter in the role of diameter. Each Feature_-parameter acts as diameter for zero or more Locator_feature objects.

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Each Locator_feature refers to exactly one Feature_parameter in the role of tip_angle. Each Feature_-parameter acts as tip_angle for zero or more Locator_feature objects.

Each Locator_feature refers to zero or one Feature_parameter in the role of tip_radius. Each Feature_-parameter acts as tip_radius for zero or more Locator_feature objects.

4.3.1055 Make_from_relationship to Multi_language_string

Each Make_from_relationship (see 4.2.304) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Make_from_-relationship objects.

NOTE - This assertion is established through string_select.

4.3.1056 Manufacturing_configuration to Item_instance

Each Manufacturing_configuration (see 4.2.305) refers to exactly one Item_instance (see 4.2.271) in the role of configured_element. Each Item_instance acts as configured_element for zero or more Manufac-turing_configuration objects.

4.3.1057 Manufacturing_configuration to Organization

Each Manufacturing_configuration (see 4.2.305) refers to zero or more Organization (see 4.2.331) ob-jects in the role of concerned_organization. Each Organization acts as concerned_organization for zero or more Manufacturing_configuration objects.

4.3.1058 Manufacturing_configuration to Product_design

Each Manufacturing_configuration (see 4.2.305) is_solution_for exactly one Product_design (see 4.2.396). Each Product_design is related to zero or more Manufacturing_configuration objects.

4.3.1059 Mated_item_association to Geometric_model_relationship_with_transformation

Each Mated_item_association (see 4.2.307) refers to zero or one Geometric_model_relationship_with_-transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_trans-formation acts as placement for zero or more Mated_item_association objects.

NOTE - This assertion is established through transformation_select.

4.3.1060 Mated_item_association to Mating_definition

Each Mated_item_association (see 4.2.307) is relating to exactly one Mating_definition (see 4.2.313). Each Mating_definition has mated_items defined by two or more Mated_item_association objects.

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NOTE - The relating Mating_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1061 Mated_item_association to Template_instance

Each Mated_item_association (see 4.2.307) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each Template_instance acts as placement for zero or more Mated_item_association objects.

NOTE - This assertion is established through transformation_select.

4.3.1062 Mated_item_relationship to Mated_item_association

Each Mated_item_relationship (see 4.2.308) is related to exactly one Mated_item_association (see 4.2.307). Each Mated_item_association is referenced by zero or more Mated_item_relationship objects as related.

NOTE 1 - The related Mated_item_association is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Mated_item_relationship is relating to exactly one Mated_item_association. Each Mated_item_association is referenced by zero or more Mated_item_relationship objects as relating.

NOTE 2 - The relating Mated_item_association is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1063 Mated_item_relationship to Quantified_instance

Each Mated_item_relationship (see 4.2.308) refers to zero or more Quantified_instance (see 4.2.417) objects in the role of mating_material. Each Quantified_instance acts as mating_material for zero or more Mated_item_relationship objects.

4.3.1064 Mated_item_relationship to Shape_element_relationship

Each Mated_item_relationship (see 4.2.308) refers to zero or one Shape_element_relationship (see 4.2.450) in the role of mated_shape. Each Shape_element_relationship acts as mated_shape for zero or more Mated_item_relationship objects.

4.3.1065 Material to Catalogue_thread

Each Material (see 4.2.309) refers to zero or more Catalogue_thread (see 4.2.48) objects in the role of described_element. Each Catalogue_thread acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

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4.3.1066 Material to Complex_product

Each Material (see 4.2.309) refers to zero or more Complex_product (see 4.2.80) objects in the role of described_element. Each Complex_product acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1067 Material to Design_constraint

Each Material (see 4.2.309) refers to zero or more Design_constraint (see 4.2.138) objects in the role of described_element. Each Design_constraint acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1068 Material to Design_discipline_item_definition

Each Material (see 4.2.309) refers to zero or more Design_discipline_item_definition (see 4.2.142) objects in the role of described_element. Each Design_discipline_item_definition acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1069 Material to Document_file

Each Material (see 4.2.309) refers to zero or more Document_file (see 4.2.159) objects in the role of described_element. Each Document_file acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1070 Material to Document_representation

Each Material (see 4.2.309) refers to zero or more Document_representation (see 4.2.163) objects in the role of described_element. Each Document_representation acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1071 Material to Feature_definition

Each Material (see 4.2.309) refers to zero or more Feature_definition (see 4.2.199) objects in the role of described_element. Each Feature_definition acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

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4.3.1072 Material to General_feature

Each Material (see 4.2.309) refers to zero or more General_feature (see 4.2.221) objects in the role of described_element. Each General_feature acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1073 Material to Item_definition_instance_relationship

Each Material (see 4.2.309) refers to zero or more Item_definition_instance_relationship (see 4.2.268) objects in the role of described_element. Each Item_definition_instance_relationship acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1074 Material to Item_definition_relationship

Each Material (see 4.2.309) refers to zero or more Item_definition_relationship (see 4.2.269) objects in the role of described_element. Each Item_definition_relationship acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1075 Material to Item_instance

Each Material (see 4.2.309) refers to zero or more Item_instance (see 4.2.271) objects in the role of described_element. Each Item_instance acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1076 Material to Item_instance_relationship

Each Material (see 4.2.309) refers to zero or more Item_instance_relationship (see 4.2.272) objects in the role of described_element. Each Item_instance_relationship acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1077 Material to Item_shape

Each Material (see 4.2.309) refers to zero or more Item_shape (see 4.2.274) objects in the role of described_element. Each Item_shape acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

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4.3.1078 Material to Product_class

Each Material (see 4.2.309) refers to zero or more Product_class (see 4.2.392) objects in the role of described_element. Each Product_class acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1079 Material to Product_identification

Each Material (see 4.2.309) refers to zero or more Product_identification (see 4.2.398) objects in the role of described_element. Each Product_identification acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1080 Material to Product_structure_relationship

Each Material (see 4.2.309) refers to zero or more Product_structure_relationship (see 4.2.400) objects in the role of described_element. Each Product_structure_relationship acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1081 Material to Shape_element

Each Material (see 4.2.309) refers to zero or more Shape_element (see 4.2.449) objects in the role of described_element. Each Shape_element acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1082 Material to Shape_element_relationship

Each Material (see 4.2.309) refers to zero or more Shape_element_relationship (see 4.2.450) objects in the role of described_element. Each Shape_element_relationship acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1083 Material to Thread_feature

Each Material (see 4.2.309) refers to zero or more Thread_feature (see 4.2.517) objects in the role of described_element. Each Thread_feature acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

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4.3.1084 Material to Transition_feature

Each Material (see 4.2.309) refers to zero or more Transition_feature (see 4.2.537) objects in the role of described_element. Each Transition_feature acts as described_element for zero or more Material objects.

NOTE - This assertion is established through item_property_select.

4.3.1085 Material_property_association to Material

Each Material_property_association (see 4.2.311) refers to exactly one Material (see 4.2.309) in the role of described_material. Each Material acts as described_material for zero or more Material_property_association objects.

4.3.1086 Material_property_association to Material_property_value_representation

Each Material_property_association (see 4.2.311) refers to exactly one Material_property_value_representation (see 4.2.312) in the role of associated_property_value. Each Material_property_value_representation acts as associated_property_value for zero or more Material_property_association objects.

4.3.1087 Material_property_value_representation to Data_environment

Each Material_property_value_representation (see 4.2.312) refers to exactly one Data_environment (see 4.2.116) in the role of environment_condition. Each Data_environment acts as environment_condition for zero or more Material_property_value_representation objects.

4.3.1088 Material_property_value_representation to Material_property

Each Material_property_value_representation (see 4.2.312) refers to exactly one Material_property (see 4.2.310) in the role of definition. Each Material_property acts as definition for zero or more Material_property_value_representation objects.

4.3.1089 Measurement_path to Cartesian_coordinate_space

Each Measurement_path (see 4.2.314) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Measurement_path objects.

4.3.1090 Measurement_path to Curve

Each Measurement_path (see 4.2.314) is_defined_as exactly one Curve (see 4.2.108). Each Curve is related to zero or more Measurement_path objects.

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4.3.1091 Model_change to Change

Each Model_change (see 4.2.315) is_describing exactly one Change (see 4.2.55). Each Change is related to zero or more Model_change objects.

4.3.1092 Model_change to Detailed_element

Each Model_change (see 4.2.315) refers to zero or more Detailed_element (see 4.2.143) objects in the role of deleted_element. Each Detailed_element acts as deleted_element for zero or more Model_change objects.

4.3.1093 Model_change to Multi_language_string

Each Model_change (see 4.2.315) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Model_change objects.

NOTE - This assertion is established through string_select.

4.3.1094 Model_image to External_model

Each Model_image (see 4.2.316) is_displaying zero or one External_model (see 4.2.189). Each External_model is related to zero or more Model_image objects.

NOTE - This assertion is established through presented_model_select.

4.3.1095 Model_image to Multi_language_string

Each Model_image (see 4.2.316) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Model_image objects.

NOTE - This assertion is established through string_select.

4.3.1096 Model_image to Styled_model

Each Model_image (see 4.2.316) is_displaying zero or one Styled_model (see 4.2.484). Each Styled_model is related to zero or more Model_image objects.

NOTE - This assertion is established through presented_model_select.

4.3.1097 Model_image to View

Each Model_image (see 4.2.316) is_presented_in exactly one View (see 4.2.554). Each View has image defined by zero or one Model_image.

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4.3.1098 Model_property_association to Activity

Each Model_property_association (see 4.2.317) refers to zero or one Activity (see 4.2.2) in the role of described_element. Each Activity acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

4.3.1099 Model_property_association to Activity_method_assignment

Each Model_property_association (see 4.2.317) refers to zero or one Activity_method_assignment (see 4.2.5) in the role of described_element. Each Activity_method_assignment acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

4.3.1100 Model_property_association to Catalogue_thread

Each Model_property_association (see 4.2.317) refers to zero or one Catalogue_thread (see 4.2.48) in the role of described_element. Each Catalogue_thread acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1101 Model_property_association to Complex_product

Each Model_property_association (see 4.2.317) refers to zero or one Complex_product (see 4.2.80) in the role of described_element. Each Complex_product acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1102 Model_property_association to Design_constraint

Each Model_property_association (see 4.2.317) refers to zero or one Design_constraint (see 4.2.138) in the role of described_element. Each Design_constraint acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

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4.3.1103 Model_property_association to Design_discipline_item_definition

Each Model_property_association (see 4.2.317) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of described_element. Each Design_discipline_item_definition acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1104 Model_property_association to Document_file

Each Model_property_association (see 4.2.317) refers to zero or one Document_file (see 4.2.159) in the role of described_element. Each Document_file acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1105 Model_property_association to Document_representation

Each Model_property_association (see 4.2.317) refers to zero or one Document_representation (see 4.2.163) in the role of described_element. Each Document_representation acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1106 Model_property_association to Feature_definition

Each Model_property_association (see 4.2.317) refers to zero or one Feature_definition (see 4.2.199) in the role of described_element. Each Feature_definition acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1107 Model_property_association to General_feature

Each Model_property_association (see 4.2.317) refers to zero or one General_feature (see 4.2.221) in the role of described_element. Each General_feature acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

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4.3.1108 Model_property_association to Item_definition_instance_relationship

Each Model_property_association (see 4.2.317) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of described_element. Each Item_definition_instance_relationship acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1109 Model_property_association to Item_definition_relationship

Each Model_property_association (see 4.2.317) refers to zero or one Item_definition_relationship (see 4.2.269) in the role of described_element. Each Item_definition_relationship acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1110 Model_property_association to Item_instance

Each Model_property_association (see 4.2.317) refers to zero or one Item_instance (see 4.2.271) in the role of described_element. Each Item_instance acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1111 Model_property_association to Item_instance_relationship

Each Model_property_association (see 4.2.317) refers to zero or one Item_instance_relationship (see 4.2.272) in the role of described_element. Each Item_instance_relationship acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1112 Model_property_association to Item_shape

Each Model_property_association (see 4.2.317) refers to zero or one Item_shape (see 4.2.274) in the role of described_element. Each Item_shape acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

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4.3.1113 Model_property_association to Model_property_value

Each Model_property_association (see 4.2.317) refers to exactly one Model_property_value (see 4.2.318) in the role of associated_property_value. Each Model_property_value acts as associated_property_value for zero or more Model_property_association objects.

4.3.1114 Model_property_association to Organization

Each Model_property_association (see 4.2.317) refers to zero or one Organization (see 4.2.331) in the role of validity_context. Each Organization acts as validity_context for zero or more Model_property_association objects.

4.3.1115 Model_property_association to Process_operation_definition

Each Model_property_association (see 4.2.317) refers to zero or one Process_operation_definition (see 4.2.381) in the role of described_element. Each Process_operation_definition acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

4.3.1116 Model_property_association to Process_operation_occurrence

Each Model_property_association (see 4.2.317) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of described_element. Each Process_operation_occurrence acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

4.3.1117 Model_property_association to Process_operation_resource_assignment

Each Model_property_association (see 4.2.317) refers to zero or one Process_operation_resource_assignment (see 4.2.386) in the role of described_element. Each Process_operation_resource_assignment acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

4.3.1118 Model_property_association to Process_plan

Each Model_property_association (see 4.2.317) refers to zero or one Process_plan (see 4.2.387) in the role of described_element. Each Process_plan acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and process_property_select.

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4.3.1119 Model_property_association to Product_class

Each Model_property_association (see 4.2.317) refers to zero or one Product_class (see 4.2.392) in the role of described_element. Each Product_class acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1120 Model_property_association to Product_identification

Each Model_property_association (see 4.2.317) refers to zero or one Product_identification (see 4.2.398) in the role of described_element. Each Product_identification acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1121 Model_property_association to Product_structure_relationship

Each Model_property_association (see 4.2.317) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of described_element. Each Product_structure_relationship acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1122 Model_property_association to Shape_element

Each Model_property_association (see 4.2.317) refers to zero or one Shape_element (see 4.2.449) in the role of described_element. Each Shape_element acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1123 Model_property_association to Shape_element_relationship

Each Model_property_association (see 4.2.317) refers to zero or one Shape_element_relationship (see 4.2.450) in the role of described_element. Each Shape_element_relationship acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

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4.3.1124 Model_property_association to Thread_feature

Each Model_property_association (see 4.2.317) refers to zero or one Thread_feature (see 4.2.517) in the role of described_element. Each Thread_feature acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1125 Model_property_association to Transition_feature

Each Model_property_association (see 4.2.317) refers to zero or one Transition_feature (see 4.2.537) in the role of described_element. Each Transition_feature acts as described_element for zero or more Model_property_association objects.

NOTE - This assertion is established through model_property_select and item_property_select.

4.3.1126 Model_property_value to External_model

Each Model_property_value (see 4.2.318) refers to zero or one External_model (see 4.2.189) in the role of describing_model. Each External_model acts as describing_model for zero or one Model_property_value.

NOTE - This assertion is established through model_property_representation_select.

4.3.1127 Model_property_value to General_property

Each Model_property_value (see 4.2.318) refers to exactly one General_property (see 4.2.230) in the role of definition. Each General_property acts as definition for zero or more Model_property_value objects.

4.3.1128 Model_property_value to Geometric_model

Each Model_property_value (see 4.2.318) refers to zero or one Geometric_model (see 4.2.238) in the role of describing_model. Each Geometric_model acts as describing_model for zero or one Model_property_value.

NOTE - This assertion is established through model_property_representation_select.

4.3.1129 Model_property_value to Styled_model

Each Model_property_value (see 4.2.318) refers to zero or one Styled_model (see 4.2.484) in the role of describing_model. Each Styled_model acts as describing_model for zero or one Model_property_value.

NOTE - This assertion is established through model_property_representation_select.

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4.3.1130 Moments_of_inertia to Axis_placement

Each Moments_of_inertia (see 4.2.319) refers to exactly one Axis_placement (see 4.2.33) in the role of reference_axis_placement. Each Axis_placement acts as reference_axis_placement for zero or more Moments_of_inertia objects.

4.3.1131 Moments_of_inertia to Cartesian_coordinate_space

Each Moments_of_inertia (see 4.2.319) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Moments_of_inertia objects.

4.3.1132 Moments_of_inertia to Numerical_value

Each Moments_of_inertia (see 4.2.319) refers to one, two, or three Numerical_value (see 4.2.324) objects in the role of inertia_value. Each Numerical_value acts as inertia_value for zero or more Moments_of_inertia objects.

4.3.1133 Multi_language_string to String_with_language

Each Multi_language_string (see 4.2.320) refers to zero or more String_with_language (see 4.2.479) objects in the role of additional_language_dependent_string. Each String_with_language has used_by defined by one or more Multi_language_string objects.

Each Multi_language_string refers to exactly one String_with_language in the role of primary_language_dependent_string. Each String_with_language has used_by defined by one or more Multi_language_string objects.

4.3.1134 Named_size to Classification_system

Each Named_size (see 4.2.321) refers to zero or one Classification_system (see 4.2.71) in the role of referenced_standard. Each Classification_system acts as referenced_standard for zero or more Named_size objects.

4.3.1135 Ngon_profile to Feature_parameter

Each Ngon_profile (see 4.2.323) refers to zero or one Feature_parameter (see 4.2.201) in the role of corner_radius. Each Feature_parameter acts as corner_radius for zero or more Ngon_profile objects.

Each Ngon_profile refers to exactly one Feature_parameter in the role of diameter. Each Feature_parameter acts as diameter for zero or more Ngon_profile objects.

4.3.1136 Open_profile_usage to Open_profile

Each Open_profile_usage (see 4.2.329) refers to exactly one Open_profile (see 4.2.328) in the role of used_profile. Each Open_profile acts as used_profile for zero or more Open_profile_usage objects.

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4.3.1137 Open_profile_usage to Plane

Each Open_profile_usage (see 4.2.329) refers to zero or one Plane (see 4.2.360) in the role of profile_limit. Each Plane acts as profile_limit for zero or more Open_profile_usage objects.

4.3.1138 Organization_in_contract to Contract

Each Organization_in_contract (see 4.2.332) refers to one or more Contract (see 4.2.104) objects in the role of signed_contract. Each Contract has release defined by zero or more Organization_in_contract objects.

4.3.1139 Organization_in_contract to Date_and_person_organization

Each Organization_in_contract (see 4.2.332) refers to zero or more Date_and_person_organization (see 4.2.118) objects in the role of signature. Each Date_and_person_organization acts as signature for zero or more Organization_in_contract objects.

4.3.1140 Organization_in_contract to Organization

Each Organization_in_contract (see 4.2.332) refers to exactly one Organization (see 4.2.331) in the role of contracted_organization. Each Organization acts as contracted_organization for zero or more Organization_in_contract objects.

4.3.1141 Organization_relationship to Multi_language_string

Each Organization_relationship (see 4.2.333) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Organization_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1142 Organization_relationship to Organization

Each Organization_relationship (see 4.2.333) is related to exactly one Organization (see 4.2.331). Each Organization is referenced by zero or more Organization_relationship objects as related.

NOTE 1 - The related Organization is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Organization_relationship is relating to exactly one Organization. Each Organization is referenced by zero or more Organization_relationship objects as relating.

NOTE 2 - The relating Organization is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.1143 Oriented_edge_curve to B_spline_curve

Each Oriented_edge_curve (see 4.2.334) refers to zero or one B_spline_curve (see 4.2.36) in the role of edge_geometry. Each B_spline_curve acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1144 Oriented_edge_curve to Circle

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Circle (see 4.2.56) in the role of edge_-geometry. Each Circle acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1145 Oriented_edge_curve to Curve_on_surface

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Curve_on_surface (see 4.2.110) in the role of edge_geometry. Each Curve_on_surface acts as edge_geometry for zero or more Oriented_edge_-curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1146 Oriented_edge_curve to Ellipse

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Ellipse (see 4.2.183) in the role of edge_-geometry. Each Ellipse acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1147 Oriented_edge_curve to Hyperbola

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Hyperbola (see 4.2.260) in the role of edge_geometry. Each Hyperbola acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1148 Oriented_edge_curve to Line

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Line (see 4.2.296) in the role of edge_-geometry. Each Line acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

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4.3.1149 Oriented_edge_curve to Parabola

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Parabola (see 4.2.337) in the role of edge_-geometry. Each Parabola acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1150 Oriented_edge_curve to Polyline

Each Oriented_edge_curve (see 4.2.334) refers to zero or one Polyline (see 4.2.377) in the role of edge_-geometry. Each Polyline acts as edge_geometry for zero or more Oriented_edge_curve objects.

NOTE - This assertion is established through topologically_bounded_curve_select.

4.3.1151 Oriented_edge_curve to Vertex_point

Each Oriented_edge_curve (see 4.2.334) refers to exactly one Vertex_point (see 4.2.553) in the role of edge_end. Each Vertex_point acts as edge_end for zero or more Oriented_edge_curve objects.

Each Oriented_edge_curve refers to exactly one Vertex_point in the role of edge_start. Each Vertex_-point acts as edge_start for zero or more Oriented_edge_curve objects.

4.3.1152 Pair_value to Kinematic_pair

Each Pair_value (see 4.2.335) is_applied_to exactly one Kinematic_pair (see 4.2.287). Each Kinematic_-pair is related to zero or more Pair_value objects.

4.3.1153 Panel_hole_with_barring to Angle_specification

Each Panel_hole_with_barring (see 4.2.336) refers to zero or one Angle_specification (see 4.2.11) in the role of angle_defined_by. Each Angle_specification acts as angle_defined_by for zero or more Panel_-hole_with_barring objects.

4.3.1154 Panel_hole_with_barring to Closed_profile_usage

Each Panel_hole_with_barring (see 4.2.336) refers to exactly one Closed_profile_usage (see 4.2.73) in the role of barring_profile. Each Closed_profile_usage acts as barring_profile for zero or more Panel_-hole_with_barring objects.

4.3.1155 Panel_hole_with_barring to Feature_parameter

Each Panel_hole_with_barring (see 4.2.336) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Panel_hole_with_-barring objects.

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4.3.1156 Parallelism_tolerance to Datum

Each Parallelism_tolerance (see 4.2.338) refers to one or two Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Parallelism_tolerance objects.

4.3.1157 Parallelism_tolerance to Reference_plane

Each Parallelism_tolerance (see 4.2.338) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Parallelism_tolerance objects.

4.3.1158 Partial_circular_path to Feature_parameter

Each Partial_circular_path (see 4.2.339) refers to exactly one Feature_parameter (see 4.2.201) in the role of sweep_angle. Each Feature_parameter acts as sweep_angle for zero or more Partial_circular_path objects.

4.3.1159 Partial_circular_profile to Feature_parameter

Each Partial_circular_profile (see 4.2.340) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius. Each Feature_parameter acts as radius for zero or more Partial_circular_profile objects.

Each Partial_circular_profile refers to exactly one Feature_parameter in the role of sweep_angle. Each Feature_parameter acts as sweep_angle for zero or more Partial_circular_profile objects.

4.3.1160 Path to Axis_placement

Each Path (see 4.2.342) is_defined_by exactly one Axis_placement (see 4.2.33). Each Axis_placement is related to zero or more Path objects.

4.3.1161 Path to Cartesian_coordinate_space

Each Path (see 4.2.342) is_defined_in zero or one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Path objects.

4.3.1162 Path_parameter to General_feature

Each Path_parameter (see 4.2.344) refers to exactly one General_feature (see 4.2.221) in the role of parameter_context. Each General_feature acts as parameter_context for zero or more Path_parameter objects.

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4.3.1163 Path_parameter to Path

Each Path_parameter (see 4.2.344) refers to exactly one Path (see 4.2.342) in the role of associated_path. Each Path acts as associated_path for zero or more Path_parameter objects.

4.3.1164 Perpendicularity_tolerance to Datum

Each Perpendicularity_tolerance (see 4.2.345) refers to one, two, or three Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Perpendicularity_-tolerance objects.

4.3.1165 Perpendicularity_tolerance to Reference_plane

Each Perpendicularity_tolerance (see 4.2.345) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Perpendicularity_-tolerance objects.

4.3.1166 Person_in_organization to Organization

Each Person_in_organization (see 4.2.347) refers to exactly one Organization (see 4.2.331) in the role of associated_organization. Each Organization acts as associated_organization for zero or more Person_-in_organization objects.

4.3.1167 Person_in_organization to Person

Each Person_in_organization (see 4.2.347) refers to exactly one Person (see 4.2.346) in the role of associated_person. Each Person has associated_organization defined by one or more Person_in_organization objects.

4.3.1168 Person_in_organization_relationship to Multi_language_string

Each Person_in_organization_relationship (see 4.2.348) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Person_in_organization_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1169 Person_in_organization_relationship to Person_in_organization

Each Person_in_organization_relationship (see 4.2.348) is related to exactly one Person_in_organization (see 4.2.347). Each Person_in_organization is referenced by zero or more Person_in_organization_-relationship objects as related.

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NOTE 1 - The related Person_in_organization is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Person_in_organization_relationship is relating to exactly one Person_in_organization. Each Person_in_organization is referenced by zero or more Person_in_organization_relationship objects as relating.

NOTE 2 - The relating Person_in_organization is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1170 Person_organization_assignment to Activity

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1171 Person_organization_assignment to Activity_element

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1172 Person_organization_assignment to Activity_method_assignment

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1173 Person_organization_assignment to Alternate_item_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.1174 Person_organization_assignment to Approval_status

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Approval_status (see 4.2.24) objects. Each Approval_status is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1175 Person_organization_assignment to Assembly_substitute_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Assembly_substitute_-relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1176 Person_organization_assignment to Certification

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1177 Person_organization_assignment to Class_category_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1178 Person_organization_assignment to Class_condition_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Person_organization_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1179 Person_organization_assignment to Class_inclusion_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1180 Person_organization_assignment to Class_specification_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Class_specification_-association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Person_-organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1181 Person_organization_assignment to Class_structure_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1182 Person_organization_assignment to Classification_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.1183 Person_organization_assignment to Classification_system

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1184 Person_organization_assignment to Complex_product

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1185 Person_organization_assignment to Complex_product_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Complex_product_relationship (see 4.2.81) objects. Each Complex_product_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1186 Person_organization_assignment to Configuration

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1187 Person_organization_assignment to Contract

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.1188 Person_organization_assignment to Design_constraint

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1189 Person_organization_assignment to Design_discipline_item_definition

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Design_discipline_-item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1190 Person_organization_assignment to Document

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1191 Person_organization_assignment to Document_file

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1192 Person_organization_assignment to Document_representation

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.1193 Person_organization_assignment to Document_version

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1194 Person_organization_assignment to Drawing

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1195 Person_organization_assignment to Drawing_sheet

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1196 Person_organization_assignment to Event_reference

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Event_reference (see 4.2.184) objects. Each Event_reference is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select.

4.3.1197 Person_organization_assignment to General_classification

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.1198 Person_organization_assignment to Geometric_model

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1199 Person_organization_assignment to Item

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1200 Person_organization_assignment to Item_definition_instance_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_definition_instance_-relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1201 Person_organization_assignment to Item_definition_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1202 Person_organization_assignment to Item_instance

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

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4.3.1203 Person_organization_assignment to Item_instance_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1204 Person_organization_assignment to Item_version

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1205 Person_organization_assignment to Item_version_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1206 Person_organization_assignment to Kinematic_simulation_information

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1207 Person_organization_assignment to Manufacturing_configuration

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Person_organization_assignment objects.

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NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1208 Person_organization_assignment to Material

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1209 Person_organization_assignment to Multi_language_string

Each Person_organization_assignment (see 4.2.349) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Person_organization_assignment objects.

NOTE - This assertion is established through string_select.

4.3.1210 Person_organization_assignment to Organization

Each Person_organization_assignment (see 4.2.349) refers to zero or one Organization (see 4.2.331) in the role of assigned_person_organization. Each Organization acts as assigned_person_organization for zero or more Person_organization_assignment objects.

NOTE - This assertion is established through person_organization_select.

4.3.1211 Person_organization_assignment to Organization_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Organization_relationship (see 4.2.333) objects. Each Organization_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_-organizational_data_select.

4.3.1212 Person_organization_assignment to Person_in_organization

Each Person_organization_assignment (see 4.2.349) refers to zero or one Person_in_organization (see 4.2.347) in the role of assigned_person_organization. Each Person_in_organization acts as assigned_-person_organization for zero or more Person_organization_assignment objects.

NOTE 1 - This assertion is established through person_organization_select.

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Each Person_organization_assignment is_applied_to zero or more Person_in_organization objects. Each Person_in_organization is related to zero or more Person_organization_assignment objects.

NOTE 2 - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1213 Person_organization_assignment to Person_in_organization_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Person_in_organization_relationship (see 4.2.348) objects. Each Person_in_organization_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1214 Person_organization_assignment to Physical_assembly_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1215 Person_organization_assignment to Physical_instance

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1216 Person_organization_assignment to Physical_instance_test_result

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.1217 Person_organization_assignment to Process_operation_definition

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Process_operation_definition (see 4.2.381) objects. Each Process_operation_definition is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1218 Person_organization_assignment to Process_operation_occurrence

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Process_operation_occurrence (see 4.2.384) objects. Each Process_operation_occurrence is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1219 Person_organization_assignment to Process_operation_resource_assignment

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Process_operation_resource_assignment (see 4.2.386) objects. Each Process_operation_resource_assignment is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1220 Person_organization_assignment to Process_plan

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1221 Person_organization_assignment to Product_class

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

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4.3.1222 Person_organization_assignment to Product_identification

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Product_identification (see 4.2.398) objects. Each Product_identification is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1223 Person_organization_assignment to Product_structure_relationship

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select and general_organizational_data_select.

4.3.1224 Person_organization_assignment to Project

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.1225 Person_organization_assignment to Property

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

4.3.1226 Person_organization_assignment to Property_value_association

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_organizational_data_select, and general_organizational_data_sub_select.

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4.3.1227 Person_organization_assignment to Security_classification

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Security_classification (see 4.2.443) objects. Each Security_classification is related to zero or more Person_organization_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1228 Person_organization_assignment to Security_level

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Security_level (see 4.2.444) objects. Each Security_level is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1229 Person_organization_assignment to Specification

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1230 Person_organization_assignment to Specification_category

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Person_organization_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1231 Person_organization_assignment to Specification_expression

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

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4.3.1232 Person_organization_assignment to Specification_inclusion

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Person_organization_-assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1233 Person_organization_assignment to Styled_model

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1234 Person_organization_assignment to View_area

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1235 Person_organization_assignment to Work_order

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1236 Person_organization_assignment to Work_request

Each Person_organization_assignment (see 4.2.349) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Person_organization_assignment objects.

NOTE - This assertion is established through date_time_person_organization_element_select, general_-organizational_data_select, and general_organizational_data_sub_select.

4.3.1237 Physical_assembly_relationship to Item_instance

Each Physical_assembly_relationship (see 4.2.350) is_realization_of exactly one Item_instance (see 4.2.271). Each Item_instance is related to zero or more Physical_assembly_relationship objects.

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4.3.1238 Physical_assembly_relationship to Physical_instance

Each Physical_assembly_relationship (see 4.2.350) refers to exactly one Physical_instance (see 4.2.352) in the role of physical_assembly. Each Physical_instance acts as physical_assembly for zero or more Physical_assembly_relationship objects.

Each Physical_assembly_relationship refers to exactly one Physical_instance in the role of physical_-component. Each Physical_instance acts as physical_component for zero or more Physical_assembly_-relationship objects.

4.3.1239 Physical_document to Hardcopy

Each Physical_document (see 4.2.351) refers to zero or more Hardcopy (see 4.2.253) objects in the role of component. Each Hardcopy acts as component for zero or more Physical_document objects.

4.3.1240 Physical_instance to Design_discipline_item_definition

Each Physical_instance (see 4.2.352) is_realization_of zero or one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is related to zero or more Physical_instance objects.

NOTE - This assertion is established through physical_instance_definition_select.

4.3.1241 Physical_instance to Multi_language_string

Each Physical_instance (see 4.2.352) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Physical_instance objects.

NOTE - This assertion is established through string_select.

4.3.1242 Physical_instance to Product_identification

Each Physical_instance (see 4.2.352) is_realization_of zero or one Product_identification (see 4.2.398). Each Product_identification is related to zero or more Physical_instance objects.

NOTE - This assertion is established through physical_instance_definition_select.

4.3.1243 Physical_instance_test_result to Activity

Each Physical_instance_test_result (see 4.2.353) refers to zero or one Activity (see 4.2.2) in the role of test_activity. Each Activity acts as test_activity for zero or more Physical_instance_test_result objects.

NOTE - This assertion is established through test_activity_select.

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4.3.1244 Physical_instance_test_result to Multi_language_string

Each Physical_instance_test_result (see 4.2.353) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Physical_instance_test_result objects.

NOTE - This assertion is established through string_select.

4.3.1245 Physical_instance_test_result to Physical_instance

Each Physical_instance_test_result (see 4.2.353) refers to exactly one Physical_instance (see 4.2.352) in the role of tested_instance. Each Physical_instance acts as tested_instance for zero or more Physical_instance_test_result objects.

4.3.1246 Physical_instance_test_result to Process_operation_occurrence

Each Physical_instance_test_result (see 4.2.353) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of test_activity. Each Process_operation_occurrence acts as test_activity for zero or more Physical_instance_test_result objects.

NOTE - This assertion is established through test_activity_select.

4.3.1247 Physical_instance_test_result to Property_value_representation

Each Physical_instance_test_result (see 4.2.353) refers to zero or more Property_value_representation (see 4.2.414) objects in the role of test_result. Each Property_value_representation acts as test_result for zero or more Physical_instance_test_result objects.

4.3.1248 Placed_feature to Feature_placement

Each Placed_feature (see 4.2.356) is_placed_by exactly one Feature_placement (see 4.2.202). Each Feature_placement is related to zero or more Placed_feature objects.

4.3.1249 Placed_target to Axis_placement

Each Placed_target (see 4.2.357) refers to exactly one Axis_placement (see 4.2.33) in the role of parameter_reference. Each Axis_placement acts as parameter_reference for zero or more Placed_target objects.

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4.3.1250 Placed_target to Cartesian_coordinate_space

Each Placed_target (see 4.2.357) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Placed_target objects.

4.3.1251 Planar_bottom_condition to Feature_parameter

Each Planar_bottom_condition (see 4.2.358) refers to zero or one Feature_parameter (see 4.2.201) in the role of floor_radius. Each Feature_parameter acts as floor_radius for zero or more Planar_bottom_-condition objects.

4.3.1252 Plib_property_reference to Plib_class_reference

Each Plib_property_reference (see 4.2.362) refers to exactly one Plib_class_reference (see 4.2.361) in the role of name_scope. Each Plib_class_reference acts as name_scope for zero or more Plib_property_-reference objects.

4.3.1253 Pocket_feature to Angle_taper

Each Pocket_feature (see 4.2.366) refers to zero or one Angle_taper (see 4.2.12) in the role of taper. Each Angle_taper acts as taper for zero or more Pocket_feature objects.

NOTE - This assertion is established through taper_select.

4.3.1254 Pocket_feature to Diameter_taper

Each Pocket_feature (see 4.2.366) refers to zero or one Diameter_taper (see 4.2.146) in the role of taper. Each Diameter_taper acts as taper for zero or more Pocket_feature objects.

NOTE - This assertion is established through taper_select.

4.3.1255 Pocket_feature to Directed_taper

Each Pocket_feature (see 4.2.366) refers to zero or one Directed_taper (see 4.2.154) in the role of taper. Each Directed_taper acts as taper for zero or more Pocket_feature objects.

NOTE - This assertion is established through taper_select.

4.3.1256 Pocket_feature to Feature_parameter

Each Pocket_feature (see 4.2.366) refers to zero or one Feature_parameter (see 4.2.201) in the role of base_radius. Each Feature_parameter acts as base_radius for zero or more Pocket_feature objects.

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4.3.1257 Pocket_feature to Linear_path

Each Pocket_feature (see 4.2.366) refers to exactly one Linear_path (see 4.2.300) in the role of pocket_depth. Each Linear_path acts as pocket_depth for zero or more Pocket_feature objects.

4.3.1258 Pocket_feature to Pocket_bottom_condition

Each Pocket_feature (see 4.2.366) refers to zero or one Pocket_bottom_condition (see 4.2.365) in the role of bottom_condition. Each Pocket_bottom_condition acts as bottom_condition for zero or more Pocket_feature objects.

NOTE - This assertion is established through pocket_bottom_condition_select.

4.3.1259 Pocket_feature to Profile_usage

Each Pocket_feature (see 4.2.366) refers to exactly one Profile_usage (see 4.2.403) in the role of boundary. Each Profile_usage acts as boundary for zero or more Pocket_feature objects.

4.3.1260 Pocket_feature to Through_pocket_bottom_condition

Each Pocket_feature (see 4.2.366) refers to zero or one Through_pocket_bottom_condition (see 4.2.520) in the role of bottom_condition. Each Through_pocket_bottom_condition acts as bottom_condition for zero or more Pocket_feature objects.

NOTE - This assertion is established through pocket_bottom_condition_select.

4.3.1261 Point_appearance to Point_marker_symbol

Each Point_appearance (see 4.2.368) refers to exactly one Point_marker_symbol (see 4.2.372) in the role of marker. Each Point_marker_symbol acts as marker for zero or more Point_appearance objects.

4.3.1262 Point_direction to Cartesian_point

Each Point_direction (see 4.2.369) refers to exactly one Cartesian_point (see 4.2.47) in the role of location. Each Cartesian_point acts as location for zero or more Point_direction objects.

4.3.1263 Point_direction_model to Point_direction_sequence

Each Point_direction_model (see 4.2.370) refers to zero or more Point_direction_sequence (see 4.2.371) objects in the role of point_direction_elements. Each Point_direction_sequence acts as point_direction_elements for zero or more Point_direction_model objects.

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4.3.1264 Point_direction_model to Point_sequence

Each Point_direction_model (see 4.2.370) refers to zero or more Point_sequence (see 4.2.375) objects in the role of point_elements. Each Point_sequence acts as point_elements for zero or more Point_direction_model objects.

4.3.1265 Point_direction_sequence to Point_direction

Each Point_direction_sequence (see 4.2.371) refers to zero or more Point_direction (see 4.2.369) objects in the role of element. Each Point_direction acts as element for zero or more Point_direction_sequence objects.

NOTE - This assertion is established through point_direction_element_select.

4.3.1266 Point_direction_sequence to Point_on_surface

Each Point_direction_sequence (see 4.2.371) refers to zero or more Point_on_surface (see 4.2.374) objects in the role of element. Each Point_on_surface acts as element for zero or more Point_direction_sequence objects.

NOTE - This assertion is established through point_direction_element_select.

4.3.1267 Point_sequence to Cartesian_point

Each Point_sequence (see 4.2.375) refers to one or more Cartesian_point (see 4.2.47) objects in the role of element. Each Cartesian_point acts as element for zero or more Point_sequence objects.

4.3.1268 Poly_loop to Cartesian_point

Each Poly_loop (see 4.2.376) refers to three or more Cartesian_point (see 4.2.47) objects in the role of polygon. Each Cartesian_point acts as polygon for zero or more Poly_loop objects.

4.3.1269 Position_tolerance to Datum

Each Position_tolerance (see 4.2.378) refers to zero, one, two, or three Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Position_tolerance objects.

4.3.1270 Position_tolerance to Reference_plane

Each Position_tolerance (see 4.2.378) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Position_tolerance objects.

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4.3.1271 Process_feature_in_solid to Axis_placement

Each Process_feature_in_solid (see 4.2.380) refers to exactly one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more Process_feature_in_solid objects.

4.3.1272 Process_operation_definition to Multi_language_string

Each Process_operation_definition (see 4.2.381) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Process_operation_definition objects.

NOTE 1 - This assertion is established through string_select.

Each Process_operation_definition refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Process_operation_definition objects.

NOTE 2 - This assertion is established through string_select.

4.3.1273 Process_operation_definition_relationship to Process_operation_definition

Each Process_operation_definition_relationship (see 4.2.382) is related to exactly one Process_operation_definition (see 4.2.381). Each Process_operation_definition is referenced by zero or more Process_operation_definition_relationship objects as related.

NOTE 1 - The related Process_operation_definition is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Process_operation_definition_relationship is relating to exactly one Process_operation_definition. Each Process_operation_definition is referenced by zero or more Process_operation_definition_relationship objects as relating.

NOTE 2 - The relating Process_operation_definition is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1274 Process_operation_input_or_output to Assembly_component_relationship

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Assembly_component_relationship (see 4.2.26) in the role of element. Each Assembly_component_relationship acts as element for zero or more Process_operation_input_or_output objects.

NOTE - This assertion is established through process_operation_input_or_output_select.

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4.3.1275 Process_operation_input_or_output to Design_discipline_item_definition

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of element. Each Design_discipline_item_definition acts as element for zero or more Process_operation_input_or_output objects.

NOTE - This assertion is established through process_operation_input_or_output_select.

4.3.1276 Process_operation_input_or_output to Item_instance

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Item_instance (see 4.2.271) in the role of element. Each Item_instance acts as element for zero or more Process_operation_input_or_output objects.

NOTE - This assertion is established through process_operation_input_or_output_select.

4.3.1277 Process_operation_input_or_output to Mated_item_association

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Mated_item_association (see 4.2.307) in the role of element. Each Mated_item_association acts as element for zero or more Process_operation_input_or_output objects.

NOTE - This assertion is established through process_operation_input_or_output_select.

4.3.1278 Process_operation_input_or_output to Multi_language_string

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Process_operation_input_or_output objects.

NOTE - This assertion is established through string_select.

4.3.1279 Process_operation_input_or_output to Process_operation_occurrence

Each Process_operation_input_or_output (see 4.2.383) refers to exactly one Process_operation_occurrence (see 4.2.384) in the role of operation. Each Process_operation_occurrence acts as operation for zero or more Process_operation_input_or_output objects.

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4.3.1280 Process_operation_input_or_output to Shape_element

Each Process_operation_input_or_output (see 4.2.383) refers to zero or more Shape_element (see 4.2.449) objects in the role of concerned_shape. Each Shape_element acts as concerned_shape for zero or more Process_operation_input_or_output objects.

4.3.1281 Process_operation_input_or_output to Transformation

Each Process_operation_input_or_output (see 4.2.383) refers to zero or one Transformation (see 4.2.533) in the role of placement. Each Transformation acts as placement for zero or more Process_operation_-input_or_output objects.

4.3.1282 Process_operation_occurrence to Cartesian_coordinate_space

Each Process_operation_occurrence (see 4.2.384) is_defined_in zero or one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Process_operation_occurrence objects.

4.3.1283 Process_operation_occurrence to Process_operation_definition

Each Process_operation_occurrence (see 4.2.384) refers to exactly one Process_operation_definition (see 4.2.381) in the role of operation_definition. Each Process_operation_definition acts as operation_definition for zero or more Process_operation_occurrence objects.

4.3.1284 Process_operation_occurrence to Process_plan

Each Process_operation_occurrence (see 4.2.384) refers to exactly one Process_plan (see 4.2.387) in the role of plan. Each Process_plan acts as plan for zero or more Process_operation_occurrence objects.

4.3.1285 Process_operation_occurrence_relationship to Multi_language_string

Each Process_operation_occurrence_relationship (see 4.2.385) refers to zero or one Multi_language_-string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Process_operation_occurrence_relationship objects.

NOTE - This assertion is established through string_select.

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4.3.1286 Process_operation_occurrence_relationship to Process_operation_occurrence

Each Process_operation_occurrence_relationship (see 4.2.385) is related to exactly one Process_operation_occurrence (see 4.2.384). Each Process_operation_occurrence is referenced by zero or more Process_operation_occurrence_relationship objects as related.

NOTE 1 - The related Process_operation_occurrence is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Process_operation_occurrence_relationship is relating to exactly one Process_operation_occurrence. Each Process_operation_occurrence is referenced by zero or more Process_operation_occurrence_relationship objects as relating.

NOTE 2 - The relating Process_operation_occurrence is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1287 Process_operation_occurrence_relationship to Property_value

Each Process_operation_occurrence_relationship (see 4.2.385) refers to zero or one Property_value (see 4.2.412) in the role of waiting_time. Each Property_value acts as waiting_time for zero or more Process_operation_occurrence_relationship objects.

4.3.1288 Process_operation_resource_assignment to Descriptive_specification

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Descriptive_specification (see 4.2.137) in the role of resource_definition. Each Descriptive_specification acts as resource_definition for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through resource_definition_select.

4.3.1289 Process_operation_resource_assignment to Design_discipline_item_definition

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Design_discipline_item_definition (see 4.2.142) in the role of resource_definition. Each Design_discipline_item_definition acts as resource_definition for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through resource_definition_select.

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4.3.1290 Process_operation_resource_assignment to Item_instance

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Item_instance (see 4.2.271) in the role of resource_definition. Each Item_instance acts as resource_definition for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through resource_definition_select.

4.3.1291 Process_operation_resource_assignment to Multi_language_string

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Multi_language_string (see 4.2.320) in the role of reason. Each Multi_language_string acts as reason for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through string_select.

4.3.1292 Process_operation_resource_assignment to Physical_instance

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Physical_instance (see 4.2.352) in the role of resource_definition. Each Physical_instance acts as resource_definition for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through resource_definition_select.

4.3.1293 Process_operation_resource_assignment to Process_operation_occurrence

Each Process_operation_resource_assignment (see 4.2.386) refers to exactly one Process_operation_occurrence (see 4.2.384) in the role of operation. Each Process_operation_occurrence acts as operation for zero or more Process_operation_resource_assignment objects.

4.3.1294 Process_operation_resource_assignment to Product_component

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Product_component (see 4.2.394) in the role of resource_definition. Each Product_component acts as resource_definition for zero or more Process_operation_resource_assignment objects.

NOTE - This assertion is established through resource_definition_select.

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4.3.1295 Process_operation_resource_assignment to Transformation

Each Process_operation_resource_assignment (see 4.2.386) refers to zero or one Transformation (see 4.2.533) in the role of placement. Each Transformation acts as placement for zero or more Process_-operation_resource_assignment objects.

4.3.1296 Process_plan to Item_version

Each Process_plan (see 4.2.387) refers to zero or more Item_version (see 4.2.275) objects in the role of produced_output. Each Item_version acts as produced_output for zero or more Process_plan objects.

4.3.1297 Process_plan to Multi_language_string

Each Process_plan (see 4.2.387) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Process_plan objects.

NOTE 1 - This assertion is established through string_select.

Each Process_plan refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Process_plan objects.

NOTE 2 - This assertion is established through string_select.

4.3.1298 Process_plan_relationship to Multi_language_string

Each Process_plan_relationship (see 4.2.388) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Process_-plan_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1299 Process_plan_relationship to Process_plan

Each Process_plan_relationship (see 4.2.388) is related to exactly one Process_plan (see 4.2.387). Each Process_plan is referenced by zero or more Process_plan_relationship objects as related.

NOTE 1 - The related Process_plan is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Process_plan_relationship is relating to exactly one Process_plan. Each Process_plan is referenced by zero or more Process_plan_relationship objects as relating.

NOTE 2 - The relating Process_plan is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.1300 Process_property_association to Activity

Each Process_property_association (see 4.2.390) refers to zero or one Activity (see 4.2.2) in the role of described_element. Each Activity acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

4.3.1301 Process_property_association to Activity_method_assignment

Each Process_property_association (see 4.2.390) refers to zero or one Activity_method_assignment (see 4.2.5) in the role of described_element. Each Activity_method_assignment acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

4.3.1302 Process_property_association to Process_operation_definition

Each Process_property_association (see 4.2.390) refers to zero or one Process_operation_definition (see 4.2.381) in the role of described_element. Each Process_operation_definition acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

4.3.1303 Process_property_association to Process_operation_occurrence

Each Process_property_association (see 4.2.390) refers to zero or one Process_operation_occurrence (see 4.2.384) in the role of described_element. Each Process_operation_occurrence acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

4.3.1304 Process_property_association to Process_operation_resource_assignment

Each Process_property_association (see 4.2.390) refers to zero or one Process_operation_resource_assignment (see 4.2.386) in the role of described_element. Each Process_operation_resource_assignment acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

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4.3.1305 Process_property_association to Process_plan

Each Process_property_association (see 4.2.390) refers to zero or one Process_plan (see 4.2.387) in the role of described_element. Each Process_plan acts as described_element for zero or more Process_property_association objects.

NOTE - This assertion is established through process_property_select.

4.3.1306 Process_state to Design_discipline_item_definition

Each Process_state (see 4.2.391) refers to exactly one Design_discipline_item_definition (see 4.2.142) in the role of related_item_definition. Each Design_discipline_item_definition acts as related_item_definition for zero or more Process_state objects.

4.3.1307 Product_class to Multi_language_string

Each Product_class (see 4.2.392) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_class objects.

NOTE 1 - This assertion is established through string_select.

Each Product_class refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Product_class objects.

NOTE 2 - This assertion is established through string_select.

4.3.1308 Product_class_relationship to Multi_language_string

Each Product_class_relationship (see 4.2.393) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_class_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1309 Product_class_relationship to Product_class

Each Product_class_relationship (see 4.2.393) is related to exactly one Product_class (see 4.2.392). Each Product_class is referenced by zero or more Product_class_relationship objects as related.

NOTE 1 - The related Product_class is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Product_class_relationship is relating to exactly one Product_class. Each Product_class is referenced by zero or more Product_class_relationship objects as relating.

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NOTE 2 - The relating Product_class is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1310 Product_component to Application_context

Each Product_component (see 4.2.394) is_relevant_for zero or more Application_context (see 4.2.21) objects. Each Application_context is related to zero or more Product_component objects.

4.3.1311 Product_component to Class_category_association

Each Product_component (see 4.2.394) is_influenced_by zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Product_component objects.

4.3.1312 Product_component to Multi_language_string

Each Product_component (see 4.2.394) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_component objects.

NOTE 1 - This assertion is established through string_select.

Each Product_component refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Product_component objects.

NOTE 2 - This assertion is established through string_select.

4.3.1313 Product_design to Item_version

Each Product_design (see 4.2.396) refers to exactly one Item_version (see 4.2.275) in the role of design. Each Item_version has associated_product defined by zero or one Product_design.

4.3.1314 Product_design to Product_identification

Each Product_design (see 4.2.396) refers to exactly one Product_identification (see 4.2.398) in the role of product. Each Product_identification has associated_design defined by zero or one Product_design.

4.3.1315 Product_function to Application_context

Each Product_function (see 4.2.397) is_relevant_for zero or more Application_context (see 4.2.21) objects. Each Application_context is related to zero or more Product_function objects.

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4.3.1316 Product_function to Multi_language_string

Each Product_function (see 4.2.397) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_function objects.

NOTE 1 - This assertion is established through string_select.

Each Product_function refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Product_function objects.

NOTE 2 - This assertion is established through string_select.

4.3.1317 Product_identification to Multi_language_string

Each Product_identification (see 4.2.398) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_identification objects.

NOTE 1 - This assertion is established through string_select.

Each Product_identification refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Product_identification objects.

NOTE 2 - This assertion is established through string_select.

4.3.1318 Product_identification to Product_class

Each Product_identification (see 4.2.398) refers to exactly one Product_class (see 4.2.392) in the role of associated_product_class. Each Product_class acts as associated_product_class for zero or more Product_identification objects.

4.3.1319 Product_specification to Specification

Each Product_specification (see 4.2.399) refers to one or more Specification (see 4.2.467) objects in the role of defining_specification. Each Specification acts as defining_specification for zero or more Product_specification objects.

4.3.1320 Product_structure_relationship to Complex_product

Each Product_structure_relationship (see 4.2.400) is relating to exactly one Complex_product (see 4.2.80). Each Complex_product is referenced by zero or more Product_structure_relationship objects as relating.

NOTE - The relating Complex_product is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.1321 Product_structure_relationship to Multi_language_string

Each Product_structure_relationship (see 4.2.400) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Product_structure_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1322 Product_structure_relationship to Product_constituent

Each Product_structure_relationship (see 4.2.400) is related to exactly one Product_constituent (see 4.2.395). Each Product_constituent is referenced by zero or more Product_structure_relationship objects as related.

NOTE - The related Product_constituent is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

4.3.1323 Profile to Axis_placement

Each Profile (see 4.2.401) refers to exactly one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more Profile objects.

4.3.1324 Profile to Cartesian_coordinate_space

Each Profile (see 4.2.401) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Profile objects.

4.3.1325 Profile_parameter to General_feature

Each Profile_parameter (see 4.2.402) refers to exactly one General_feature (see 4.2.221) in the role of parameter_context. Each General_feature acts as parameter_context for zero or more Profile_parameter objects.

4.3.1326 Profile_parameter to Profile

Each Profile_parameter (see 4.2.402) refers to exactly one Profile (see 4.2.401) in the role of associated_profile. Each Profile acts as associated_profile for zero or more Profile_parameter objects.

4.3.1327 Profile_usage to Profile

Each Profile_usage (see 4.2.403) refers to exactly one Profile (see 4.2.401) in the role of used_profile. Each Profile acts as used_profile for zero or more Profile_usage objects.

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4.3.1328 Profile_usage to Transformation

Each Profile_usage (see 4.2.403) refers to zero or one Transformation (see 4.2.533) in the role of profile_-placement. Each Transformation acts as profile_placement for zero or more Profile_usage objects.

4.3.1329 Project to Activity

Each Project (see 4.2.404) refers to zero or more Activity (see 4.2.2) objects in the role of work_program. Each Activity has associated_project defined by zero or one Project.

4.3.1330 Project to Date_time

Each Project (see 4.2.404) refers to zero or one Date_time (see 4.2.119) in the role of actual_end_date. Each Date_time acts as actual_end_date for zero or more Project objects.

Each Project refers to zero or one Date_time in the role of actual_start_date. Each Date_time acts as actual_start_date for zero or more Project objects.

Each Project refers to zero or one Date_time in the role of planned_end_date. Each Date_time acts as planned_end_date for zero or more Project objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Project refers to zero or one Date_time in the role of planned_start_date. Each Date_time acts as planned_start_date for zero or more Project objects.

NOTE 2 - This assertion is established through event_or_date_select.

4.3.1331 Project to Duration

Each Project (see 4.2.404) refers to zero or one Duration (see 4.2.174) in the role of planned_end_date. Each Duration acts as planned_end_date for zero or more Project objects.

NOTE - This assertion is established through period_or_date_select.

4.3.1332 Project to Event_reference

Each Project (see 4.2.404) refers to zero or one Event_reference (see 4.2.184) in the role of planned_-end_date. Each Event_reference acts as planned_end_date for zero or more Project objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Project refers to zero or one Event_reference in the role of planned_start_date. Each Event_-reference acts as planned_start_date for zero or more Project objects.

NOTE 2 - This assertion is established through event_or_date_select.

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4.3.1333 Project to Multi_language_string

Each Project (see 4.2.404) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Project objects.

NOTE 1 - This assertion is established through string_select.

Each Project refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Project objects.

NOTE 2 - This assertion is established through string_select.

4.3.1334 Project to Product_class

Each Project (see 4.2.404) refers to zero or more Product_class (see 4.2.392) objects in the role of affected_product_class. Each Product_class acts as affected_product_class for zero or more Project objects.

4.3.1335 Project_relationship to Multi_language_string

Each Project_relationship (see 4.2.405) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Project_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1336 Project_relationship to Project

Each Project_relationship (see 4.2.405) is related to exactly one Project (see 4.2.404). Each Project is referenced by zero or more Project_relationship objects as related.

NOTE 1 - The related Project is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Project_relationship is relating to exactly one Project. Each Project is referenced by zero or more Project_relationship objects as relating.

NOTE 2 - The relating Project is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1337 Projection to Shape_element

Each Projection (see 4.2.406) refers to exactly one Shape_element (see 4.2.449) in the role of projection_end. Each Shape_element acts as projection_end for zero or more Projection objects.

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4.3.1338 Property to External_library_reference

Each Property (see 4.2.409) refers to zero or one External_library_reference (see 4.2.188) in the role of property_source. Each External_library_reference acts as property_source for zero or more Property objects.

NOTE - This assertion is established through property_source_select.

4.3.1339 Property to Multi_language_string

Each Property (see 4.2.409) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Property objects.

NOTE - This assertion is established through string_select.

4.3.1340 Property to Plib_property_reference

Each Property (see 4.2.409) refers to zero or one Plib_property_reference (see 4.2.362) in the role of property_source. Each Plib_property_reference acts as property_source for zero or more Property objects.

NOTE - This assertion is established through property_source_select.

4.3.1341 Property to Unit

Each Property (see 4.2.409) refers to zero or more Unit (see 4.2.541) objects in the role of allowed_unit. Each Unit acts as allowed_unit for zero or more Property objects.

4.3.1342 Property_change to Change

Each Property_change (see 4.2.410) is_describing exactly one Change (see 4.2.55). Each Change is related to zero or more Property_change objects.

4.3.1343 Property_change to Multi_language_string

Each Property_change (see 4.2.410) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Property_change objects.

NOTE - This assertion is established through string_select.

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4.3.1344 Property_change to Property_value_representation

Each Property_change (see 4.2.410) refers to zero or more Property_value_representation (see 4.2.414) objects in the role of added_property. Each Property_value_representation acts as added_property for zero or more Property_change objects.

Each Property_change refers to zero or more Property_value_representation objects in the role of deleted_property. Each Property_value_representation acts as deleted_property for zero or more Property_change objects.

4.3.1345 Property_relationship to Multi_language_string

Each Property_relationship (see 4.2.411) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Property_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1346 Property_relationship to Property

Each Property_relationship (see 4.2.411) is related to exactly one Property (see 4.2.409). Each Property is referenced by zero or more Property_relationship objects as related.

NOTE 1 - The related Property is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Property_relationship is relating to exactly one Property. Each Property is referenced by zero or more Property_relationship objects as relating.

NOTE 2 - The relating Property is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1347 Property_value_association to Multi_language_string

Each Property_value_association (see 4.2.413) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Property_value_association objects.

NOTE - This assertion is established through string_select.

4.3.1348 Property_value_association to Organization

Each Property_value_association (see 4.2.413) refers to zero or one Organization (see 4.2.331) in the role of validity_context. Each Organization acts as validity_context for zero or more Property_value_association objects.

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NOTE - This assertion is established through validity_context_select.

4.3.1349 Property_value_association to Product_class

Each Property_value_association (see 4.2.413) refers to zero or one Product_class (see 4.2.392) in the role of validity_context. Each Product_class acts as validity_context for zero or more Property_value_-association objects.

NOTE - This assertion is established through validity_context_select.

4.3.1350 Property_value_association to Product_identification

Each Property_value_association (see 4.2.413) refers to zero or one Product_identification (see 4.2.398) in the role of validity_context. Each Product_identification acts as validity_context for zero or more Property_value_association objects.

NOTE - This assertion is established through validity_context_select.

4.3.1351 Property_value_association to Property_value_representation

Each Property_value_association (see 4.2.413) refers to exactly one Property_value_representation (see 4.2.414) in the role of describing_property_value. Each Property_value_representation acts as describing_property_value for zero or more Property_value_association objects.

4.3.1352 Property_value_representation to Property

Each Property_value_representation (see 4.2.414) refers to exactly one Property (see 4.2.409) in the role of definition. Each Property acts as definition for zero or more Property_value_representation objects.

4.3.1353 Property_value_representation to Property_value

Each Property_value_representation (see 4.2.414) refers to exactly one Property_value (see 4.2.412) in the role of specified_value. Each Property_value acts as specified_value for zero or more Property_-value_representation objects.

4.3.1354 Property_value_representation to Unit

Each Property_value_representation (see 4.2.414) refers to zero or one Unit (see 4.2.541) in the role of global_unit. Each Unit acts as global_unit for zero or more Property_value_representation objects.

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4.3.1355 Property_value_representation_relationship to Multi_language_string

Each Property_value_representation_relationship (see 4.2.415) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Property_value_representation_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1356 Property_value_representation_relationship to Property_value_representation

Each Property_value_representation_relationship (see 4.2.415) is related to exactly one Property_value_representation (see 4.2.414). Each Property_value_representation is referenced by zero or more Property_value_representation_relationship objects as related.

NOTE 1 - The related Property_value_representation is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Property_value_representation_relationship is relating to exactly one Property_value_representation. Each Property_value_representation is referenced by zero or more Property_value_representation_relationship objects as relating.

NOTE 2 - The relating Property_value_representation is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1357 Quantified_instance to Numerical_value

Each Quantified_instance (see 4.2.417) refers to exactly one Numerical_value (see 4.2.324) in the role of quantity. Each Numerical_value acts as quantity for zero or more Quantified_instance objects.

4.3.1358 Rectangular_closed_pocket to Closed_profile_usage

Each Rectangular_closed_pocket (see 4.2.421) refers to exactly one Closed_profile_usage (see 4.2.73) in the role of boundary. Each Closed_profile_usage acts as boundary for zero or more Rectangular_closed_pocket objects.

4.3.1359 Rectangular_closed_profile to Feature_parameter

Each Rectangular_closed_profile (see 4.2.422) refers to zero or one Feature_parameter (see 4.2.201) in the role of corner_radius. Each Feature_parameter acts as corner_radius for zero or more Rectangular_closed_profile objects.

Each Rectangular_closed_profile refers to exactly one Feature_parameter in the role of profile_length. Each Feature_parameter acts as profile_length for zero or more Rectangular_closed_profile objects.

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Each Rectangular_closed_profile refers to exactly one Feature_parameter in the role of profile_width. Each Feature_parameter acts as profile_width for zero or more Rectangular_closed_profile objects.

4.3.1360 Rectangular_offset_pattern to Feature_parameter

Each Rectangular_offset_pattern (see 4.2.423) refers to exactly one Feature_parameter (see 4.2.201) in the role of offset_distance. Each Feature_parameter acts as offset_distance for zero or more Rectangular_offset_pattern objects.

4.3.1361 Rectangular_open_pocket to Open_profile_usage

Each Rectangular_open_pocket (see 4.2.425) refers to exactly one Open_profile_usage (see 4.2.329) in the role of boundary. Each Open_profile_usage acts as boundary for zero or more Rectangular_open_pocket objects.

4.3.1362 Rectangular_pattern to Feature_parameter

Each Rectangular_pattern (see 4.2.426) refers to exactly one Feature_parameter (see 4.2.201) in the role of column_spacing. Each Feature_parameter acts as column_spacing for zero or more Rectangular_pattern objects.

Each Rectangular_pattern refers to exactly one Feature_parameter in the role of row_spacing. Each Feature_parameter acts as row_spacing for zero or more Rectangular_pattern objects.

4.3.1363 Rectangular_pattern to Rectangular_offset_pattern

Each Rectangular_pattern (see 4.2.426) refers to zero or more Rectangular_offset_pattern (see 4.2.423) objects in the role of relocated_feature. Each Rectangular_offset_pattern has base_feature defined by one or more Rectangular_pattern objects.

4.3.1364 Rectangular_pattern to Rectangular_omit_pattern

Each Rectangular_pattern (see 4.2.426) refers to zero or more Rectangular_omit_pattern (see 4.2.424) objects in the role of missing_feature. Each Rectangular_omit_pattern has base_feature defined by one or more Rectangular_pattern objects.

4.3.1365 Rectangular_size to Value_with_unit

Each Rectangular_size (see 4.2.427) refers to zero or one Value_with_unit (see 4.2.549) in the role of density. Each Value_with_unit acts as density for zero or more Rectangular_size objects.

Each Rectangular_size refers to exactly one Value_with_unit in the role of height. Each Value_with_unit acts as height for zero or more Rectangular_size objects.

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Each Rectangular_size refers to exactly one Value_with_unit in the role of width. Each Value_with_unit acts as width for zero or more Rectangular_size objects.

4.3.1366 Replaced_definition_relationship to Multi_language_string

Each Replaced_definition_relationship (see 4.2.430) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Replaced_definition_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1367 Replaced_usage_relationship to Item_definition_instance_relationship

Each Replaced_usage_relationship (see 4.2.431) refers to zero or one Item_definition_instance_relationship (see 4.2.268) in the role of usage_context. Each Item_definition_instance_relationship acts as usage_context for zero or more Replaced_usage_relationship objects.

NOTE - This assertion is established through instance_usage_context_select.

4.3.1368 Replaced_usage_relationship to Multi_language_string

Each Replaced_usage_relationship (see 4.2.431) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Replaced_usage_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1369 Replaced_usage_relationship to Process_operation_input_or_output

Each Replaced_usage_relationship (see 4.2.431) refers to zero or one Process_operation_input_or_output (see 4.2.383) in the role of usage_context. Each Process_operation_input_or_output acts as usage_context for zero or more Replaced_usage_relationship objects.

NOTE - This assertion is established through instance_usage_context_select.

4.3.1370 Replaced_usage_relationship to Product_structure_relationship

Each Replaced_usage_relationship (see 4.2.431) refers to zero or one Product_structure_relationship (see 4.2.400) in the role of usage_context. Each Product_structure_relationship acts as usage_context for zero or more Replaced_usage_relationship objects.

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NOTE - This assertion is established through instance_usage_context_select.

4.3.1371 Replicate_base_assignment to Feature_definition

Each Replicate_base_assignment (see 4.2.432) refers to exactly one Feature_definition (see 4.2.199) in the role of base_feature. Each Feature_definition acts as base_feature for zero or more Replicate_base_assignment objects.

4.3.1372 Replicate_base_assignment to Transformation

Each Replicate_base_assignment (see 4.2.432) refers to zero or one Transformation (see 4.2.533) in the role of replicate_placement. Each Transformation acts as replicate_placement for zero or more Replicate_base_assignment objects.

4.3.1373 Replicate_feature to Axis_placement

Each Replicate_feature (see 4.2.433) refers to exactly one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more Replicate_feature objects.

4.3.1374 Replicate_feature to Replicate_base_assignment

Each Replicate_feature (see 4.2.433) refers to exactly one Replicate_base_assignment (see 4.2.432) in the role of replicate_base. Each Replicate_base_assignment acts as replicate_base for zero or more Replicate_feature objects.

4.3.1375 Retention_period to Activity

Each Retention_period (see 4.2.434) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1376 Retention_period to Activity_element

Each Retention_period (see 4.2.434) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1377 Retention_period to Activity_method_assignment

Each Retention_period (see 4.2.434) is_applied_to zero or more Activity_method_assignment (see 4.2.5) objects. Each Activity_method_assignment is related to zero or more Retention_period objects.

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NOTE - This assertion is established through general_organizational_data_select.

4.3.1378 Retention_period to Alternate_item_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Alternate_item_relationship (see 4.2.9) objects. Each Alternate_item_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1379 Retention_period to Approval_status

Each Retention_period (see 4.2.434) is_applied_to zero or more Approval_status (see 4.2.24) objects. Each Approval_status is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1380 Retention_period to Assembly_substitute_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1381 Retention_period to Certification

Each Retention_period (see 4.2.434) is_applied_to zero or more Certification (see 4.2.50) objects. Each Certification is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1382 Retention_period to Class_category_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Class_category_association (see 4.2.64) objects. Each Class_category_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1383 Retention_period to Class_condition_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Class_condition_association (see 4.2.65) objects. Each Class_condition_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1384 Retention_period to Class_inclusion_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Class_inclusion_association (see 4.2.66) objects. Each Class_inclusion_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1385 Retention_period to Class_specification_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Class_specification_association (see 4.2.67) objects. Each Class_specification_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1386 Retention_period to Class_structure_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1387 Retention_period to Classification_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Classification_association (see 4.2.69) objects. Each Classification_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1388 Retention_period to Classification_system

Each Retention_period (see 4.2.434) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1389 Retention_period to Complex_product

Each Retention_period (see 4.2.434) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1390 Retention_period to Complex_product_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Complex_product_relationship (see 4.2.81) objects. Each Complex_product_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1391 Retention_period to Configuration

Each Retention_period (see 4.2.434) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1392 Retention_period to Contract

Each Retention_period (see 4.2.434) is_applied_to zero or more Contract (see 4.2.104) objects. Each Contract is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1393 Retention_period to Date_time

Each Retention_period (see 4.2.434) refers to zero or one Date_time (see 4.2.119) in the role of earliest_end_definition. Each Date_time acts as earliest_end_definition for zero or more Retention_period objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Retention_period refers to zero or one Date_time in the role of latest_end_definition. Each Date_time acts as latest_end_definition for zero or more Retention_period objects.

NOTE 2 - This assertion is established through period_or_date_select.

Each Retention_period refers to zero or one Date_time in the role of start_definition. Each Date_time acts as start_definition for zero or more Retention_period objects.

NOTE 3 - This assertion is established through event_or_date_select.

4.3.1394 Retention_period to Design_constraint

Each Retention_period (see 4.2.434) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1395 Retention_period to Design_discipline_item_definition

Each Retention_period (see 4.2.434) is_applied_to zero or more Design_discipline_item_definition (see 4.2.142) objects. Each Design_discipline_item_definition is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1396 Retention_period to Document

Each Retention_period (see 4.2.434) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1397 Retention_period to Document_file

Each Retention_period (see 4.2.434) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1398 Retention_period to Document_representation

Each Retention_period (see 4.2.434) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1399 Retention_period to Document_version

Each Retention_period (see 4.2.434) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1400 Retention_period to Drawing

Each Retention_period (see 4.2.434) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1401 Retention_period to Drawing_sheet

Each Retention_period (see 4.2.434) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1402 Retention_period to Duration

Each Retention_period (see 4.2.434) refers to zero or one Duration (see 4.2.174) in the role of earliest_end_definition. Each Duration acts as earliest_end_definition for zero or more Retention_period objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Retention_period refers to zero or one Duration in the role of latest_end_definition. Each Duration acts as latest_end_definition for zero or more Retention_period objects.

NOTE 2 - This assertion is established through period_or_date_select.

4.3.1403 Retention_period to Event_reference

Each Retention_period (see 4.2.434) refers to zero or one Event_reference (see 4.2.184) in the role of earliest_end_definition. Each Event_reference acts as earliest_end_definition for zero or more Retention_period objects.

NOTE 1 - This assertion is established through period_or_date_select.

Each Retention_period refers to zero or one Event_reference in the role of latest_end_definition. Each Event_reference acts as latest_end_definition for zero or more Retention_period objects.

NOTE 2 - This assertion is established through period_or_date_select.

Each Retention_period refers to zero or one Event_reference in the role of start_definition. Each Event_reference acts as start_definition for zero or more Retention_period objects.

NOTE 3 - This assertion is established through event_or_date_select.

4.3.1404 Retention_period to General_classification

Each Retention_period (see 4.2.434) is_applied_to zero or more General_classification (see 4.2.216) objects. Each General_classification is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1405 Retention_period to Geometric_model

Each Retention_period (see 4.2.434) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1406 Retention_period to Item

Each Retention_period (see 4.2.434) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1407 Retention_period to Item_definition_instance_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_definition_instance_relationship (see 4.2.268) objects. Each Item_definition_instance_relationship is related to zero or more Retention_-period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1408 Retention_period to Item_definition_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_definition_relationship (see 4.2.269) objects. Each Item_definition_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1409 Retention_period to Item_instance

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_instance (see 4.2.271) objects. Each Item_instance is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1410 Retention_period to Item_instance_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_instance_relationship (see 4.2.272) objects. Each Item_instance_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1411 Retention_period to Item_version

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1412 Retention_period to Item_version_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Item_version_relationship (see 4.2.276) objects. Each Item_version_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1413 Retention_period to Kinematic_simulation_information

Each Retention_period (see 4.2.434) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1414 Retention_period to Manufacturing_configuration

Each Retention_period (see 4.2.434) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1415 Retention_period to Material

Each Retention_period (see 4.2.434) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1416 Retention_period to Multi_language_string

Each Retention_period (see 4.2.434) refers to zero or one Multi_language_string (see 4.2.320) in the role of retention_purpose. Each Multi_language_string acts as retention_purpose for zero or more Retention_period objects.

NOTE - This assertion is established through string_select.

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4.3.1417 Retention_period to Organization_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Organization_relationship (see 4.2.333) objects. Each Organization_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1418 Retention_period to Person_in_organization

Each Retention_period (see 4.2.434) is_applied_to zero or more Person_in_organization (see 4.2.347) objects. Each Person_in_organization is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1419 Retention_period to Person_in_organization_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Person_in_organization_relationship (see 4.2.348) objects. Each Person_in_organization_relationship is related to zero or more Retention_-period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1420 Retention_period to Physical_assembly_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1421 Retention_period to Physical_instance

Each Retention_period (see 4.2.434) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1422 Retention_period to Physical_instance_test_result

Each Retention_period (see 4.2.434) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1423 Retention_period to Process_operation_definition

Each Retention_period (see 4.2.434) is_applied_to zero or more Process_operation_definition (see 4.2.381) objects. Each Process_operation_definition is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1424 Retention_period to Process_operation_occurrence

Each Retention_period (see 4.2.434) is_applied_to zero or more Process_operation_occurrence (see 4.2.384) objects. Each Process_operation_occurrence is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1425 Retention_period to Process_operation_resource_assignment

Each Retention_period (see 4.2.434) is_applied_to zero or more Process_operation_resource_assignment (see 4.2.386) objects. Each Process_operation_resource_assignment is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1426 Retention_period to Process_plan

Each Retention_period (see 4.2.434) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1427 Retention_period to Product_class

Each Retention_period (see 4.2.434) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1428 Retention_period to Product_identification

Each Retention_period (see 4.2.434) is_applied_to zero or more Product_identification (see 4.2.398) objects. Each Product_identification is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

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4.3.1429 Retention_period to Product_structure_relationship

Each Retention_period (see 4.2.434) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select.

4.3.1430 Retention_period to Project

Each Retention_period (see 4.2.434) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1431 Retention_period to Property

Each Retention_period (see 4.2.434) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1432 Retention_period to Property_value_association

Each Retention_period (see 4.2.434) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1433 Retention_period to Security_classification

Each Retention_period (see 4.2.434) is_applied_to zero or more Security_classification (see 4.2.443) objects. Each Security_classification is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1434 Retention_period to Security_level

Each Retention_period (see 4.2.434) is_applied_to zero or more Security_level (see 4.2.444) objects. Each Security_level is related to zero or more Retention_period objects.

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NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1435 Retention_period to Specification

Each Retention_period (see 4.2.434) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1436 Retention_period to Specification_category

Each Retention_period (see 4.2.434) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1437 Retention_period to Specification_expression

Each Retention_period (see 4.2.434) is_applied_to zero or more Specification_expression (see 4.2.470) objects. Each Specification_expression is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1438 Retention_period to Specification_inclusion

Each Retention_period (see 4.2.434) is_applied_to zero or more Specification_inclusion (see 4.2.471) objects. Each Specification_inclusion is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1439 Retention_period to Styled_model

Each Retention_period (see 4.2.434) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

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4.3.1440 Retention_period to View_area

Each Retention_period (see 4.2.434) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1441 Retention_period to Work_order

Each Retention_period (see 4.2.434) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1442 Retention_period to Work_request

Each Retention_period (see 4.2.434) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Retention_period objects.

NOTE - This assertion is established through general_organizational_data_select and general_organizational_data_sub_select.

4.3.1443 Rib_feature to Directed_taper

Each Rib_feature (see 4.2.435) refers to zero or one Directed_taper (see 4.2.154) in the role of draft_taper. Each Directed_taper acts as draft_taper for zero or more Rib_feature objects.

4.3.1444 Rib_feature to Feature_parameter

Each Rib_feature (see 4.2.435) refers to zero or one Feature_parameter (see 4.2.201) in the role of fillet_radius. Each Feature_parameter acts as fillet_radius for zero or more Rib_feature objects.

Each Rib_feature refers to zero or one Feature_parameter in the role of shoulder_radius. Each Feature_parameter acts as shoulder_radius for zero or more Rib_feature objects.

4.3.1445 Rib_feature to Open_profile_usage

Each Rib_feature (see 4.2.435) refers to exactly one Open_profile_usage (see 4.2.329) in the role of rib_profile. Each Open_profile_usage acts as rib_profile for zero or more Rib_feature objects.

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4.3.1446 Rib_feature to Path

Each Rib_feature (see 4.2.435) refers to exactly one Path (see 4.2.342) in the role of sweep_path. Each Path acts as sweep_path for zero or more Rib_feature objects.

4.3.1447 Round_hole to Angle_taper

Each Round_hole (see 4.2.439) refers to zero or one Angle_taper (see 4.2.12) in the role of taper. Each Angle_taper acts as taper for zero or more Round_hole objects.

NOTE - This assertion is established through taper_select.

4.3.1448 Round_hole to Closed_profile_usage

Each Round_hole (see 4.2.439) refers to exactly one Closed_profile_usage (see 4.2.73) in the role of diameter. Each Closed_profile_usage acts as diameter for zero or more Round_hole objects.

4.3.1449 Round_hole to Diameter_taper

Each Round_hole (see 4.2.439) refers to zero or one Diameter_taper (see 4.2.146) in the role of taper. Each Diameter_taper acts as taper for zero or more Round_hole objects.

NOTE - This assertion is established through taper_select.

4.3.1450 Round_hole to Directed_taper

Each Round_hole (see 4.2.439) refers to zero or one Directed_taper (see 4.2.154) in the role of taper. Each Directed_taper acts as taper for zero or more Round_hole objects.

NOTE - This assertion is established through taper_select.

4.3.1451 Round_hole to Hole_bottom_condition

Each Round_hole (see 4.2.439) refers to zero or one Hole_bottom_condition (see 4.2.257) in the role of bottom_condition. Each Hole_bottom_condition acts as bottom_condition for zero or more Round_hole objects.

NOTE - This assertion is established through hole_bottom_condition_select.

4.3.1452 Round_hole to Linear_path

Each Round_hole (see 4.2.439) refers to exactly one Linear_path (see 4.2.300) in the role of hole_depth. Each Linear_path acts as hole_depth for zero or more Round_hole objects.

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4.3.1453 Round_hole to Through_hole_bottom_condition

Each Round_hole (see 4.2.439) refers to zero or one Through_hole_bottom_condition (see 4.2.519) in the role of bottom_condition. Each Through_hole_bottom_condition acts as bottom_condition for zero or more Round_hole objects.

NOTE - This assertion is established through hole_bottom_condition_select.

4.3.1454 Rounded_u_profile to Feature_parameter

Each Rounded_u_profile (see 4.2.440) refers to exactly one Feature_parameter (see 4.2.201) in the role of width. Each Feature_parameter acts as width for zero or more Rounded_u_profile objects.

4.3.1455 Same_time_machining_relationship to Geometric_model_relationship_with_transformation

Each Same_time_machining_relationship (see 4.2.442) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_transformation acts as placement for zero or more Same_time_machining_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.1456 Same_time_machining_relationship to Multi_language_string

Each Same_time_machining_relationship (see 4.2.442) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Same_time_machining_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1457 Same_time_machining_relationship to Template_instance

Each Same_time_machining_relationship (see 4.2.442) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each Template_instance acts as placement for zero or more Same_time_machining_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.1458 Security_classification to Activity

Each Security_classification (see 4.2.443) is_applied_to zero or more Activity (see 4.2.2) objects. Each Activity is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1459 Security_classification to Activity_element

Each Security_classification (see 4.2.443) is_applied_to zero or more Activity_element (see 4.2.3) objects. Each Activity_element is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1460 Security_classification to Assembly_substitute_relationship

Each Security_classification (see 4.2.443) is_applied_to zero or more Assembly_substitute_relationship (see 4.2.28) objects. Each Assembly_substitute_relationship is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1461 Security_classification to Class_structure_relationship

Each Security_classification (see 4.2.443) is_applied_to zero or more Class_structure_relationship (see 4.2.68) objects. Each Class_structure_relationship is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1462 Security_classification to Classification_system

Each Security_classification (see 4.2.443) is_applied_to zero or more Classification_system (see 4.2.71) objects. Each Classification_system is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1463 Security_classification to Complex_product

Each Security_classification (see 4.2.443) is_applied_to zero or more Complex_product (see 4.2.80) objects. Each Complex_product is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1464 Security_classification to Configuration

Each Security_classification (see 4.2.443) is_applied_to zero or more Configuration (see 4.2.94) objects. Each Configuration is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1465 Security_classification to Design_constraint

Each Security_classification (see 4.2.443) is_applied_to zero or more Design_constraint (see 4.2.138) objects. Each Design_constraint is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1466 Security_classification to Document

Each Security_classification (see 4.2.443) is_applied_to zero or more Document (see 4.2.155) objects. Each Document is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1467 Security_classification to Document_file

Each Security_classification (see 4.2.443) is_applied_to zero or more Document_file (see 4.2.159) objects. Each Document_file is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1468 Security_classification to Document_representation

Each Security_classification (see 4.2.443) is_applied_to zero or more Document_representation (see 4.2.163) objects. Each Document_representation is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1469 Security_classification to Document_version

Each Security_classification (see 4.2.443) is_applied_to zero or more Document_version (see 4.2.167) objects. Each Document_version is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1470 Security_classification to Drawing

Each Security_classification (see 4.2.443) is_applied_to zero or more Drawing (see 4.2.170) objects. Each Drawing is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1471 Security_classification to Drawing_sheet

Each Security_classification (see 4.2.443) is_applied_to zero or more Drawing_sheet (see 4.2.173) objects. Each Drawing_sheet is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1472 Security_classification to Geometric_model

Each Security_classification (see 4.2.443) is_applied_to zero or more Geometric_model (see 4.2.238) objects. Each Geometric_model is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1473 Security_classification to Item

Each Security_classification (see 4.2.443) is_applied_to zero or more Item (see 4.2.267) objects. Each Item is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1474 Security_classification to Item_version

Each Security_classification (see 4.2.443) is_applied_to zero or more Item_version (see 4.2.275) objects. Each Item_version is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1475 Security_classification to Kinematic_simulation_information

Each Security_classification (see 4.2.443) is_applied_to zero or more Kinematic_simulation_information (see 4.2.288) objects. Each Kinematic_simulation_information is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1476 Security_classification to Manufacturing_configuration

Each Security_classification (see 4.2.443) is_applied_to zero or more Manufacturing_configuration (see 4.2.305) objects. Each Manufacturing_configuration is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1477 Security_classification to Material

Each Security_classification (see 4.2.443) is_applied_to zero or more Material (see 4.2.309) objects. Each Material is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1478 Security_classification to Multi_language_string

Each Security_classification (see 4.2.443) refers to zero or one Multi_language_string (see 4.2.320) in the role of name. Each Multi_language_string acts as name for zero or more Security_classification objects.

NOTE 1 - This assertion is established through string_select.

Each Security_classification refers to zero or one Multi_language_string in the role of purpose. Each Multi_language_string acts as purpose for zero or more Security_classification objects.

NOTE 2 - This assertion is established through string_select.

4.3.1479 Security_classification to Physical_assembly_relationship

Each Security_classification (see 4.2.443) is_applied_to zero or more Physical_assembly_relationship (see 4.2.350) objects. Each Physical_assembly_relationship is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1480 Security_classification to Physical_instance

Each Security_classification (see 4.2.443) is_applied_to zero or more Physical_instance (see 4.2.352) objects. Each Physical_instance is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1481 Security_classification to Physical_instance_test_result

Each Security_classification (see 4.2.443) is_applied_to zero or more Physical_instance_test_result (see 4.2.353) objects. Each Physical_instance_test_result is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1482 Security_classification to Process_plan

Each Security_classification (see 4.2.443) is_applied_to zero or more Process_plan (see 4.2.387) objects. Each Process_plan is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1483 Security_classification to Product_class

Each Security_classification (see 4.2.443) is_applied_to zero or more Product_class (see 4.2.392) objects. Each Product_class is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1484 Security_classification to Product_structure_relationship

Each Security_classification (see 4.2.443) is_applied_to zero or more Product_structure_relationship (see 4.2.400) objects. Each Product_structure_relationship is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1485 Security_classification to Project

Each Security_classification (see 4.2.443) is_applied_to zero or more Project (see 4.2.404) objects. Each Project is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1486 Security_classification to Property

Each Security_classification (see 4.2.443) is_applied_to zero or more Property (see 4.2.409) objects. Each Property is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1487 Security_classification to Property_value_association

Each Security_classification (see 4.2.443) is_applied_to zero or more Property_value_association (see 4.2.413) objects. Each Property_value_association is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

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4.3.1488 Security_classification to Security_level

Each Security_classification (see 4.2.443) refers to exactly one Security_level (see 4.2.444) in the role of level. Each Security_level acts as level for zero or more Security_classification objects.

4.3.1489 Security_classification to Specification

Each Security_classification (see 4.2.443) is_applied_to zero or more Specification (see 4.2.467) objects. Each Specification is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1490 Security_classification to Specification_category

Each Security_classification (see 4.2.443) is_applied_to zero or more Specification_category (see 4.2.468) objects. Each Specification_category is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1491 Security_classification to Styled_model

Each Security_classification (see 4.2.443) is_applied_to zero or more Styled_model (see 4.2.484) objects. Each Styled_model is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1492 Security_classification to View_area

Each Security_classification (see 4.2.443) is_applied_to zero or more View_area (see 4.2.555) objects. Each View_area is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1493 Security_classification to Work_order

Each Security_classification (see 4.2.443) is_applied_to zero or more Work_order (see 4.2.564) objects. Each Work_order is related to zero or more Security_classification objects.

NOTE - This assertion is established through security_element_select.

4.3.1494 Security_classification to Work_request

Each Security_classification (see 4.2.443) is_applied_to zero or more Work_request (see 4.2.565) objects. Each Work_request is related to zero or more Security_classification objects.

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NOTE - This assertion is established through security_element_select.

4.3.1495 Security_level to Classification_system

Each Security_level (see 4.2.444) refers to zero or one Classification_system (see 4.2.71) in the role of used_classification_system. Each Classification_system acts as used_classification_system for zero or more Security_level objects.

4.3.1496 Selected_instance to Value_with_unit

Each Selected_instance (see 4.2.445) refers to exactly one Value_with_unit (see 4.2.549) in the role of selected_quantity. Each Value_with_unit acts as selected_quantity for zero or more Selected_instance objects.

4.3.1497 Shape_dependent_property to Cartesian_coordinate_space

Each Shape_dependent_property (see 4.2.447) is_defined_in zero or one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Shape_dependent_property objects.

4.3.1498 Shape_dependent_property to Item_shape

Each Shape_dependent_property (see 4.2.447) refers to zero or one Item_shape (see 4.2.274) in the role of described_element. Each Item_shape acts as described_element for zero or more Shape_dependent_-property objects.

NOTE - This assertion is established through shaped_element_select.

4.3.1499 Shape_dependent_property to Multi_language_string

Each Shape_dependent_property (see 4.2.447) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Shape_-dependent_property objects.

NOTE - This assertion is established through string_select.

4.3.1500 Shape_dependent_property to Shape_element

Each Shape_dependent_property (see 4.2.447) refers to zero or one Shape_element (see 4.2.449) in the role of described_element. Each Shape_element acts as described_element for zero or more Shape_-dependent_property objects.

NOTE - This assertion is established through shaped_element_select.

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4.3.1501 Shape_description_association to External_geometric_model

Each Shape_description_association (see 4.2.448) refers to zero or one External_geometric_model (see 4.2.186) in the role of defining_geometry. Each External_geometric_model acts as defining_geometry for zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_definition_select.

4.3.1502 Shape_description_association to Feature_definition

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Feature_definition (see 4.2.199). Each Feature_definition is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and feature_definition_select.

4.3.1503 Shape_description_association to General_feature

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one General_feature (see 4.2.221). Each General_feature is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and feature_definition_select.

4.3.1504 Shape_description_association to Geometric_model

Each Shape_description_association (see 4.2.448) refers to zero or one Geometric_model (see 4.2.238) in the role of defining_geometry. Each Geometric_model acts as defining_geometry for zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_definition_select.

4.3.1505 Shape_description_association to Item_shape

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Item_shape (see 4.2.274). Each Item_shape is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and shaped_element_select.

4.3.1506 Shape_description_association to Shape_element

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Shape_element (see 4.2.449). Each Shape_element is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and shaped_element_select.

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4.3.1507 Shape_description_association to Shape_element_relationship

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Shape_element_relationship (see 4.2.450). Each Shape_element_relationship is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select.

4.3.1508 Shape_description_association to Thread_feature

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Thread_feature (see 4.2.517). Each Thread_feature is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and feature_definition_select.

4.3.1509 Shape_description_association to Transition_feature

Each Shape_description_association (see 4.2.448) is_defining_shape_for zero or one Transition_feature (see 4.2.537). Each Transition_feature is related to zero or more Shape_description_association objects.

NOTE - This assertion is established through shape_information_select and feature_definition_select.

4.3.1510 Shape_element to Item_shape

Each Shape_element (see 4.2.449) refers to exactly one Item_shape (see 4.2.274) in the role of composition. Each Item_shape acts as composition for zero or more Shape_element objects.

4.3.1511 Shape_element to Multi_language_string

Each Shape_element (see 4.2.449) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Shape_element objects.

NOTE - This assertion is established through string_select.

4.3.1512 Shape_element_relationship to Multi_language_string

Each Shape_element_relationship (see 4.2.450) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Shape_element_relationship objects.

NOTE - This assertion is established through string_select.

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4.3.1513 Shape_element_relationship to Shape_element

Each Shape_element_relationship (see 4.2.450) is related to exactly one Shape_element (see 4.2.449). Each Shape_element is referenced by zero or more Shape_element_relationship objects as related.

NOTE 1 - The related Shape_element is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Shape_element_relationship is relating to exactly one Shape_element. Each Shape_element is referenced by zero or more Shape_element_relationship objects as relating.

NOTE 2 - The relating Shape_element is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1514 Shell to Face

Each Shell (see 4.2.451) refers to one or more Face (see 4.2.191) objects in the role of included_face. Each Face acts as included_face for zero or more Shell objects.

4.3.1515 Simple_pair_range to Kinematic_pair

Each Simple_pair_range (see 4.2.453) is_applied_to exactly one Kinematic_pair (see 4.2.287). Each Kinematic_pair is related to zero or more Simple_pair_range objects.

4.3.1516 Single_datum to Datum_target_set

Each Single_datum (see 4.2.454) is_defined_by zero or one Datum_target_set (see 4.2.127). Each Datum_target_set is related to zero or more Single_datum objects.

NOTE - This assertion is established through datum_representation_select.

4.3.1517 Single_datum to Derived_geometry

Each Single_datum (see 4.2.454) is_defined_by zero or one Derived_geometry (see 4.2.136). Each Derived_geometry is related to zero or more Single_datum objects.

NOTE - This assertion is established through datum_representation_select.

4.3.1518 Single_datum to Shape_element

Each Single_datum (see 4.2.454) is_defined_by zero or one Shape_element (see 4.2.449). Each Shape_element is related to zero or more Single_datum objects.

NOTE - This assertion is established through datum_representation_select.

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4.3.1519 Single_datum to Tolerance_condition

Each Single_datum (see 4.2.454) refers to zero or one Tolerance_condition (see 4.2.522) in the role of modification. Each Tolerance_condition acts as modification for zero or more Single_datum objects.

4.3.1520 Size_dimension to Annotation_curve

Each Size_dimension (see 4.2.456) is_applied_to zero or one Annotation_curve (see 4.2.16). Each Annotation_curve is related to zero or more Size_dimension objects.

NOTE - This assertion is established through element_with_dimension_select.

4.3.1521 Size_dimension to Shape_element

Each Size_dimension (see 4.2.456) is_applied_to zero or one Shape_element (see 4.2.449). Each Shape_element is related to zero or more Size_dimension objects.

NOTE - This assertion is established through element_with_dimension_select.

4.3.1522 Slot_feature to Open_profile_usage

Each Slot_feature (see 4.2.458) refers to exactly one Open_profile_usage (see 4.2.329) in the role of slot_profile. Each Open_profile_usage acts as slot_profile for zero or more Slot_feature objects.

4.3.1523 Slot_feature to Path

Each Slot_feature (see 4.2.458) refers to exactly one Path (see 4.2.342) in the role of sweep_path. Each Path acts as sweep_path for zero or more Slot_feature objects.

4.3.1524 Slot_feature to Slot_end_type

Each Slot_feature (see 4.2.458) refers to exactly two Slot_end_type (see 4.2.457) objects in the role of end_condition. Each Slot_end_type acts as end_condition for zero or more Slot_feature objects.

4.3.1525 Solid_replica to B_rep_model

Each Solid_replica (see 4.2.462) refers to zero or one B_rep_model (see 4.2.35) in the role of replicated_solid. Each B_rep_model acts as replicated_solid for zero or more Solid_replica objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.1526 Solid_replica to Boolean_result

Each Solid_replica (see 4.2.462) refers to zero or one Boolean_result (see 4.2.41) in the role of replicated_solid. Each Boolean_result acts as replicated_solid for zero or more Solid_replica objects.

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NOTE - This assertion is established through csg_select.

4.3.1527 Solid_replica to Csg_primitive

Each Solid_replica (see 4.2.462) refers to zero or one Csg_primitive (see 4.2.107) in the role of replicated_solid. Each Csg_primitive acts as replicated_solid for zero or more Solid_replica objects.

NOTE - This assertion is established through csg_select.

4.3.1528 Solid_replica to Faceted_b_rep_model

Each Solid_replica (see 4.2.462) refers to zero or one Faceted_b_rep_model (see 4.2.196) in the role of replicated_solid. Each Faceted_b_rep_model acts as replicated_solid for zero or more Solid_replica objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.1529 Solid_replica to Solid_replica

Each Solid_replica (see 4.2.462) refers to zero or one Solid_replica in the role of replicated_solid. Each Solid_replica acts as replicated_solid for zero or more Solid_replica objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.1530 Solid_replica to Swept_face_solid

Each Solid_replica (see 4.2.462) refers to zero or one Swept_face_solid (see 4.2.502) in the role of replicated_solid. Each Swept_face_solid acts as replicated_solid for zero or more Solid_replica objects.

NOTE - This assertion is established through csg_select and non_primitive_solid_select.

4.3.1531 Specific_document_classification to Document

Each Specific_document_classification (see 4.2.463) refers to one or more Document (see 4.2.155) objects in the role of associated_document. Each Document acts as associated_document for zero or more Specific_document_classification objects.

4.3.1532 Specific_document_classification to Multi_language_string

Each Specific_document_classification (see 4.2.463) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specific_document_classification objects.

NOTE - This assertion is established through string_select.

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4.3.1533 Specific_document_classification_hierarchy to Specific_document_classification

Each Specific_document_classification_hierarchy (see 4.2.464) refers to exactly one Specific_document_classification (see 4.2.463) in the role of sub_classification. Each Specific_document_classification acts as sub_classification for zero or more Specific_document_classification_hierarchy objects.

Each Specific_document_classification_hierarchy refers to exactly one Specific_document_classification in the role of super_classification. Each Specific_document_classification acts as super_classification for zero or more Specific_document_classification_hierarchy objects.

4.3.1534 Specific_item_classification to Item

Each Specific_item_classification (see 4.2.465) refers to one or more Item (see 4.2.267) objects in the role of associated_item. Each Item has item_classification defined by one or more Specific_item_classification objects.

4.3.1535 Specific_item_classification to Multi_language_string

Each Specific_item_classification (see 4.2.465) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specific_item_classification objects.

NOTE - This assertion is established through string_select.

4.3.1536 Specific_item_classification_hierarchy to Specific_item_classification

Each Specific_item_classification_hierarchy (see 4.2.466) refers to exactly one Specific_item_classification (see 4.2.465) in the role of sub_classification. Each Specific_item_classification acts as sub_classification for zero or more Specific_item_classification_hierarchy objects.

Each Specific_item_classification_hierarchy refers to exactly one Specific_item_classification in the role of super_classification. Each Specific_item_classification acts as super_classification for zero or more Specific_item_classification_hierarchy objects.

4.3.1537 Specification to Multi_language_string

Each Specification (see 4.2.467) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specification objects.

NOTE 1 - This assertion is established through string_select.

Each Specification refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Specification objects.

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NOTE 2 - This assertion is established through string_select.

4.3.1538 Specification to Specification_category

Each Specification (see 4.2.467) refers to exactly one Specification_category (see 4.2.468) in the role of category. Each Specification_category acts as category for zero or more Specification objects.

4.3.1539 Specification_category to Multi_language_string

Each Specification_category (see 4.2.468) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specification_-category objects.

NOTE - This assertion is established through string_select.

4.3.1540 Specification_category_hierarchy to Specification_category

Each Specification_category_hierarchy (see 4.2.469) refers to exactly one Specification_category (see 4.2.468) in the role of sub_category. Each Specification_category acts as sub_category for zero or more Specification_category_hierarchy objects.

Each Specification_category_hierarchy refers to exactly one Specification_category in the role of super_-category. Each Specification_category acts as super_category for zero or more Specification_category_-hierarchy objects.

4.3.1541 Specification_expression to Multi_language_string

Each Specification_expression (see 4.2.470) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specification_-expression objects.

NOTE - This assertion is established through string_select.

4.3.1542 Specification_expression to Specification

Each Specification_expression (see 4.2.470) refers to zero or more Specification (see 4.2.467) objects in the role of operand. Each Specification acts as operand for zero or more Specification_expression objects.

NOTE - This assertion is established through specification_operand_select.

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4.3.1543 Specification_expression to Specification_expression

Each Specification_expression (see 4.2.470) refers to zero or more Specification_expression objects in the role of operand. Each Specification_expression acts as operand for zero or more Specification_-expression objects.

NOTE - This assertion is established through specification_operand_select.

4.3.1544 Specification_inclusion to Multi_language_string

Each Specification_inclusion (see 4.2.471) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Specification_-inclusion objects.

NOTE - This assertion is established through string_select.

4.3.1545 Specification_inclusion to Specification

Each Specification_inclusion (see 4.2.471) refers to zero or one Specification (see 4.2.467) in the role of if_condition. Each Specification acts as if_condition for zero or more Specification_inclusion objects.

NOTE 1 - This assertion is established through specification_operand_select.

Each Specification_inclusion refers to zero or one Specification in the role of included_specification. Each Specification acts as included_specification for zero or more Specification_inclusion objects.

NOTE 2 - This assertion is established through specification_operand_select.

4.3.1546 Specification_inclusion to Specification_expression

Each Specification_inclusion (see 4.2.471) refers to zero or one Specification_expression (see 4.2.470) in the role of if_condition. Each Specification_expression acts as if_condition for zero or more Specification_inclusion objects.

NOTE 1 - This assertion is established through specification_operand_select.

Each Specification_inclusion refers to zero or one Specification_expression in the role of included_specification. Each Specification_expression acts as included_specification for zero or more Specification_-inclusion objects.

NOTE 2 - This assertion is established through specification_operand_select.

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4.3.1547 Specified_instance to Assembly_definition

Each Specified_instance (see 4.2.472) refers to exactly one Assembly_definition (see 4.2.27) in the role of assembly_context. Each Assembly_definition acts as assembly_context for zero or more Specified_instance objects.

4.3.1548 Specified_instance to Item_instance

Each Specified_instance (see 4.2.472) refers to exactly one Item_instance (see 4.2.271) in the role of related_instance. Each Item_instance acts as related_instance for zero or more Specified_instance objects.

Each Specified_instance refers to exactly one Item_instance in the role of upper_usage. Each Item_instance acts as upper_usage for zero or more Specified_instance objects.

4.3.1549 Spherical_bottom to Feature_parameter

Each Spherical_bottom (see 4.2.474) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius. Each Feature_parameter acts as radius for zero or more Spherical_bottom objects.

4.3.1550 Square_u_profile to Feature_parameter

Each Square_u_profile (see 4.2.476) refers to exactly one Feature_parameter (see 4.2.201) in the role of first_angle. Each Feature_parameter acts as first_angle for zero or more Square_u_profile objects.

Each Square_u_profile refers to zero or one Feature_parameter in the role of first_radius. Each Feature_parameter acts as first_radius for zero or more Square_u_profile objects.

Each Square_u_profile refers to exactly one Feature_parameter in the role of second_angle. Each Feature_parameter acts as second_angle for zero or more Square_u_profile objects.

Each Square_u_profile refers to zero or one Feature_parameter in the role of second_radius. Each Feature_parameter acts as second_radius for zero or more Square_u_profile objects.

Each Square_u_profile refers to exactly one Feature_parameter in the role of width. Each Feature_parameter acts as width for zero or more Square_u_profile objects.

4.3.1551 Straightness_tolerance to Reference_plane

Each Straightness_tolerance (see 4.2.477) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Straightness_tolerance objects.

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4.3.1552 String_value to Multi_language_string

Each String_value (see 4.2.478) refers to zero or one Multi_language_string (see 4.2.320) in the role of value_specification. Each Multi_language_string acts as value_specification for zero or more String_-value objects.

NOTE - This assertion is established through string_select.

4.3.1553 String_with_language to Language

Each String_with_language (see 4.2.479) refers to exactly one Language (see 4.2.291) in the role of language_specification. Each Language acts as language_specification for zero or more String_with_-language objects.

4.3.1554 Structuring_method_hierarchy to Group

Each Structuring_method_hierarchy (see 4.2.480) is related to exactly one Group (see 4.2.250). Each Group is referenced by zero or more Structuring_method_hierarchy objects as related.

NOTE 1 - The related Group is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Structuring_method_hierarchy is relating to zero or one Group. Each Group is referenced by zero or more Structuring_method_hierarchy objects as relating.

NOTE 2 - The relating Group is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

NOTE 3 - This assertion is established through structuring_method_select.

4.3.1555 Structuring_method_hierarchy to Layer

Each Structuring_method_hierarchy (see 4.2.480) is relating to zero or one Layer (see 4.2.292). Each Layer is referenced by zero or more Structuring_method_hierarchy objects as relating.

NOTE 1 - The relating Layer is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

NOTE 2 - This assertion is established through structuring_method_select.

4.3.1556 Styled_annotation_model to Cartesian_coordinate_space

Each Styled_annotation_model (see 4.2.481) is_defined_in exactly one Cartesian_coordinate_space (see 4.2.44). Each Cartesian_coordinate_space is related to zero or more Styled_annotation_model objects.

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4.3.1557 Styled_element to Appearance_assignment

Each Styled_element (see 4.2.482) refers to exactly one Appearance_assignment (see 4.2.20) in the role of appearance. Each Appearance_assignment acts as appearance for zero or more Styled_element objects.

4.3.1558 Styled_geometric_model to Geometric_model

Each Styled_geometric_model (see 4.2.483) refers to exactly one Geometric_model (see 4.2.238) in the role of styled_geometry_context. Each Geometric_model acts as styled_geometry_context for zero or more Styled_geometric_model objects.

4.3.1559 Styled_model to Multi_language_string

Each Styled_model (see 4.2.484) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Styled_model objects.

NOTE - This assertion is established through string_select.

4.3.1560 Styled_model to Styled_element

Each Styled_model (see 4.2.484) refers to one or more Styled_element (see 4.2.482) objects in the role of element. Each Styled_element acts as element for zero or more Styled_model objects.

4.3.1561 Styled_model to Template_instance

Each Styled_model (see 4.2.484) refers to zero or more Template_instance (see 4.2.512) objects in the role of additional_elements. Each Template_instance acts as additional_elements for zero or more Styled_model objects.

4.3.1562 Styled_model_element to Detailed_model_element

Each Styled_model_element (see 4.2.485) refers to exactly one Detailed_model_element (see 4.2.145) in the role of element. Each Detailed_model_element acts as element for zero or more Styled_model_element objects.

4.3.1563 Styled_model_relationship to Multi_language_string

Each Styled_model_relationship (see 4.2.486) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Styled_model_relationship objects.

NOTE - This assertion is established through string_select.

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4.3.1564 Styled_model_relationship to Styled_model

Each Styled_model_relationship (see 4.2.486) is related to exactly one Styled_model (see 4.2.484). Each Styled_model is referenced by zero or more Styled_model_relationship objects as related.

NOTE 1 - The related Styled_model is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each Styled_model_relationship is relating to exactly one Styled_model. Each Styled_model is referenced by zero or more Styled_model_relationship objects as relating.

NOTE 2 - The relating Styled_model is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1565 Supplier_solution to Organization

Each Supplier_solution (see 4.2.488) refers to exactly one Organization (see 4.2.331) in the role of supplier. Each Organization acts as supplier for zero or more Supplier_solution objects.

4.3.1566 Surface_appearance to Surface_appearance_element

Each Surface_appearance (see 4.2.490) refers to one or more Surface_appearance_element (see 4.2.491) objects in the role of element. Each Surface_appearance_element acts as element for zero or more Surface_appearance objects.

4.3.1567 Surface_appearance_element to Visual_appearance

Each Surface_appearance_element (see 4.2.491) refers to zero or one Visual_appearance (see 4.2.560) in the role of presented_surface_condition. Each Visual_appearance acts as presented_surface_condition for zero or more Surface_appearance_element objects.

4.3.1568 Surface_condition to Process_operation_occurrence

Each Surface_condition (see 4.2.492) is_caused_by zero or one Process_operation_occurrence (see 4.2.384). Each Process_operation_occurrence is related to zero or more Surface_condition objects.

4.3.1569 Surface_condition_association to Item_shape

Each Surface_condition_association (see 4.2.493) refers to zero or one Item_shape (see 4.2.274) in the role of described_element. Each Item_shape acts as described_element for zero or more Surface_condition_association objects.

NOTE - This assertion is established through shaped_element_select.

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4.3.1570 Surface_condition_association to Shape_element

Each Surface_condition_association (see 4.2.493) refers to zero or one Shape_element (see 4.2.449) in the role of described_element. Each Shape_element acts as described_element for zero or more Surface_-condition_association objects.

NOTE - This assertion is established through shaped_element_select.

4.3.1571 Surface_condition_association to Surface_condition

Each Surface_condition_association (see 4.2.493) refers to exactly one Surface_condition (see 4.2.492) in the role of describing_surface_condition. Each Surface_condition acts as describing_surface_condition for zero or more Surface_condition_association objects.

4.3.1572 Surface_model to Shell

Each Surface_model (see 4.2.496) refers to zero or more Shell (see 4.2.451) objects in the role of element. Each Shell acts as element for zero or more Surface_model objects.

4.3.1573 Surface_profile_tolerance to Datum

Each Surface_profile_tolerance (see 4.2.499) refers to zero, one, two, or three Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Surface_profile_tolerance objects.

4.3.1574 Surface_texture to Measurement_path

Each Surface_texture (see 4.2.500) refers to zero or one Measurement_path (see 4.2.314) in the role of measuring_direction. Each Measurement_path acts as measuring_direction for zero or more Surface_-texture objects.

4.3.1575 Surface_texture_parameter to Default_surface_texture

Each Surface_texture_parameter (see 4.2.501) refers to zero or one Default_surface_texture (see 4.2.133) in the role of described_texture. Each Default_surface_texture acts as described_texture for one or more Surface_texture_parameter objects.

NOTE - This assertion is established through texture_select.

4.3.1576 Surface_texture_parameter to Surface_texture

Each Surface_texture_parameter (see 4.2.501) refers to zero or one Surface_texture (see 4.2.500) in the role of described_texture. Each Surface_texture acts as described_texture for one or more Surface_-texture_parameter objects.

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NOTE - This assertion is established through texture_select.

4.3.1577 Surface_texture_parameter to Value_with_unit

Each Surface_texture_parameter (see 4.2.501) refers to exactly one Value_with_unit (see 4.2.549) in the role of parameter_value. Each Value_with_unit acts as parameter_value for zero or more Surface_-texture_parameter objects.

4.3.1578 Swept_face_solid to Face

Each Swept_face_solid (see 4.2.502) refers to exactly one Face (see 4.2.191) in the role of swept_face. Each Face acts as swept_face for zero or more Swept_face_solid objects.

4.3.1579 Symmetry_tolerance to Datum

Each Symmetry_tolerance (see 4.2.503) refers to one, two, or three Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Symmetry_tolerance objects.

4.3.1580 Symmetry_tolerance to Reference_plane

Each Symmetry_tolerance (see 4.2.503) refers to zero or one Reference_plane (see 4.2.429) in the role of affected_plane. Each Reference_plane acts as affected_plane for zero or more Symmetry_tolerance objects.

4.3.1581 Tactile_appearance to Multi_language_string

Each Tactile_appearance (see 4.2.504) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Tactile_appearance objects.

NOTE 1 - This assertion is established through string_select.

Each Tactile_appearance refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Tactile_appearance objects.

NOTE 2 - This assertion is established through string_select.

4.3.1582 Tactile_appearance to Value_with_unit

Each Tactile_appearance (see 4.2.504) refers to zero or one Value_with_unit (see 4.2.549) in the role of depth. Each Value_with_unit acts as depth for zero or more Tactile_appearance objects.

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4.3.1583 Target_area to Shape_element

Each Target_area (see 4.2.505) is_defined_by exactly one Shape_element (see 4.2.449). Each Shape_-element is related to zero or more Target_area objects.

4.3.1584 Technical_solution to Multi_language_string

Each Technical_solution (see 4.2.510) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Technical_solution objects.

NOTE - This assertion is established through string_select.

4.3.1585 Tee_profile to Feature_parameter

Each Tee_profile (see 4.2.511) refers to exactly one Feature_parameter (see 4.2.201) in the role of cross_-bar_depth. Each Feature_parameter acts as cross_bar_depth for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of cross_bar_width. Each Feature_-parameter acts as cross_bar_width for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of depth. Each Feature_parameter acts as depth for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of first_angle. Each Feature_-parameter acts as first_angle for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of first_offset. Each Feature_-parameter acts as first_offset for zero or more Tee_profile objects.

Each Tee_profile refers to zero or one Feature_parameter in the role of radius. Each Feature_parameter acts as radius for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of second_angle. Each Feature_-parameter acts as second_angle for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of second_offset. Each Feature_-parameter acts as second_offset for zero or more Tee_profile objects.

Each Tee_profile refers to exactly one Feature_parameter in the role of width. Each Feature_parameter acts as width for zero or more Tee_profile objects.

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4.3.1586 Template_instance to External_model

Each Template_instance (see 4.2.512) refers to zero or one External_model (see 4.2.189) in the role of template_definition. Each External_model acts as template_definition for zero or more Template_-instance objects.

NOTE - This assertion is established through template_definition_select.

4.3.1587 Template_instance to Geometric_model

Each Template_instance (see 4.2.512) refers to zero or one Geometric_model (see 4.2.238) in the role of template_definition. Each Geometric_model acts as template_definition for zero or more Template_-instance objects.

NOTE - This assertion is established through template_definition_select.

4.3.1588 Template_instance to Styled_model

Each Template_instance (see 4.2.512) refers to zero or one Styled_model (see 4.2.484) in the role of template_definition. Each Styled_model acts as template_definition for zero or more Template_instance objects.

NOTE - This assertion is established through template_definition_select.

4.3.1589 Template_instance to Transformation

Each Template_instance (see 4.2.512) refers to exactly one Transformation (see 4.2.533) in the role of model_placement. Each Transformation acts as model_placement for zero or more Template_instance objects.

4.3.1590 Thickness_dimension to Measurement_path

Each Thickness_dimension (see 4.2.516) refers to zero or one Measurement_path (see 4.2.314) in the role of used_path. Each Measurement_path acts as used_path for zero or more Thickness_dimension objects.

4.3.1591 Thread_feature to Axis_placement

Each Thread_feature (see 4.2.517) refers to exactly one Axis_placement (see 4.2.33) in the role of location_and_orientation. Each Axis_placement acts as location_and_orientation for zero or more Thread_-feature objects.

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4.3.1592 Thread_feature to Thread_specification

Each Thread_feature (see 4.2.517) refers to exactly one Thread_specification (see 4.2.518) in the role of thread_definition. Each Thread_specification acts as thread_definition for zero or more Thread_feature objects.

4.3.1593 Thread_specification to Feature_parameter

Each Thread_specification (see 4.2.518) refers to exactly one Feature_parameter (see 4.2.201) in the role of density. Each Feature_parameter acts as density for zero or more Thread_specification objects.

Each Thread_specification refers to exactly one Feature_parameter in the role of major_diameter. Each Feature_parameter acts as major_diameter for zero or more Thread_specification objects.

4.3.1594 Tolerance_table_cell to General_tolerance_table

Each Tolerance_table_cell (see 4.2.523) refers to exactly one General_tolerance_table (see 4.2.234) in the role of table. Each General_tolerance_table has cell defined by one or more Tolerance_table_cell objects.

4.3.1595 Tolerance_table_cell to Multi_language_string

Each Tolerance_table_cell (see 4.2.523) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Tolerance_table_cell objects.

NOTE - This assertion is established through string_select.

4.3.1596 Tolerance_table_cell to Plus_minus_toleranced_datum

Each Tolerance_table_cell (see 4.2.523) refers to zero or one Plus_minus_toleranced_datum (see 4.2.364) in the role of cell_value. Each Plus_minus_toleranced_datum acts as cell_value for zero or more Tolerance_table_cell objects.

NOTE - This assertion is established through cell_entry_select.

4.3.1597 Tolerance_table_cell to Significant_number_of_digits

Each Tolerance_table_cell (see 4.2.523) refers to zero or one Significant_number_of_digits (see 4.2.452) in the role of limit. Each Significant_number_of_digits acts as limit for zero or more Tolerance_table_cell objects.

NOTE - This assertion is established through limit_select.

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4.3.1598 Tolerance_table_cell to Upper_lower_limit

Each Tolerance_table_cell (see 4.2.523) refers to zero or one Upper_lower_limit (see 4.2.542) in the role of limit. Each Upper_lower_limit acts as limit for zero or more Tolerance_table_cell objects.

NOTE - This assertion is established through limit_select.

4.3.1599 Tolerance_table_cell to Upper_lower_toleranced_datum

Each Tolerance_table_cell (see 4.2.523) refers to zero or one Upper_lower_toleranced_datum (see 4.2.543) in the role of cell_value. Each Upper_lower_toleranced_datum acts as cell_value for zero or more Tolerance_table_cell objects.

NOTE - This assertion is established through cell_entry_select.

4.3.1600 Tolerance_zone to Geometric_tolerance

Each Tolerance_zone (see 4.2.524) is_zone_for one or more Geometric_tolerance (see 4.2.243) objects. Each Geometric_tolerance is related to zero or more Tolerance_zone objects.

4.3.1601 Tolerance_zone_definition to Shape_element

Each Tolerance_zone_definition (see 4.2.525) refers to exactly one Shape_element (see 4.2.449) in the role of first_element. Each Shape_element acts as first_element for zero or more Tolerance_zone_definition objects.

Each Tolerance_zone_definition refers to zero or one Shape_element in the role of second_element. Each Shape_element acts as second_element for zero or more Tolerance_zone_definition objects.

4.3.1602 Tolerance_zone_definition to Tolerance_zone

Each Tolerance_zone_definition (see 4.2.525) is_defining exactly one Tolerance_zone (see 4.2.524). Each Tolerance_zone is related to zero or more Tolerance_zone_definition objects.

4.3.1603 Tool_part_relationship to Geometric_model_relationship_with_transformation

Each Tool_part_relationship (see 4.2.528) refers to zero or one Geometric_model_relationship_with_transformation (see 4.2.240) in the role of placement. Each Geometric_model_relationship_with_transformation acts as placement for zero or more Tool_part_relationship objects.

NOTE - This assertion is established through transformation_select.

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4.3.1604 Tool_part_relationship to Multi_language_string

Each Tool_part_relationship (see 4.2.528) refers to zero or one Multi_language_string (see 4.2.320) in the role of used_technology_description. Each Multi_language_string acts as used_technology_description for zero or more Tool_part_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1605 Tool_part_relationship to Template_instance

Each Tool_part_relationship (see 4.2.528) refers to zero or one Template_instance (see 4.2.512) in the role of placement. Each Template_instance acts as placement for zero or more Tool_part_relationship objects.

NOTE - This assertion is established through transformation_select.

4.3.1606 Topologically_connected_set to Face

Each Topologically_connected_set (see 4.2.529) refers to zero or more Face (see 4.2.191) objects in the role of element. Each Face acts as element for zero or more Topologically_connected_set objects.

NOTE - This assertion is established through connected_element_select.

4.3.1607 Topologically_connected_set to Oriented_edge_curve

Each Topologically_connected_set (see 4.2.529) refers to zero or more Oriented_edge_curve (see 4.2.334) objects in the role of element. Each Oriented_edge_curve acts as element for zero or more Topologically_connected_set objects.

NOTE - This assertion is established through connected_element_select.

4.3.1608 Total_runout_tolerance to Datum

Each Total_runout_tolerance (see 4.2.532) refers to one or two Datum (see 4.2.123) objects in the role of reference_datum. Each Datum acts as reference_datum for zero or more Total_runout_tolerance objects.

4.3.1609 Transition_feature to Face

Each Transition_feature (see 4.2.537) refers to exactly one Face (see 4.2.191) in the role of face_1. Each Face acts as face_1 for zero or more Transition_feature objects.

Each Transition_feature refers to exactly one Face in the role of face_2. Each Face acts as face_2 for zero or more Transition_feature objects.

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4.3.1610 Treatment_result to Multi_language_string

Each Treatment_result (see 4.2.538) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Treatment_result objects.

NOTE 1 - This assertion is established through string_select.

Each Treatment_result refers to zero or one Multi_language_string in the role of name. Each Multi_-language_string acts as name for zero or more Treatment_result objects.

NOTE 2 - This assertion is established through string_select.

Each Treatment_result refers to zero or one Multi_language_string in the role of purpose. Each Multi_-language_string acts as purpose for zero or more Treatment_result objects.

NOTE 3 - This assertion is established through string_select.

4.3.1611 Value_limitation to Limits_and_fits

Each Value_limitation (see 4.2.545) is_defined_by zero or one Limits_and_fits (see 4.2.295). Each Lim-its_and_fits is related to zero or more Value_limitation objects.

NOTE - This assertion is established through limitation_definition_select.

4.3.1612 Value_limitation to Numerical_value

Each Value_limitation (see 4.2.545) refers to exactly one Numerical_value (see 4.2.324) in the role of limited_value. Each Numerical_value has limitation defined by zero or one Value_limitation.

4.3.1613 Value_limitation to Plus_minus_bounds

Each Value_limitation (see 4.2.545) is_defined_by zero or one Plus_minus_bounds (see 4.2.363). Each Plus_minus_bounds is related to zero or more Value_limitation objects.

NOTE - This assertion is established through limitation_definition_select.

4.3.1614 Value_list to Property_value

Each Value_list (see 4.2.546) refers to one or more Property_value (see 4.2.412) objects in the role of values. Each Property_value acts as values for zero or more Value_list objects.

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4.3.1615 Value_termination to Feature_parameter

Each Value_termination (see 4.2.548) refers to exactly one Feature_parameter (see 4.2.201) in the role of angle. Each Feature_parameter acts as angle for zero or more Value_termination objects.

Each Value_termination refers to exactly one Feature_parameter in the role of depth. Each Feature_parameter acts as depth for zero or more Value_termination objects.

4.3.1616 Value_with_unit to Unit

Each Value_with_unit (see 4.2.549) refers to zero or one Unit (see 4.2.541) in the role of unit_component. Each Unit acts as unit_component for zero or more Value_with_unit objects.

4.3.1617 Vector_appearance to Terminator_symbol

Each Vector_appearance (see 4.2.550) refers to exactly one Terminator_symbol (see 4.2.513) in the role of arrow_head_type. Each Terminator_symbol acts as arrow_head_type for zero or more Vector_appearance objects.

4.3.1618 Vee_profile to Feature_parameter

Each Vee_profile (see 4.2.551) refers to exactly one Feature_parameter (see 4.2.201) in the role of profile_angle. Each Feature_parameter acts as profile_angle for zero or more Vee_profile objects.

Each Vee_profile refers to zero or one Feature_parameter in the role of radius. Each Feature_parameter acts as radius for zero or more Vee_profile objects.

Each Vee_profile refers to exactly one Feature_parameter in the role of tilt_angle. Each Feature_parameter acts as tilt_angle for zero or more Vee_profile objects.

4.3.1619 Vertex_loop to Vertex_point

Each Vertex_loop (see 4.2.552) refers to exactly one Vertex_point (see 4.2.553) in the role of loop_vertex. Each Vertex_point acts as loop_vertex for zero or more Vertex_loop objects.

4.3.1620 Vertex_point to Point

Each Vertex_point (see 4.2.553) refers to exactly one Point (see 4.2.367) in the role of vertex_geometry. Each Point acts as vertex_geometry for zero or more Vertex_point objects.

4.3.1621 View to Cartesian_coordinate_space_2d

Each View (see 4.2.554) refers to exactly one Cartesian_coordinate_space_2d (see 4.2.45) in the role of view_space. Each Cartesian_coordinate_space_2d acts as view_space for zero or more View objects.

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4.3.1622 View to Drawing_sheet

Each View (see 4.2.554) refers to zero or one Drawing_sheet (see 4.2.173) in the role of layout. Each Drawing_sheet acts as layout for zero or more View objects.

NOTE - This assertion is established through area_select.

4.3.1623 View to Multi_language_string

Each View (see 4.2.554) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more View objects.

NOTE 1 - This assertion is established through string_select.

Each View refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more View objects.

NOTE 2 - This assertion is established through string_select.

4.3.1624 View to Transformation_2d

Each View (see 4.2.554) refers to exactly one Transformation_2d (see 4.2.534) in the role of view_placement. Each Transformation_2d acts as view_placement for zero or more View objects.

4.3.1625 View to View_area

Each View (see 4.2.554) refers to zero or one View_area (see 4.2.555) in the role of layout. Each View_area acts as layout for zero or more View objects.

NOTE - This assertion is established through area_select.

4.3.1626 View_area to Cartesian_coordinate_space_2d

Each View_area (see 4.2.555) refers to exactly one Cartesian_coordinate_space_2d (see 4.2.45) in the role of area_space. Each Cartesian_coordinate_space_2d acts as area_space for zero or more View_area objects.

4.3.1627 View_area to Multi_language_string

Each View_area (see 4.2.555) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more View_area objects.

NOTE 1 - This assertion is established through string_select.

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Each View_area refers to zero or one Multi_language_string in the role of name. Each Multi_language_-string acts as name for zero or more View_area objects.

NOTE 2 - This assertion is established through string_select.

4.3.1628 View_area_assignment to Complex_product

Each View_area_assignment (see 4.2.556) is_describing zero or one Complex_product (see 4.2.80). Each Complex_product is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1629 View_area_assignment to Design_constraint

Each View_area_assignment (see 4.2.556) is_describing zero or one Design_constraint (see 4.2.138). Each Design_constraint is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1630 View_area_assignment to Design_discipline_item_definition

Each View_area_assignment (see 4.2.556) is_describing zero or one Design_discipline_item_definition (see 4.2.142). Each Design_discipline_item_definition is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1631 View_area_assignment to Item_definition_instance_relationship

Each View_area_assignment (see 4.2.556) is_describing zero or one Item_definition_instance_relationship (see 4.2.268). Each Item_definition_instance_relationship is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1632 View_area_assignment to Item_definition_relationship

Each View_area_assignment (see 4.2.556) is_describing zero or one Item_definition_relationship (see 4.2.269). Each Item_definition_relationship is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

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4.3.1633 View_area_assignment to Item_instance

Each View_area_assignment (see 4.2.556) is_describing zero or one Item_instance (see 4.2.271). Each Item_instance is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1634 View_area_assignment to Item_instance_relationship

Each View_area_assignment (see 4.2.556) is_describing zero or one Item_instance_relationship (see 4.2.272). Each Item_instance_relationship is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1635 View_area_assignment to Item_version

Each View_area_assignment (see 4.2.556) is_describing zero or one Item_version (see 4.2.275). Each Item_version is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1636 View_area_assignment to Process_operation_definition

Each View_area_assignment (see 4.2.556) is_describing zero or one Process_operation_definition (see 4.2.381). Each Process_operation_definition is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1637 View_area_assignment to Process_operation_occurrence

Each View_area_assignment (see 4.2.556) is_describing zero or one Process_operation_occurrence (see 4.2.384). Each Process_operation_occurrence is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1638 View_area_assignment to Process_plan

Each View_area_assignment (see 4.2.556) is_describing zero or one Process_plan (see 4.2.387). Each Process_plan is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

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4.3.1639 View_area_assignment to Product_class

Each View_area_assignment (see 4.2.556) is_describing zero or one Product_class (see 4.2.392). Each Product_class is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1640 View_area_assignment to Specification

Each View_area_assignment (see 4.2.556) is_describing zero or one Specification (see 4.2.467). Each Specification is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1641 View_area_assignment to Specification_category

Each View_area_assignment (see 4.2.556) is_describing zero or one Specification_category (see 4.2.468). Each Specification_category is related to zero or more View_area_assignment objects.

NOTE - This assertion is established through presentation_association_select.

4.3.1642 View_area_assignment to View_area

Each View_area_assignment (see 4.2.556) refers to exactly one View_area (see 4.2.555) in the role of associated_view_area. Each View_area acts as associated_view_area for zero or more View_area_assignment objects.

4.3.1643 View_area_relationship to Multi_language_string

Each View_area_relationship (see 4.2.557) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more View_area_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1644 View_area_relationship to View_area

Each View_area_relationship (see 4.2.557) is related to exactly one View_area (see 4.2.555). Each View_area is referenced by zero or more View_area_relationship objects as related.

NOTE 1 - The related View_area is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each View_area_relationship is relating to exactly one View_area. Each View_area is referenced by zero or more View_area_relationship objects as relating.

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NOTE 2 - The relating View_area is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

4.3.1645 View_placed_annotation to Annotation_element

Each View_placed_annotation (see 4.2.558) refers to zero or one Annotation_element (see 4.2.17) in the role of element. Each Annotation_element acts as element for zero or more View_placed_annotation objects.

NOTE - This assertion is established through annotation_select.

4.3.1646 View_placed_annotation to Draughting_callout

Each View_placed_annotation (see 4.2.558) refers to zero or one Draughting_callout (see 4.2.169) in the role of element. Each Draughting_callout acts as element for zero or more View_placed_annotation objects.

NOTE - This assertion is established through annotation_select.

4.3.1647 View_placed_annotation to View

Each View_placed_annotation (see 4.2.558) refers to exactly one View (see 4.2.554) in the role of reference_view. Each View acts as reference_view for zero or more View_placed_annotation objects.

4.3.1648 View_relationship to Multi_language_string

Each View_relationship (see 4.2.559) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more View_relationship objects.

NOTE - This assertion is established through string_select.

4.3.1649 View_relationship to View

Each View_relationship (see 4.2.559) is related to exactly one View (see 4.2.554). Each View is referenced by zero or more View_relationship objects as related.

NOTE 1 - The related View is the secondary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the child object.

Each View_relationship is relating to exactly one View. Each View is referenced by zero or more View_relationship objects as relating.

NOTE 2 - The relating View is the primary object in the relationship, i.e., in a hierarchical relationship structure it plays the role of the parent object.

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4.3.1650 Visual_appearance to Multi_language_string

Each Visual_appearance (see 4.2.560) refers to zero or one Multi_language_string (see 4.2.320) in the role of colour_name. Each Multi_language_string acts as colour_name for zero or more Visual_appearance objects.

NOTE 1 - This assertion is established through string_select.

Each Visual_appearance refers to zero or one Multi_language_string in the role of name. Each Multi_language_string acts as name for zero or more Visual_appearance objects.

NOTE 2 - This assertion is established through string_select.

4.3.1651 Wireframe_model_2d to Curve_set_2d

Each Wireframe_model_2d (see 4.2.561) refers to zero or more Curve_set_2d (see 4.2.111) objects in the role of element. Each Curve_set_2d acts as element for zero or more Wireframe_model_2d objects.

4.3.1652 Wireframe_model_3d to Curve_set_3d

Each Wireframe_model_3d (see 4.2.562) refers to zero or more Curve_set_3d (see 4.2.112) objects in the role of element. Each Curve_set_3d acts as element for zero or more Wireframe_model_3d objects.

4.3.1653 Woodruff_slot_end_type to Feature_parameter

Each Woodruff_slot_end_type (see 4.2.563) refers to exactly one Feature_parameter (see 4.2.201) in the role of radius. Each Feature_parameter acts as radius for zero or more Woodruff_slot_end_type objects.

4.3.1654 Work_order to Activity

Each Work_order (see 4.2.564) is_controlling exactly one Activity (see 4.2.2). Each Activity has authorization defined by zero or one Work_order.

4.3.1655 Work_order to Multi_language_string

Each Work_order (see 4.2.564) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Work_order objects.

NOTE - This assertion is established through string_select.

4.3.1656 Work_request to Activity_method

The assertion between work_request and activity_method in the role of scope exists only because of the select type structure and shall not be instantiated.

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NOTE - This assertion is established through activity_element_select.

4.3.1657 Work_request to Alternate_item_relationship

Each Work_request (see 4.2.565) refers to zero or more Alternate_item_relationship (see 4.2.9) objects in the role of scope. Each Alternate_item_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1658 Work_request to Assembly_substitute_relationship

Each Work_request (see 4.2.565) refers to zero or more Assembly_substitute_relationship (see 4.2.28) objects in the role of scope. Each Assembly_substitute_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1659 Work_request to Class_category_association

Each Work_request (see 4.2.565) refers to zero or more Class_category_association (see 4.2.64) objects in the role of scope. Each Class_category_association acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1660 Work_request to Class_condition_association

Each Work_request (see 4.2.565) refers to zero or more Class_condition_association (see 4.2.65) objects in the role of scope. Each Class_condition_association acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1661 Work_request to Class_inclusion_association

Each Work_request (see 4.2.565) refers to zero or more Class_inclusion_association (see 4.2.66) objects in the role of scope. Each Class_inclusion_association acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1662 Work_request to Class_specification_association

Each Work_request (see 4.2.565) refers to zero or more Class_specification_association (see 4.2.67) objects in the role of scope. Each Class_specification_association acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1663 Work_request to Class_structure_relationship

Each Work_request (see 4.2.565) refers to zero or more Class_structure_relationship (see 4.2.68) objects in the role of scope. Each Class_structure_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1664 Work_request to Complex_product

Each Work_request (see 4.2.565) refers to zero or more Complex_product (see 4.2.80) objects in the role of scope. Each Complex_product acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1665 Work_request to Configuration

Each Work_request (see 4.2.565) refers to zero or more Configuration (see 4.2.94) objects in the role of scope. Each Configuration acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1666 Work_request to Date_and_person_organization

Each Work_request (see 4.2.565) refers to one or more Date_and_person_organization (see 4.2.118) objects in the role of notified_person. Each Date_and_person_organization acts as notified_person for zero or more Work_request objects.

Each Work_request refers to exactly one Date_and_person_organization in the role of requestor. Each Date_and_person_organization acts as requestor for zero or more Work_request objects.

4.3.1667 Work_request to Design_constraint

Each Work_request (see 4.2.565) refers to zero or more Design_constraint (see 4.2.138) objects in the role of scope. Each Design_constraint acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1668 Work_request to Design_discipline_item_definition

Each Work_request (see 4.2.565) refers to zero or more Design_discipline_item_definition (see 4.2.142) objects in the role of scope. Each Design_discipline_item_definition acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1669 Work_request to Document

Each Work_request (see 4.2.565) refers to zero or more Document (see 4.2.155) objects in the role of scope. Each Document acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1670 Work_request to Document_file

Each Work_request (see 4.2.565) refers to zero or more Document_file (see 4.2.159) objects in the role of scope. Each Document_file acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1671 Work_request to Document_representation

Each Work_request (see 4.2.565) refers to zero or more Document_representation (see 4.2.163) objects in the role of scope. Each Document_representation acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1672 Work_request to Document_version

Each Work_request (see 4.2.565) refers to zero or more Document_version (see 4.2.167) objects in the role of scope. Each Document_version acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1673 Work_request to Drawing

Each Work_request (see 4.2.565) refers to zero or more Drawing (see 4.2.170) objects in the role of scope. Each Drawing acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1674 Work_request to Feature_occurrence

Each Work_request (see 4.2.565) refers to zero or more Feature_occurrence (see 4.2.200) objects in the role of scope. Each Feature_occurrence acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1675 Work_request to Geometric_model

Each Work_request (see 4.2.565) refers to zero or more Geometric_model (see 4.2.238) objects in the role of scope. Each Geometric_model acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1676 Work_request to Item

Each Work_request (see 4.2.565) refers to zero or more Item (see 4.2.267) objects in the role of scope. Each Item acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1677 Work_request to Item_definition_instance_relationship

Each Work_request (see 4.2.565) refers to zero or more Item_definition_instance_relationship (see 4.2.268) objects in the role of scope. Each Item_definition_instance_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1678 Work_request to Item_definition_relationship

Each Work_request (see 4.2.565) refers to zero or more Item_definition_relationship (see 4.2.269) objects in the role of scope. Each Item_definition_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1679 Work_request to Item_instance

Each Work_request (see 4.2.565) refers to zero or more Item_instance (see 4.2.271) objects in the role of scope. Each Item_instance acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1680 Work_request to Item_instance_relationship

Each Work_request (see 4.2.565) refers to zero or more Item_instance_relationship (see 4.2.272) objects in the role of scope. Each Item_instance_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1681 Work_request to Item_version

Each Work_request (see 4.2.565) refers to zero or more Item_version (see 4.2.275) objects in the role of scope. Each Item_version acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1682 Work_request to Kinematic_simulation_information

Each Work_request (see 4.2.565) refers to zero or more Kinematic_simulation_information (see 4.2.288) objects in the role of scope. Each Kinematic_simulation_information acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1683 Work_request to Manufacturing_configuration

Each Work_request (see 4.2.565) refers to zero or more Manufacturing_configuration (see 4.2.305) objects in the role of scope. Each Manufacturing_configuration acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1684 Work_request to Material

Each Work_request (see 4.2.565) refers to zero or more Material (see 4.2.309) objects in the role of scope. Each Material acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1685 Work_request to Multi_language_string

Each Work_request (see 4.2.565) refers to zero or one Multi_language_string (see 4.2.320) in the role of description. Each Multi_language_string acts as description for zero or more Work_request objects.

NOTE - This assertion is established through string_select.

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4.3.1686 Work_request to Physical_assembly_relationship

Each Work_request (see 4.2.565) refers to zero or more Physical_assembly_relationship (see 4.2.350) objects in the role of scope. Each Physical_assembly_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1687 Work_request to Physical_instance

Each Work_request (see 4.2.565) refers to zero or more Physical_instance (see 4.2.352) objects in the role of scope. Each Physical_instance acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1688 Work_request to Process_operation_definition

Each Work_request (see 4.2.565) refers to zero or more Process_operation_definition (see 4.2.381) objects in the role of scope. Each Process_operation_definition acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1689 Work_request to Process_operation_occurrence

Each Work_request (see 4.2.565) refers to zero or more Process_operation_occurrence (see 4.2.384) objects in the role of scope. Each Process_operation_occurrence acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1690 Work_request to Process_plan

Each Work_request (see 4.2.565) refers to zero or more Process_plan (see 4.2.387) objects in the role of scope. Each Process_plan acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1691 Work_request to Product_class

Each Work_request (see 4.2.565) refers to zero or more Product_class (see 4.2.392) objects in the role of scope. Each Product_class acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1692 Work_request to Product_identification

Each Work_request (see 4.2.565) refers to zero or more Product_identification (see 4.2.398) objects in the role of scope. Each Product_identification acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1693 Work_request to Product_structure_relationship

Each Work_request (see 4.2.565) refers to zero or more Product_structure_relationship (see 4.2.400) objects in the role of scope. Each Product_structure_relationship acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1694 Work_request to Property

Each Work_request (see 4.2.565) refers to zero or more Property (see 4.2.409) objects in the role of scope. Each Property acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1695 Work_request to Property_value_association

Each Work_request (see 4.2.565) refers to zero or more Property_value_association (see 4.2.413) objects in the role of scope. Each Property_value_association acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1696 Work_request to Specification

Each Work_request (see 4.2.565) refers to zero or more Specification (see 4.2.467) objects in the role of scope. Each Specification acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1697 Work_request to Specification_category

Each Work_request (see 4.2.565) refers to zero or more Specification_category (see 4.2.468) objects in the role of scope. Each Specification_category acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

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4.3.1698 Work_request to Specification_expression

Each Work_request (see 4.2.565) refers to zero or more Specification_expression (see 4.2.470) objects in the role of scope. Each Specification_expression acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1699 Work_request to Specification_inclusion

Each Work_request (see 4.2.565) refers to zero or more Specification_inclusion (see 4.2.471) objects in the role of scope. Each Specification_inclusion acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1700 Work_request to Styled_model

Each Work_request (see 4.2.565) refers to zero or more Styled_model (see 4.2.484) objects in the role of scope. Each Styled_model acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

4.3.1701 Work_request to View_area

Each Work_request (see 4.2.565) refers to zero or more View_area (see 4.2.555) objects in the role of scope. Each View_area acts as scope for zero or more Work_request objects.

NOTE - This assertion is established through activity_element_select.

5 Application interpreted model

5.1 Mapping table

This clause contains the mapping table that shows how each UoF and application object of this part of ISO 10303 (see clause 4) maps to one or more AIM constructs (see annex A). The mapping table is organized in five columns.

Column 1) Application element: Name of an application element as it appears in the application object definition in 4.2. Application object names are written in uppercase. Attribute names and assertions are listed after the application object to which they belong and are written in lower case.

Column 2) AIM element: Name of an AIM element as it appears in the AIM (see annex A), the term 'IDENTICAL MAPPING', or the term 'PATH'. AIM entities are written in lower case. Attribute names of AIM entities are referred to as <entity name> . <attribute name>. The mapping of an application element may result in several related AIM elements. Each of these AIM elements requires a line of

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its own in the table. The term ‘IDENTICAL MAPPING’ indicates that both application objects of an application assertion map to the same AIM element. The term ‘PATH’ indicates that the application assertion maps to the entire reference path.

Column 3) Source: For those AIM elements that are interpreted from the integrated resources or the application interpreted constructs, this is the number of the corresponding part of ISO 10303. For those AIM elements that are created for the purpose of this part of ISO 10303, this is the number of this part. Entities or types that are defined within the integrated resources have an AIC as the source reference if the use of the entity or type for the mapping is within the scope of the AIC.

Column 4) Rules: One or more numbers may be given that refer to rules that apply to the current AIM element or reference path. For rules that are derived from relationships between application objects, the same rule is referred to by the mapping entries of all the involved AIM elements. The expanded names of the rules are listed after the table.

Column 5) Reference path: To describe fully the mapping of an application object, it may be necessary to specify a reference path through several related AIM elements. The reference path column documents the role of an AIM element relative to the AIM element in the row succeeding it. Two or more such related AIM elements define the interpretation of the integrated resources that satisfies the requirement specified by the application object. For each AIM element that has been created for use within this part of ISO 10303, a reference path up to its supertype from an integrated resource is specified.

For the expression of reference paths the following notational conventions apply:

a) `[]` : enclosed section constrains multiple AIM elements or sections of the reference path are required to satisfy an information requirement;

b) `()` : enclosed section constrains multiple AIM elements or sections of the reference path are identified as alternatives within the mapping to satisfy an information requirement;

c) `{}` : enclosed section constrains the reference path to satisfy an information requirement;

d) `<>` : enclosed section constrains at one or more required reference path;

e) `||` : enclosed section constrains the supertype entity;

f) `->` : attribute references the entity or select type given in the following row;

g) `<-` : entity or select type is referenced by the attribute in the following row;

h) `[i]` : attribute is an aggregation of which a single member is given in the following row;

i) `[n]` : attribute is an aggregation of which member `n` is given in the following row;

j) `=>` : entity is a supertype of the entity given in the following row;

k) `<=` : entity is a subtype of the entity given in the following row;

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l) = : the string, select, or enumeration type is constrained to a choice or value;

m) \ : the reference path expression continues on the next line.

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Table 2 – Mapping table surface_condition UoF (C1)

Application element	AIM element	Source	Rules	Reference path
COATING_LAYER	shape_aspect (see NOTE 1)	41		{shape_aspect.name = 'coating layer'} (see NOTE 1)[1)]
coating_layer to thickness_-dimension (as thickness)	PATH			shape_aspect <- dimensional_size.applies_to dimensional_size
coating_layer to material (as used_-material)	PATH			shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- material_designation.definitions[i] material_designation
CONTACT_RATIO #1: If the value_with_-unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_-unit is a value_range.	contact_ratio_-representation	214		contact_ratio_representation <= representation
contact_ratio to physical_model (as measuring_-gauge)	PATH			contact_ratio_representation <= representation <- property_definition_representation.used_representation property_definition_representation {property_definition_representation.name = 'contact ratio reference'} property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition =>

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_with_associated_documents => physically_modelled_product_definition
contact_ratio to value_with_unit (as ratio_value)	PATH(see NOTE 2)			contact_ratio_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'ratio value'} #1: (measure_representation_item) #2: (compound_representation_item => value_range) (see NOTE 2)[2)]
DEFAULT_SETTING_-ASSOCIATION #1: If the default_-context is a digital_-document, a digital_file, or an item_shape. #2: If the default_-context is a drawing_sheet or a view_area.	#1: (property_-definition_-representation) #2: (representation_-relationship)	41 43		#1: ({property_definition_representation property_definition_representation.name = 'default setting association'}) #2: ({representation_relationship representation_relationship.name = 'default setting association'})
default_setting_-association to digital_document (as default_-context)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
default_setting_- association to digital_file (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => document_file
default_setting_- association to drawing_sheet (as default_- context)	PATH			representation_relationship representation_relationship.rep_2 ->) representation => presentation_representation => presentation_area => drawing_sheet_revision
default_setting_- association to item_shape (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition => product_definition_shape
default_setting_- association to view_area (as default_- context)	PATH			representation_relationship representation_relationship.rep_2 ->) representation => presentation_representation => presentation_area
default_setting_- association to default_surface_- texture (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default surface texture'}

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
DEFAULT_SURFACE_- TEXTURE	representation	43		{representation [representation.name = 'default surface texture'] [representation.context_of_items -> representation_context representation_context.context_type = 'default setting']}
measuring_method	descriptive_- representation_item. description	45		representation representation.items[i] -> representation_item => {representation_item.name = 'measuring method'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = 'ISO 4287') (descriptive_representation_item.description = 'ISO 12085') (descriptive_representation_item.description = 'ISO 13565')}
HARDNESS #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	hardness_- representation	214		hardness_representation <= representation
description	representation. description	43		hardness_representation <= representation representation.description
environment_- condition	data_environment	45		hardness_representation <= representation <- property_definition_representation.used_representation property_definition_representation => material_property_representation

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				material_property_representation.dependent_environment -> data_environment
measuring_method	descriptive_- representation_item. description	45		hardness_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'measuring method'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = 'brinell') (descriptive_representation_item.description = 'rockwell') (descriptive_representation_item.description = 'vickers')}
measuring_- position	descriptive_- representation_item. description	45		hardness_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'measuring position'} descriptive_representation_item descriptive_representation_item.description
hardness to value_with_unit (as depth)	PATH(see NOTE 3)			hardness_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'depth'} #1: (measure_representation_item) #2: (compound_representation_item => value_range) (see NOTE 3)[3)]
hardness to multi_language_- string (as description)	#3: ([representation. description] [PATH]) #4: (PATH)	43	158	hardness_representation <= representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
hardness to value_with_unit (as hardness_-value)	PATH(see NOTE 4)			hardness_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'hardness'} #1: (measure_representation_item) #2: (compound_representation_item => value_range) (see NOTE 4)[4)]
MEASUREMENT_PATH	representation	43		{representation.name = 'measuring direction'}
measurement_path to curve (as is_defined_-as)	PATH			representation representation.items[i] ->> representation_item => geometric_representation_item => curve => (pcurve) (surface_curve)
measurement_path to cartesian_-coordinate_space (as is_defined_-in)	PATH		52	representation representation.context_of_items ->> representation_context => geometric_representation_context
SURFACE_-CONDITION	representation	43		{representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->> represented_definition

Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition property_definition derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition -> general_property {general_property.name = 'surface condition'}}
value_- determination	type_qualifier.name	45	49	representation representation.items[i] -> representation_item => qualified_representation_item qualified_representation_item.qualifiers[i] -> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name) (type_qualifier.name = 'required') (type_qualifier.name = 'designed') (type_qualifier.name = 'calculated') (type_qualifier.name = 'measured') (type_qualifier.name = 'estimated')}
surface_- condition to process_- operation_- occurrence (as is_caused_- by)	PATH			representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_or_shape_select = property_definition property_or_shape_select <- process_property_association.property_or_shape process_property_association process_property_association.process ->

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_process <= action {action <- action_relationship.related_action action_relationship action_relationship.name = 'process operation occurrence'}
SURFACE_- CONDITION_- ASSOCIATION	property_definition_- representation	41		
surface_- condition_- association to item_shape (as described_- element)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition => product_definition_shape
surface_- condition_- association to shape_element (as described_- element)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition property_definition.definition ->> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect
surface_- condition_- association to surface_- condition (as describing_- surface_- condition)	PATH			property_definition_representation property_definition_representation.used_representation ->> representation
SURFACE_TEXTURE	surface_texture_- representation	214		surface_texture_representation <= representation

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
measuring_method	descriptive_- representation_item. description	45		surface_texture_representation <= representation representation.items[i] -> representation_item => {representation_item.name = ’measuring method’} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = ’ISO 4287’) (descriptive_representation_item.description = ’ISO 12085’) (descriptive_representation_item.description = ’ISO 13565’)}
surface_texture to measurement_- path (as measuring_- direction)	PATH			surface_texture_representation <= representation <- representation_relationship.rep_1 representation_relationship representation_relationship.rep_2 -> representation
SURFACE_TEXTURE_- PARAMETER #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range.	#1: (measure_- representation_item) #2: (value_range)	45 214		#2: ({value_range <= compound_representation_item})
parameter_index	representation_item. name (see NOTE 5)	43		(see NOTE 5)[5)]
parameter_name	representation_item. name	43		

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
surface_texture_- parameter to default_surface_- texture (as described_- texture)	PATH			#1: (measure_representation_item <=) #2: (value_range <= compound_representation_item <=) representation_item <- representation.items[i] representation {representation.name = 'default surface texture'}
surface_texture_- parameter to surface_texture (as described_- texture)	PATH			#1: (measure_representation_item <=) #2: (value_range <= compound_representation_item <=) representation_item <- representation.items[i] representation => surface_texture_representation
surface_texture_- parameter to value_with_unit (as parameter_- value)	IDENTICAL MAPPING			
TACTILE_- APPEARANCE #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	tactile_appearance_- representation	214		tactile_appearance_representation <= representation

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
description	representation.description	43		tactile_appearance_representation <= representation representation.description
id	representation.id	43		tactile_appearance_representation <= representation representation.id
name	representation.name	43		tactile_appearance_representation <= representation representation.name
tactile_-appearance to value_with_unit (as depth)	PATH(see NOTE 6)			tactile_appearance_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'depth'} #1: (measure_representation_item) #2: (compound_representation_item => value_range) (see NOTE 6)[6]
tactile_-appearance to multi_language_-string (as description)	#3: ([representation.description][PATH]) #4: (PATH)	43	158	tactile_appearance_representation <= representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
tactile_- appearance to multi_language_- string (as name)	#3: ([representation. name] [PATH]) #4: (PATH)	43	158	tactile_appearance_representation <= representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
TREATMENT_RESULT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation	43	193	representation {representation.name = 'treatment result'}
description	descriptive_- representation_item. description	45		representation representation.items[i] ->> representation_item => {representation_item.name = 'result'} descriptive_representation_item descriptive_representation_item.description
id	representation.id	43		
name	representation. description	43		
purpose	descriptive_- representation_item. description	45		representation representation.items[i] ->> representation_item => {representation_item.name = 'purpose'} descriptive_representation_item

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				descriptive_representation_item.description
treatment_result to multi_-language_string (as description)	#1: ([descriptive_-representation_item.description] [PATH]) -> #2: (PATH)	45	120	representation representation.items[i] -> representation_item => descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
treatment_result to multi_-language_string (as name)	#1: ([representation.description] [PATH]) #2: (PATH)	43	120	representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
treatment_result to multi_- language_string (as purpose)	#1: ([descriptive_- representation_item. description] [PATH]) #2: (PATH)	45	120	representation representation.items[i] ->> representation_item => descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
VISUAL_- APPEARANCE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	visual_appearance_- representation	214		visual_appearance_representation <= representation
colour_id	descriptive_- representation_item. description	45		visual_appearance_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'colour id'} descriptive_representation_item descriptive_representation_item.description
colour_name	descriptive_- representation_item. description	45		visual_appearance_representation <= representation representation.items[i] ->> representation_item =>

Table 2 – Mapping table surface_condition UoF (C1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation_item.name = 'colour name'} descriptive_representation_item descriptive_representation_item.description
id	representation.id	43		visual_appearance_representation <= representation representation.id
lustre	descriptive_- representation_item. description	45		visual_appearance_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'lustre'} descriptive_representation_item descriptive_representation_item.description
name	representation.name	43		visual_appearance_representation <= representation representation.name
pattern	descriptive_- representation_item. description	45		visual_appearance_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'pattern'} descriptive_representation_item descriptive_representation_item.description
transparency	descriptive_- representation_item. description	45		visual_appearance_representation <= representation representation.items[i] ->> representation_item => {representation_item.name = 'transparency'} descriptive_representation_item descriptive_representation_item.description
visual_- appearance to multi_language_- string (as colour_name)	#1: ([descriptive_- representation_item. description] [PATH]) #2: (PATH)	45	120	visual_appearance_representation <= representation representation.items[i] ->> representation_item => descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item

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Table 2– Mapping table surface_condition UoF (C1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
visual_- appearance to multi_language_- string (as name)	#1: ([representation. name] [PATH]) #2: (PATH)	43	120	visual_appearance_representation <= representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The ARM attribute 'element_name' that is inherited from shape_element is not available for a coating layer.

2 The ARM element 'ratio_value' uses the same attribute of representation_item as the inherited ARM attribute 'value_name' of value_with_unit. The 'ratio value' qualification shall be appended to the representation_item.name representing the 'value_name'.

3 The mapping of the ARM attribute 'depth' uses the same attribute of representation_item as the inherited ARM attribute 'value_name' of value_-with_unit. If the depth is present, the qualification 'depth' it shall be appended to the representation_item.name representing the ARM attribute 'value_name'.

4 The mapping of the ARM attribute 'hardness_value' uses the same attribute of representation_item as the inherited ARM attribute 'value_name' of value_with_unit. The qualification 'hardness' shall be appended to the representation_item.name representing the ARM attribute 'value_name'.

5 The ARM attribute 'parameter_index' maps to the same attribute of representation_item as the ARM attribute 'parameter_name'. If the 'parameter_-index' is present, it shall be appended to the representation_item.name representing the 'parameter_name'.

6 The mapping of ARM attribute 'depth' uses the same attribute of representation_item as the inherited ARM attribute 'value_name' of value_-with_unit. If the depth is present, the qualification 'depth' it shall be appended to the representation_item.name representing the ARM attribute 'value_name'.

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Table 3 – Mapping table explicit_draughting UoF (D1)

Application element	AIM element	Source	Rules	Reference path
ANNOTATION_CURVE	annotation_curve_-occurrence	504		
annotation_curve_-type	curve_style.name	46	16	annotation_curve_occurrence <= annotation_occurrence <= {annotation_occurrence => draughting_annotation_occurrence} styled_item styled_item.styles[i] ->> presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select presentation_style_select = curve_style curve_style curve_style.name
DATUM_FEATURE_-CALLOUT	datum_feature_callout	506		
DATUM_TARGET_-CALLOUT	datum_target_callout	506		
DIMENSION #1: If the callout is not structured. #2: If the callout is structured.	(angular_dimension) (curve_dimension) (diameter_dimension) (leader_directed_-dimension) (linear_dimension) (ordinate_dimension) (radius_dimension)	506 506 506 506 506 506 506		(angular_dimension <= dimension_curve_directed_callout) (curve_dimension <= dimension_curve_directed_callout) (diameter_dimension <= dimension_curve_directed_callout) (leader_directed_dimension <= leader_directed_callout) (linear_dimension <= dimension_curve_directed_callout) (ordinate_dimension <= projection_directed_callout) (radius_dimension <= dimension_curve_directed_callout)
id	representation_item.name	43		(angular_dimension <= dimension_curve_directed_callout <=) (curve_dimension <= dimension_curve_directed_callout <=)

Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(diameter_dimension <= dimension_curve_directed_callout <=) (leader_directed_dimension <= leader_directed_callout <=) (linear_dimension <= dimension_curve_directed_callout <=) (ordinate_dimension <= projection_directed_callout <=) (radius_dimension <= dimension_curve_directed_callout <=) draughting_callout <= {draughting_callout => draughting_elements} geometric_representation_item <= representation_item representation_item.name
dimension to dimension_-callout (as primary_-callout)	PATH			(angular_dimension <= dimension_curve_directed_callout <=) (curve_dimension <= dimension_curve_directed_callout <=) (diameter_dimension <= dimension_curve_directed_callout <=) (leader_directed_dimension <= leader_directed_callout <=) (linear_dimension <= dimension_curve_directed_callout <=) (ordinate_dimension <= projection_directed_callout <=) (radius_dimension <= dimension_curve_directed_callout <=) draughting_callout <- {draughting_callout => draughting_elements} draughting_callout_relationship.relating_draughting_callout draughting_callout_relationship

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{draughting_callout_relationship => dimension_callout_relationship} {draughting_callout_relationship.name = 'primary'} draughting_callout_relationship.related_draughting_callout -> draughting_callout
dimension to dimension_-callout (as secondary_-callout)	PATH			(angular_dimension <= dimension_curve_directed_callout <=) (curve_dimension <= dimension_curve_directed_callout <=) (diameter_dimension <= dimension_curve_directed_callout <=) (leader_directed_dimension <= leader_directed_callout <=) (linear_dimension <= dimension_curve_directed_callout <=) (ordinate_dimension <= projection_directed_callout <=) (radius_dimension <= dimension_curve_directed_callout <=) draughting_callout <- {draughting_callout => draughting_elements} draughting_callout_relationship.relating_draughting_callout draughting_callout_relationship {draughting_callout_relationship => dimension_callout_relationship} {draughting_callout_relationship.name = 'secondary'} draughting_callout_relationship.related_draughting_callout -> draughting_callout => #1: (draughting_elements) #2: (structured_dimension_callout)

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
DIMENSION_- CALLOUT #1: If the callout is not structured. #2: If the callout is structured. #3: If the geometric_- dimension is a location_- dimension. #4: If the geometric_- dimension is a size_- dimension.	#1: (draughting_- elements) #2: (structured_- dimension_callout)	506 506	259	#1: (draughting_elements <=) #2: (structured_dimension_callout <=) draughting_callout
dimension_- callout to dimension_symbol (as callout_- element)	PATH			#1: (draughting_elements <=) #2: (structured_dimension_callout <=) draughting_callout draughting_callout.contents[i] ->draughting_callout_element draughting_callout_element = annotation_symbol_occurrence annotation_symbol_occurrence
dimension_- callout to text (as callout_- element)	PATH			#1: (draughting_elements <=) #2: (structured_dimension_callout <=) draughting_callout draughting_callout.contents[i] ->draughting_callout_element draughting_callout_element = annotation_text_occurrence annotation_text_occurrence
dimension_- callout to geometric_- dimension (as is_- displaying)	PATH			#1: (draughting_elements <=) #2: (structured_dimension_callout <=) draughting_callout <= {draughting_callout.contents[i] ->draughting_callout_element}

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				draughting_callout_element = annotation_text_occurrence annotation_text_occurrence <= annotation_occurrence <= styled_item styled_item.item ->) representation_item => geometric_representation_item => text_literal => dimension_text_associativity} geometric_representation_item <= representation_item <- mapped_item.mapping_target mapped_item {mapped_item => dimension_text_associativity <= text_literal} mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation => shape_representation => shape_dimension_representation <- dimensional_characteristic_representation.representation dimensional_characteristic_representation dimensional_characteristic_representation.dimension -> dimensional_characteristic #3: (dimensional_characteristic = dimensional_location dimensional_location) #4: (dimensional_characteristic = dimensional_size dimensional_size)
DIMENSION_CURVE	dimension_curve	101		
dimension_curve to terminator_-symbol (as terminator)	PATH		37,268	dimension_curve <= annotation_curve_occurrence <- terminator_symbol.annotated_curve terminator_symbol <= {terminator_symbol =>

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				dimension_curve_terminator} annotation_symbol_occurrence <= annotation_occurrence <= {annotation_occurrence => draughting_annotation_occurrence} styled_item styled_item.item ->) representation_item => geometric_representation_item => defined_symbol defined_symbol.definition -> defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol => pre_defined_terminator_symbol
DIMENSION_- SEQUENCE_PAIR	dimension_pair	506		dimension_pair <= draughting_callout_relationship {(draughting_callout_relationship.name = 'chained') (draughting_callout_relationship.name = 'parallel')}
dimension_- sequence_pair to dimension (as predecessor)	PATH			dimension_pair <= draughting_callout_relationship draughting_callout_relationship.relating_draughting_callout -> draughting_callout => {draughting_callout => draughting_elements} (dimension_curve_directed_callout => angular_dimension) (dimension_curve_directed_callout => curve_dimension) (dimension_curve_directed_callout => diameter_dimension) (dimension_curve_directed_callout => linear_dimension) (projection_directed_callout => ordinate_dimension) (dimension_curve_directed_callout =>

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				radius_dimension)
dimension_- sequence_pair to dimension (as successor)	PATH			dimension_pair <= draughting_callout_relationship draughting_callout_relationship.related_draughting_callout ->{draughting_callout => draughting_callout => draughting_elements} (dimension_curve_directed_callout => angular_dimension) (dimension_curve_directed_callout => curve_dimension) (dimension_curve_directed_callout => diameter_dimension) (dimension_curve_directed_callout => linear_dimension) (projection_directed_callout => ordinate_dimension) (dimension_curve_directed_callout => radius_dimension)
DRAWING #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string, #3: If the language used in the drawing is not classified. #4: If the language used in the drawing is based on a classification.	drawing_revision	101	96	
drawing_id	drawing_definition. drawing_number	101		drawing_revision drawing_revision.drawing_identifier ->drawing_definition drawing_definition.drawing_number

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_revision_- id	drawing_revision. revision_identifier	101		drawing_revision drawing_revision.revision_identifier
drawing_- specification	document.id	41		drawing_revision specified_item = drawing_revision specified_item <- draughting_specification_reference.specified_items[i] draughting_specification_reference <= document_reference document_reference.assigned_document ->> document {document.kind ->> document_type document_type.product_data_type = 'draughting specification'} document.id
drawing_type	drawing_definition. drawing_type	101		drawing_revision drawing_revision.drawing_identifier ->> drawing_definition drawing_definition.drawing_type
language	#3: (draughting_title. language) #4: ([draughting_- title.language] [PATH])	101 101	122	drawing_revision draughting_titled_item = drawing_revision draughting_titled_item <- draughting_title.items[i] draughting_title #3: (draughting_title.language) #4: ([draughting_title.language] [attribute_language_item = draughting_title attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.attribute_name = 'contents'}])
title	draughting_title. contents	101		drawing_revision draughting_titled_item = drawing_revision draughting_titled_item <- draughting_title.items[i] draughting_title

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				draughting_title.contents
drawing to multi_-language_string (as title)	#1: ([draughting_-title.contents] [PATH]) #2: (PATH)	d1	122	drawing_revision draughting_titled_item = drawing_revision draughting_titled_item <- draughting_title.items[i] draughting_title #1: (attribute_language_item = draughting_title attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'contents'}) #2: (multi_language_attribute_item = draughting_title multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'contents'})

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING_-ASSIGNMENT #1: If item_instance is not used in the context of UoF S7. #2: If item_instance is used in the context of UoF S7. #3: If no item_version is associated. #4: If an item_version is associated. #5: If product_class is used with UoF S4. #6: If product_class is used with UoF S7. #7: If specification_-category.implicit_-exclusive_condition is FALSE. #8: If specification_-category.implicit_-exclusive_condition is TRUE.	presented_item_-representation	46		
drawing_-assignment to drawing (as associated_-drawing)	PATH			presented_item_representation presented_item_representation.presentation ->presentation_representation_select presentation_representation_select = presentation_set presentation_set => drawing_revision

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_- assignment to complex_product (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_formation product_definition_formation
drawing_- assignment to design_- constraint (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_formation product_definition_formation
drawing_- assignment to design_- discipline_item_- definition (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition product_definition
drawing_- assignment to item_definition_- instance_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_- assignment to item_definition_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship
drawing_- assignment to item_instance (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select #1: (presented_item_select = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #2: (presented_item_select = product_definition product_definition)
drawing_- assignment to item_instance_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
drawing_- assignment to item_version (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_formation product_definition_formation
drawing_- assignment to process_- operation_- definition (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = action_method action_method => process_operation
drawing_- assignment to process_- operation_- occurrence (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = action_relationship action_relationship {action_relationship.name= 'process operation occurrence'}
drawing_- assignment to process_plan (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				presented_item_select = action action => #3: (process_plan) #4: (product_definition_process product_process_plan)
drawing_- assignment to product_class (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = product_concept #5: (product_concept) #6: (product_concept => product_class)
drawing_- assignment to specification (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = product_concept_feature product_concept_feature
drawing_- assignment to specification_- category (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = product_concept_feature_category #7: (product_concept_feature_category) #8: (product_concept_feature_category => exclusive_product_concept_feature_category)

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
DRAWING_SEQUENCE	drawing_revision_-sequence	101		
drawing_sequence to drawing (as preceding_-drawing)	PATH			drawing_revision_sequence drawing_revision_sequence.predecessor -> drawing_revision
drawing_sequence to drawing (as succeeding_-drawing)	PATH			drawing_revision_sequence drawing_revision_sequence.successor -> drawing_revision
DRAWING_SHEET #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	drawing_sheet_revision	101	214	
sheet_id	drawing_sheet_revision_-usage.sheet_number	101		drawing_sheet_revision <= presentation_area <- area_in_set.area area_in_set => drawing_sheet_revision_usage drawing_sheet_revision_usage.sheet_number
sheet_revision_-id	drawing_sheet_revision.revision_identifier	101		
size	presentation_size.size	46		drawing_sheet_revision <= presentation_area presentation_size_assignment_select = presentation_area presentation_size_assignment_select <- presentation_size.unit presentation_size presentation_size.size
title	draughting_title.contents	101		drawing_sheet_revision draughting_titled_item = drawing_sheet_revision draughting_titled_item <- draughting_title.items[i] draughting_title

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Table 3 – Mapping table explicit_draughting UoF (D1) (continued)

Application element	AIM element	Source	Rules	Reference path
				draughting_title.contents
drawing_sheet to drawing (as associated_- drawing)	PATH			drawing_sheet_revision <= presentation_area <- area_in_set.area area_in_set {area_in_set => drawing_sheet_revision_usage} area_in_set.in_set -> presentation_set => drawing_revision
drawing_sheet to cartesian_- coordinate_space_- 2d (as sheet_space)	PATH			drawing_sheet_revision <= presentation_area <= presentation_representation <= representation representation.context_of_items -> representation_context => geometric_representation_context {geometric_representation_context.coordinate_space_dimension = 2}
drawing_sheet to multi_language_- string (as title)	#1: ([draughting_- title.contents] [PATH]) #2: (PATH)	101	122	drawing_sheet_revision draughting_titled_item = drawing_sheet_revision draughting_titled_item <- draughting_title.items[i] draughting_title #1: (attribute_language_item = draughting_title attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'contents'}) #2: (multi_language_attribute_item = draughting_title multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment}

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Table 3 – Mapping table explicit_draughting UoF (D1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'contents')
GEOMETRIC_-TOLERANCE_-CALLOUT	geometrical_tolerance_-callout	506		geometrical_tolerance_callout <= draughting_callout
PROJECTION_CURVE	projection_curve	101		
SURFACE_-CONDITION_-CALLOUT	surface_condition_-callout	214		surface_condition_callout <= draughting_callout

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Table 4 – Mapping table associative_annotation UoF (D2)

Application element	AIM element	Source	Rules	Reference path
ASSOCIATED_- DRAUGHTING_- CALLOUT	draughting_elements	506	259	draughting_elements <= draughting_callout
associated_- draughting_- callout to annotation_- element (as is_- associated_to)	PATH			draughting_elements <= draughting_callout draughting_callout.contents[i] ->> draughting_callout_element draughting_callout_element = annotation_curve_occurrence annotation_curve_occurrence <= annotation_occurrence => draughting_annotation_occurrence
associated_- draughting_- callout to detailed_- geometric_model_- element (as is_- associated_to)	PATH			draughting_elements <= draughting_callout <= geometric_representation_item <= representation_item <- representation.items [i] representation <- {representation => shape_representation} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition property_definition.definition ->> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {shape_aspect_relationship => shape_aspect_associativity} shape_aspect_relationship.relating_shape_aspect ->

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Table 4– Mapping table associative_annotation UoF (D2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items [i] -> representation_item => (geometric_representation_item) (topological_representation_item)
ASSOCIATED_FILL_-AREA	annotation_fill_area_-occurrence	46		annotation_fill_area_occurrence {annotation_fill_area_occurrence <= annotation_occurrence => draughting_annotation_occurrence}
associated_fill_-area to annotation_curve (as is_derived_-from)	PATH			annotation_fill_area_occurrence <= annotation_occurrence <- annotation_occurrence_relationship.related_annotation_occurrence annotation_occurrence_relationship {annotation_occurrence_relationship => annotation_occurrence_associativity} annotation_occurrence_relationship.relating_annotation_occurrence -> annotation_occurrence {annotation_occurrence => annotation_curve_occurrence

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Table 4 – Mapping table associative_annotation UoF (D2) (continued)

Application element	AIM element	Source	Rules	Reference path
associated_fill_-area to detailed_-geometric_model_-element (as is_derived_-from)	PATH			annotation_fill_area_occurrence <= annotation_occurrence <= styled_item styled_item.item -> representation_item => geometric_representation_item => annotation_fill_area annotation_fill_area.boundaries[i] -> curve <= geometric_representation_item <= representation_item <- representation.items[i] representation ([representation => shape_representation] [representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship => shape_aspect_associativity]} representation.items[i] -> representation_item representation_item => (geometric_representation_item) (topological_representation_item)

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Table 4 – Mapping table associative_annotation UoF (D2) (continued)

Application element	AIM element	Source	Rules	Reference path
ASSOCIATED_- LEADER	leader_curve	506		leader_curve <= annotation_curve_occurrence {annotation_curve_occurrence <= annotation_occurrence => draughting_annotation_occurrence}
associated_- leader to annotation_- element (as target)	PATH			leader_curve <= annotation_curve_occurrence <= annotation_occurrence <- annotation_occurrence_relationship.related_annotation_occurrence annotation_occurrence_relationship {annotation_occurrence_relationship => annotation_occurrence_associativity} annotation_occurrence_relationship.relating_annotation_occurrence -> annotation_occurrence => draughting_annotation_occurrence
associated_- leader to detailed_- geometric_model_- element (as target)	PATH			leader_curve <= annotation_curve_occurrence <= annotation_occurrence <= styled_item styled_item.item ->) representation_item <- {representation_item => geometric_representation_item => curve} representation.items[i] representation {representation => shape_representation] [representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition}

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Table 4 – Mapping table associative_annotation UoF (D2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship => shape_aspect_associativity]} representation.items[i] ->> representation_item representation_item => (geometric_representation_item) (topological_representation_item)
ASSOCIATED_- PROJECTION_CURVE	projection_curve	506		projection_curve <= annotation_curve_occurrence {annotation_curve_occurrence <= annotation_occurrence => draughting_annotation_occurrence}
associated_- projection_curve to annotation_- element (as is_projected_- to)	PATH			projection_curve <= annotation_curve_occurrence <= annotation_occurrence <- annotation_occurrence_relationship.related_annotation_occurrence annotation_occurrence_relationship {annotation_occurrence_relationship => annotation_occurrence_associativity} annotation_occurrence_relationship.relating_annotation_occurrence ->> annotation_occurrence => draughting_annotation_occurrence
associated_- projection_curve to detailed_- geometric_model_- element (as is_projected_- to)	PATH			projection_curve <= annotation_curve_occurrence <= annotation_occurrence <= styled_item styled_item.item ->> representation_item <- {representation_item => geometric_representation_item => curve} representation.items[i]

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Table 4 – Mapping table associative_annotation UoF (D2) (concluded)

Application element	AIM element	Source	Rules	Reference path
				representation {[representation => shape_representation] [representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship => shape_aspect_associativity]} representation.items[i] ->) representation_item representation_item => (geometric_representation_item) (topological_representation_item)

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Table 5 – Mapping table external_reference_mechanism UoF (E1)

Application element	AIM element	Source	Rules	Reference path
ACCURACY #1: For global assignments. #2: For partial models and external geometric models. #3: For single items. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string. #6: If used with UoF G3 or G5. #7: If the face is defined by an associated surface. #8: If the face is not defined by an associated surface. #9: If the edge is defined by another edge. #10: If the edge is fully defined.	#1: (global_-uncertainty_assigned_-context) #2: (uncertainty_-assigned_-representation) #3: (qualified_-representation_item)	43 43 45	6	
accuracy_type	#1: (uncertainty_-measure_with_unit.name) #2: (uncertainty_-measure_with_unit.name) #3: (uncertainty_-qualifier.measure_-name)	43 43 45	30,43,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit uncertainty_measure_with_unit.name {(uncertainty_measure_with_unit.name) (uncertainty_measure_with_unit.name = 'angular accuracy') (uncertainty_measure_with_unit.name = 'curvature accuracy') (uncertainty_measure_with_unit.name = 'distance accuracy')}) #3: (qualified_representation_item

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				qualified_representation_item.qualifiers[i] -> value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier uncertainty_qualifier.measure_name {[(uncertainty_qualifier.measure_name) (uncertainty_qualifier.measure_name = 'angular accuracy') (uncertainty_qualifier.measure_name = 'curvature accuracy') (uncertainty_qualifier.measure_name = 'distance accuracy')] [uncertainty_qualifier => standard_uncertainty]})
accuracy_value	#1: (measure_with_- unit.value_component) #2: (measure_with_- unit.value_component) #3: (standard_- uncertainty. uncertainty_value)	41 41 45	30,43,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit <= measure_with_unit measure_with_unit.value_component) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] -> value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier => standard_uncertainty standard_uncertainty.uncertainty_value)
description	#1: (uncertainty_- measure_with_unit. description) #2: (uncertainty_- measure_with_unit. description) #3: (uncertainty_- qualifier.description)	43 43 45	30,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit uncertainty_measure_with_unit.description) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] -> value_qualifier

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				value_qualifier = uncertainty_qualifier uncertainty_qualifier uncertainty_qualifier.description)
accuracy to multi_language_- string (as description)	#1: (#4: ([uncertainty_measure_- with_unit.description] [PATH]) #5: (PATH)) #2: (#4: ([uncertainty_measure_- with_unit.description] [PATH]) #5: (PATH)) #3: (#4: ([uncertainty_- qualifier.description] [PATH]) #5: (PATH))	43 43 45	169,170	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit #4: (attribute_language_item = uncertainty_measure_with_unit attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #5: (multi_language_attribute_item = uncertainty_measure_with_unit multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier #4: (attribute_language_item = uncertainty_qualifier attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #5: (multi_language_attribute_item = uncertainty_qualifier

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
accuracy to external_-geometric_model (as is_defined_-for)	PATH			uncertainty_assigned_representation <= representation => shape_representation {shape_representation <= representation representation.context_of_items -> representation_context => {representation_context.context_type = 'external'} geometric_representation_context}
accuracy to face (as is_defined_-for)	PATH			qualified_representation_item <= representation_item => topological_representation_item => face => #6: (face_surface => advanced_face) #7: (face_surface) #8: (oriented_face)
accuracy to geometric_model (as is_defined_-for)	PATH			#1: (global_uncertainty_assigned_context <= representation_context <- representation.context_of_items representation =>) #2: (uncertainty_assigned_representation <= representation =>) shape_representation
accuracy to oriented_edge_-curve (as is_defined_-for)	PATH			qualified_representation_item <= representation_item => #9: (geometric_representation_item => edge_curve) #10: (topological_representation_item => edge =>

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				edge_curve)
accuracy to vertex_point (as is_defined_- for)	PATH			qualified_representation_item <= representation_item => geometric_representation_item => vertex_point
AXIS_PLACEMENT #1: For orientation and location of a single axis. #2: For orientation and location of two mutually perpendicular axes in two-dimensional space. #3: For orientation and location of two mutually perpendicular axes in three-dimensional space.	placement	42		{placement => #1: (axis1_placement) #2: (axis2_placement_2d) #3: (axis2_placement_3d)}
CARTESIAN_- COORDINATE_SPACE #1: If the unit has a commonly used descriptor. #2: If the unit descriptor is constructed of more than one unit name.	geometric_- representation_context	42		
cartesian_- coordinate_space to unit (as unit_of_- values)	global_unit_assigned_- context.units	41		geometric_representation_context <= representation_context => global_unit_assigned_context global_unit_assigned_context.units[i] -> unit #1: (unit = named_unit named_unit) #2: (unit = derived_unit derived_unit)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
CARTESIAN_- COORDINATE_SPACE_- 2D	geometric_- representation_context	42		{geometric_representation_context geometric_representation_context.coordinate_space_dimension = 2}
CARTESIAN_- COORDINATE_SPACE_- 3D	geometric_- representation_context	42		{geometric_representation_context geometric_representation_context.coordinate_space_dimension = 3}
DETAILED_MODEL_- ELEMENT #1: If the element is part of a geometric model. #2: If the element is a template instance.	#1: (geometric_- representation_item) #2: (mapped_item)	503 503		
DIGITAL_DOCUMENT	product_definition	41		{product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'digital document definition'}
digital_document to digital_file (as file)	PATH			product_definition => {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'digital document definition'} product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i] -> document => {document.representation_types[i] -> document_representation_type document_representation_type.name = 'digital'} document_file
DIGITAL_FILE	document_file	214		document_file <= [document {document.representation_types[1] -> document_representation_type document_representation_type.name = 'digital'}] [characterized_object]

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
DOCUMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product	41	75,179	{product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
description	product.description	41		
document_id	product.id	41		
name	product.name	41		
document to multi_language_- string (as description)	#1: ([product. description] [PATH]) #2: (PATH)	41	145	product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
document to multi_language_- string (as name)	#1: ([product.name] [PATH]) #2: (PATH)	41	145	product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
DOCUMENT_-ASSIGNMENT #1: If document assignment is not a partial document assignment. #2: If document assignment is also a partial document assignment. #3: If the described_-change is a complex_-product_relationship, or an item_version_-relationship. #4: If the described_-change is a process_plan_-relationship or process_-operation_occurrence_-relationship. #5: If the described_-change is a design_-constraint_relationship, a replaced_definition_-relationship, or a replaced_usage_-relationship. #6: If the described_-change is a shape_element_-relationship. #7: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as	#1: (applied_document_-reference) #2: (applied_document_-usage_constraint_-assignment)	214 214		#1: (applied_document_reference <= document_reference) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment)

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Table 54 Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
usage_context. #8: The general case for the descriptive_-specification. #9: If the descriptive specification is used with a process_operation_-resource_assignment. #10: If item_instance is used in the context of UoF S7. #11: If item_instance is not used in the context of UoF S7. #12: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #13: If no item_version is associated. #14: If an item_version is associated. #15: If specification_-category.implicit_-exclusive_condition is FALSE. #16: If specification_-category.implicit_-exclusive_condition is TRUE. #17: The general case for				

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
a view_area. #18: If the view_area is in a single window and in 3D context. #19: If product_class is used with UoF S4. #20: If product_class is used wth UoF S7. #21: If product_-identification is used with UoF S4. #22: If product_-identification is used with UoF S7.				
role	#1: (object_role.name) #2: (document_usage_-role.name)	41 41	23,32	#1: (applied_document_reference <= document_reference document_reference.role ->object_role object_role.name {(object_role.name) (object_role.name = 'additional information') (object_role.name = 'behavior') (object_role.name = 'catalogue') (object_role.name = 'description') (object_role.name = 'informative') (object_role.name = 'mandatory') (object_role.name = 'manual') (object_role.name = 'mathematical description') (object_role.name = 'specification')}) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.role ->document_usage_role document_usage_role.name {(document_usage_role.name)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(document_usage_role.name = 'additional information') (document_usage_role.name = 'behavior') (document_usage_role.name = 'catalogue') (document_usage_role.name = 'description') (document_usage_role.name = 'informative') (document_usage_role.name = 'mandatory') (document_usage_role.name = 'manual') (document_usage_role.name = 'mathematical description') (document_usage_role.name = 'specification')})
document_- assignment to document (as assigned_- document)	PATH			#1: (applied_document_reference <= document_reference document_reference.assigned_document ->) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.assigned_document_usage ->) document_usage_constraint document_usage_constraint.source ->) document <- {document.kind ->) document_type document_type.product_data_type = 'configuration controlled document'} document_product_association.relating_document document_product_association {document_product_association => document_product_equivalence} document_product_association.related_product ->) product_or_formation_or_definition product_or_formation_or_definition = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to document_file (as assigned_- document)	PATH			#1: (applied_document_reference <= document_reference document_reference.assigned_document ->) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.assigned_document_usage ->) document_usage_constraint document_usage_constraint.source ->) document => {document.representation_types[i] ->) document_representation_type (document_representation_type.name = 'digital') (document_representation_type.name = 'physical')} document_file
document_- assignment to document_- representation (as assigned_- document)	PATH			#1: (applied_document_reference <= document_reference document_reference.assigned_document ->) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.assigned_document_usage ->) document_usage_constraint document_usage_constraint.source ->) document <- {document.kind ->) document_type document_type.product_data_type = 'configuration controlled document definition'} document_product_association.relating_document document_product_association {document_product_association => document_product_equivalence} document_product_association.related_product ->) product_or_formation_or_definition product_or_formation_or_definition = product_definition product_definition {product_definition.frame_of_reference ->) product_definition_context <=

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element (application_context_element.name = 'physical document definition') (application_context_element.name = 'digital document definition') (application_context_element.name = 'physical model occurrence')} {product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
document_- assignment to document_version (as assigned_- document)	PATH			#1: (applied_document_reference <= document_reference document_reference.assigned_document ->) #2: (applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.assigned_document_usage -> document_usage_constraint document_usage_constraint.source ->) document <- {document.kind -> document_type document_type.product_data_type = 'configuration controlled document version'} document_product_association.relating_document document_product_association {document_product_association => document_product_equivalence} document_product_association.related_product -> product_or_formation_or_definition product_or_formation_or_definition = product_definition_formation product_definition_formation {product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <=

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_category product_category.name = 'document'}
document_- assignment to activity (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = executed_action executed_action
document_- assignment to activity_element (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = applied_action_assignment applied_action_assignment
document_- assignment to activity_method (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = action_method action_method
document_- assignment to approval (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = approval approval

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_-assignment to catalogue_thread (as is_assigned_-to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = feature_definition feature_definition => externally_defined_feature_definition
document_-assignment to certification (as is_assigned_-to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = certification certification
document_-assignment to change (as is_assigned_-to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #3: (document_reference_item = product_definition_formation_relationship product_definition_formation_relationship) #4: (document_reference_item = action_relationship action_relationship) #5: (document_reference_item = product_definition_relationship product_definition_relationship) #6: (document_reference_item = shape_aspect_relationship shape_aspect_relationship)
document_-assignment to class_structure_-relationship (as is_assigned_-to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = configuration_design configuration_design

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to classification_- attribute (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = property_definition property_definition
document_- assignment to classification_- system (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = class_system class_system
document_- assignment to complex_product (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_formation product_definition_formation
document_- assignment to contract (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = contract contract
document_- assignment to descriptive_- specification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #8: (document_reference_item = descriptive_representation_item descriptive_representation_item) #9: (document_reference_item = resource_requirement_type

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				resource_requirement_type)
document_- assignment to design_- constraint (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_formation product_definition_formation
document_- assignment to design_- discipline_item_- definition (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
document_- assignment to drawing_sheet (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = representation representation => presentation_area => drawing_sheet_revision
document_- assignment to feature_- definition (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = feature_definition feature_definition

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to general_- classification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = class class
document_- assignment to general_feature (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = feature_definition feature_definition => general_feature
document_- assignment to item (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product product
document_- assignment to item_definition_- instance_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_relationship product_definition_relationship
document_- assignment to item_definition_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_relationship product_definition_relationship

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to item_instance (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #11: (document_reference_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #10: (document_reference_item = product_definition product_definition {product_definition.frame_of_reference ->) product_definition_context <<= application_context_element application_context_element.name = 'part occurrence'})
document_- assignment to item_instance_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #12: (document_reference_item = product_definition_relationship product_definition_relationship) #7: (document_reference_item = product_definition_substitute product_definition_substitute)
document_- assignment to item_shape (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = property_definition property_definition => product_definition_shape

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to item_version (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_formation product_definition_formation
document_- assignment to material (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = material_designation material_designation
document_- assignment to organization (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = organization organization
document_- assignment to path (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect shape_aspect => path_feature_component
document_- assignment to person (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = person

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				person
document_- assignment to physical_- assembly_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_relationship product_definition_relationship => {[product_definition_relationship.relating_product_definition ->] product_definition product_definition.frame_of_reference ->] product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'] [product_definition_relationship.related_product_definition ->] product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence']} product_definition_usage => assembly_component_usage
document_- assignment to physical_- instance (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to physical_- instance_test_- result (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = property_definition property_definition {[property_definition.name = 'test results'] [property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence']}
document_- assignment to process_- operation_- occurrence (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = action_relationship action_relationship
document_- assignment to process_plan (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #13: (document_reference_item = process_plan process_plan) #14: (document_reference_item = product_definition_process product_definition_process => product_process_plan)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to product_class (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_concept #19: (product_concept) #20: (product_concept => product_class)
document_- assignment to product_- identification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = configuration_item #21: (configuration_item) #22: (configuration_item => product_identification)
document_- assignment to product_- structure_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_definition_relationship product_definition_relationship => product_definition_usage
document_- assignment to profile (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect shape_aspect

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to project (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = organizational_project organizational_project
document_- assignment to property (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = general_property general_property
document_- assignment to retention_period (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = retention retention
document_- assignment to security_- classification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = security_classification security_classification
document_- assignment to shape_element (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect shape_aspect

Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to shape_element_- relationship (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect_relationship shape_aspect_relationship
document_- assignment to specific_item_- classification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_related_product_category product_related_product_category
document_- assignment to specification (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = product_concept_feature product_concept_feature
document_- assignment to specification_- category (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #15: (document_reference_item = product_concept_feature_category product_concept_feature_category) #16: (document_reference_item = product_concept_feature_category product_concept_feature_category => exclusive_product_concept_feature_category)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to surface_- condition (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = representation representation
document_- assignment to thread_feature (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect shape_aspect => applied_area
document_- assignment to transition_- feature (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = shape_aspect shape_aspect => transition_feature
document_- assignment to view_area (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item #17: (document_reference_item = presentation_area presentation_area) #18: (document_reference_item = presentation_area presentation_area => mechanical_design_geometric_presentation_area)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- assignment to work_order (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = action_directive action_directive
document_- assignment to work_request (as is_assigned_- to)	PATH			#1: (applied_document_reference applied_document_reference.items[i] ->) #2: (applied_document_usage_constraint_assignment applied_document_usage_constraint_assignment.items[i] ->) document_reference_item document_reference_item = versioned_action_request versioned_action_request
DOCUMENT_CONTENT_- PROPERTY #1: If the unit is not assigned globally. #2: If the unit is assigned globally.	representation	43	190,187	{representation <- {[representation.name = 'document content'] [representation.context_of_items -> representation_context representation_context.context_type = 'document parameters']} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition {property_definition.name = 'document property'}}
detail_level	descriptive_- representation_item. description	45		representation representation.items[i] -> representation_item => {representation_item.name = 'detail level'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = 'rough 3d shape') (descriptive_representation_item.description = 'rounded edges')}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
geometry_type	descriptive_- representation_item. description	45		representation representation.items[i] ->> representation_item => {representation_item.name = 'geometry type'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = '3D wireframe model') (descriptive_representation_item.description = '2D shape') (descriptive_representation_item.description = 'surface model') (descriptive_representation_item.description = 'closed volume') (descriptive_representation_item.description = 'solid model') (descriptive_representation_item.description = 'solid and surface model') (descriptive_representation_item.description = 'assembly') (descriptive_representation_item.description = 'assembly with mating elements') (descriptive_representation_item.description = '2D drawing') (descriptive_representation_item.description = 'drawing derived from 3D data') (descriptive_representation_item.description = 'drawing related to 3D data')}
document_content_- property to language (as languages)	PATH			representation language_item = representation <- language_assignment.items[i] language_assignment <= classification_assignment {classification_assignment.role -> classification_role classification_role.name = 'language'} classification_assignment.assigned_class -> group => language
document_content_- property to numerical_value (as real_world_- scale)	#1: (measure_- representation_item) #2: (value_- representation_item)	45 43		representation representation.items[i] -> representation_item => {representation_item.name = 'real world scale'} #1: (measure_representation_item {measure_representation_item <=

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit [measure_with_unit.value_component -> measure_value measure_value = ratio_measure] [measure_with_unit.unit_component -> unit unit = named_unit named_unit => ratio_unit]}) #3: (value_representation_item)
DOCUMENT_- CREATION_- PROPERTY	representation	43	190,188	{representation <- {[representation.name = 'document creation'] [representation.context_of_items -> representation_context representation_context.context_type = 'document parameters']} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition {property_definition.name = 'document property'}}
creating_- interface	descriptive_- representation_item. description	45		representation representation.items[i] -> representation_item => {representation_item.name = 'creating interface'} descriptive_representation_item descriptive_representation_item.description
creating_system	descriptive_- representation_item. description	45		representation representation.items[i] -> representation_item => {representation_item.name = 'creating system'} descriptive_representation_item descriptive_representation_item.description
operating_system	descriptive_- representation_item.	45		representation representation.items[i] ->

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
	description			representation_item => {representation_item.name = 'operating system'} descriptive_representation_item descriptive_representation_item.description
DOCUMENT_FILE	document_file	214	185	{document_file <= [document {document.representation_types[i] ->> document_representation_type (document_representation_type.name = 'digital') (document_representation_type.name = 'physical')}] [characterized_object]}
file_id	document.id	41		document_file <= document {document.representation_types[i] ->> document_representation_type (document_representation_type.name = 'digital') (document_representation_type.name = 'physical')} document.id
version_id	identification_- assignment.assigned_id	41	29,200	document_file identification_item = document_file identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
document_file to document_content_- property (as content)	PATH			document_file <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'document content'}
document_file to document_-creation_-property (as creation)	PATH			document_file <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'document creation'}
document_file to document_type_-property (as document_-file_type)	PATH			document_file <= document document.kind -> document_type
document_file to external_file_id_-and_location (as external_id_-and_location)	PATH			document_file external_identification_item = document_file external_identification_item <- applied_external_identification_assignment.items[i] applied_external_identification_assignment {applied_external_identification_assignment <= external_identification_assignment <= identification_assignment identification_assignment.role -> identification_role identification_role.name = 'alternative document id and location'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_file to document_format_-property (as file_format)	PATH			document_file <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'document format'}
document_file to document_size_-property (as size)	PATH			document_file <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'document size'}
DOCUMENT_FILE_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	document_relationship	41		

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
description	document_relationship. description	41		
relation_type	document_relationship. name	41		{document_relationship document_relationship.name (document_relationship.name) (document_relationship.name = 'addition') (document_relationship.name = 'copy') (document_relationship.name = 'decomposition') (document_relationship.name = 'derivation') (document_relationship.name = 'peer') (document_relationship.name = 'reference') (document_relationship.name = 'sequence') (document_relationship.name = 'substitution') (document_relationship.name = 'translation')}
document_file_- relationship to multi_language_- string (as description)	#1: ([document_- relationship. description] [PATH]) #2: (PATH)	41	121	document_relationship #1: (attribute_language_item = document_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = document_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
document_file_- relationship to document_file (as related)	PATH			document_relationship document_relationship.related_document ->) document => document_file

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_file_- relationship to document_file (as relating)	PATH			document_relationship document_relationship.relating_document ->> document => document_file
DOCUMENT_FORMAT_- PROPERTY	representation	43	190,189	{representation <- {[representation.name = 'document format'] [representation.context_of_items ->> representation_context representation_context.context_type = 'document parameters']} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition {property_definition.name = 'document property'}}
character_code	descriptive_- representation_item. description	45		representation representation.items[i] ->> representation_item => {representation_item.name = 'character code'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = 'binary') (descriptive_representation_item.description = 'IEC 61286') (descriptive_representation_item.description = 'ISO 646') (descriptive_representation_item.description = 'ISO 3098-1') (descriptive_representation_item.description = 'ISO 6937') (descriptive_representation_item.description = 'ISO 8859-1') (descriptive_representation_item.description = 'ISO 10646')}
data_format	descriptive_- representation_item. description	45		representation representation.items[i] ->> representation_item => {representation_item.name = 'data format'} descriptive_representation_item descriptive_representation_item.description

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{(descriptive_representation_item.description) (descriptive_representation_item.description = 'DXF') (descriptive_representation_item.description = 'IGES') (descriptive_representation_item.description = 'ISO 10303-203') (descriptive_representation_item.description = 'ISO 10303-214') (descriptive_representation_item.description = 'TIFF CCITT GR4') (descriptive_representation_item.description = 'VDAFS') (descriptive_representation_item.description = 'VOXEL')}
document_format_- property to rectangular_size (as size_format)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'size format'} geometric_representation_item => planar_extent
DOCUMENT_- LOCATION_- PROPERTY	external_source	41		
location_name	external_source.source_- id	41		
DOCUMENT_- REPRESENTATION #1: If the document_- representation is not a physical_model. #2: If the document_- representation is a physical_model. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	#1: (product_- definition) #2: (physically_- modelled_product_- definition)	41 214	186	{#1: (product_definition) #2: (physically_modelled_product_definition <= product_definition_with_associated_documents <= product_definition) product_definition.frame_of_reference -> product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')}
description	product_definition. description	41		
id	product_definition.id	41		

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- representation to document_- version (as associated_- document_- version)	PATH			product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} product_definition.formation ->product_definition_formation {product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
document_- representation to document_- location_- property (as common_- location)	PATH			product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} external_identification_item = product_definition external_identification_item <- applied_external_identification_assignment.items[i] applied_external_identification_assignment <= external_identification_assignment {external_identification_assignment <= identification_assignment {identification_assignment identification_assignment.assigned_id = ''} identification_assignment.role ->identification_role identification_role.name = 'common location'} external_identification_assignment.source ->external_source

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Table 54 Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- representation to document_- content_property (as content)	PATH			product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} characterized_definition = product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation {representation.name = 'document content'}
document_- representation to document_- creation_- property (as creation)	PATH			product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} characterized_definition = product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation {representation.name = 'document creation'}
document_- representation to multi_- language_string (as description)	#3: ([product_- definition. description] [PATH]) #4: (PATH)	41	150	product_definition #3: (attribute_language_item = product_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = product_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
document_- representation to document_- format_property (as representation_- format)	PATH			product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} characterized_definition = product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'document format'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- representation to document_size_- property (as size)	PATH			product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: ((application_context_element.name = 'digital document definition') (application_context_element.name = 'physical document definition')) #2: (application_context_element.name = 'physical model occurrence')} characterized_definition = product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'document property'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation {representation.name = 'document size'}
DOCUMENT_SIZE_- PROPERTY #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range. #3: If the value_with_- unit is a numerical_value or a value_limit and the unit is specified globally.	representation	43	190,191	{representation <- {[representation.name = 'document size'] [representation.context_of_items ->representation_context representation_context.context_type = 'document parameters']} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->represented_definition represented_definition = property_definition property_definition {property_definition.name = 'document property'}}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_size_- property to value_with_unit (as file_size)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'file size'} #1: (measure_representation_item) #2: (compound_representation_item => value_range) #3: (value_representation_item)
document_size_- property to value_with_unit (as page_count)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'page count'} #1: (measure_representation_item <= measure_with_unit {measure_with_unit.value_component -> measure_value measure_value = count_measure}) #2: (compound_representation_item {compound_representation_item => value_range} compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => measure_representation_item <= measure_with_unit {measure_with_unit.value_component -> measure_value measure_value = count_measure}) #3: (value_representation_item)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
DOCUMENT_- STRUCTURE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41		
description	product_definition_- relationship. description	41		
relation_type	product_definition_- relationship.name	41		{document_relationship (document_relationship.name) (document_relationship.name = 'addition') (document_relationship.name = 'copy') (document_relationship.name = 'derivation') (document_relationship.name = 'decomposition') (document_relationship.name = 'peer') (document_relationship.name = 'reference') (document_relationship.name = 'sequence') (document_relationship.name = 'substitution') (document_relationship.name = 'translation')}
document_- structure to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_- structure to document_- representation (as related)	PATH			product_definition_relationship product_definition_relationship.related_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element (application_context_element.name = 'physical document definition') (application_context_element.name = 'digital document definition') (application_context_element.name = 'physical model occurrence')}
document_- structure to document_- representation (as relating)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element (application_context_element.name = 'physical document definition') (application_context_element.name = 'digital document definition') (application_context_element.name = 'physical model occurrence')}
DOCUMENT_TYPE_- PROPERTY	document_type	41		
document_type_- name	document_type.product_- data_type	41		{document_type.product_data_type (document_type.product_data_type) (document_type.product_data_type = 'geometry') (document_type.product_data_type = 'NC data') (document_type.product_data_type = 'FE data') (document_type.product_data_type = 'sample data') (document_type.product_data_type = 'process plan') (document_type.product_data_type = 'check plan') (document_type.product_data_type = 'drawing')}

Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
document_type_- property to classification_- system (as used_- classification_- system)	PATH		13	document_type classification_item = document_type classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {classification_assignment.role ->> classification_role classification_role.name = 'class system membership'} classification_assignment.assigned_class ->> group => class_system
DOCUMENT_VERSION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- formation	41		{product_definition_formation product_definition_formation.of_product ->> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
description	product_definition_- formation.description	41		
id	product_definition_- formation.id	41		
document_version to document (as associated_- document)	PATH			product_definition_formation product_definition_formation.of_product ->> product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
document_version to multi_- language_string (as description)	#1: ([product_- definition_formation. description] [PATH]) #2: (PATH)	41	151	product_definition_formation #1: (attribute_language_item = product_definition_formation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
DOCUMENT_VERSION_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_definition_-formation_relationship	41		
description	product_definition_-formation_relationship.description	41		
relation_type	product_definition_-formation_relationship.name	41		{product_definition_formation_relationship (product_definition_formation_relationship.name) (product_definition_formation_relationship.name = 'derivation') (product_definition_formation_relationship.name = 'hierarchy') (product_definition_formation_relationship.name = 'sequence') (product_definition_formation_relationship.name = 'supplied document')}
document_version_-relationship to multi_language_-string (as description)	#1: ([product_-definition_formation_-relationship.description] [PATH]) #2: (PATH)	41	152	product_definition_formation_relationship #1: (attribute_language_item = product_definition_formation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation_relationship multi_language_attribute_item <-

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
document_version_- relationship to document_version (as related)	PATH			product_definition_formation_relationship product_definition_formation_relationship.related_product_definition_formation ->>> product_definition_formation {product_definition_formation.of_product ->> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
document_version_- relationship to document_version (as relating)	PATH			product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation ->>> product_definition_formation {product_definition_formation.of_product ->> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
EXTERNAL_FILE_ID_- AND_LOCATION	applied_external_- identification_- assignment	214		applied_external_identification_assignment <= external_identification_assignment {external_identification_assignment <= identification_assignment identification_assignment.role ->> identification_role identification_role.name = 'external document id and location'}
external_id	identification_- assignment.assigned_id	41		applied_external_identification_assignment <= external_identification_assignment <= identification_assignment identification_assignment.assigned_id

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
external_file_id_- and_location to document_- location_- property (as location)	PATH			applied_external_identification_assignment <= external_identification_assignment {external_identification_assignment <= identification_assignment identification_assignment.role ->> identification_role identification_role.name = 'alternative document id and location'} external_identification_assignment.source ->> external_source
EXTERNAL_- GEOMETRIC_MODEL #1: If the unit is assigned globally. #2: If the unit is not assigned globally.	shape_representation	41		{shape_representation <= representation representation.context_of_items ->> representation_context => {representation_context.context_type = 'external'} geometric_representation_context}
model_extent	#1: (value_- representation_item) #2: (measure_- representation_item)	43 45	30	shape_representation <= representation <- representation_relationship.rep_1 representation_relationship {representation_relationship.name = 'model extent association'} representation_relationship.rep_2 ->> representation {representation.name = 'model extent representation'} representation.items[i] ->> representation_item => {representation_item.name = 'model extent value'} #1: (value_representation_item) #2: (measure_representation_item)
EXTERNAL_- GEOMETRIC_MODEL_- WITH_PARAMETERS	shape_representation	41		{shape_representation <= representation representation.context_of_items ->> representation_context representation_context.context_type = 'external'}

Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
external_- geometric_model_- with_parameters to general_- parameter (as parameter_- value)	PATH			shape_representation <= representation <- {representation.context_of_items -> representation_context representation_context.context_type = 'external'} representation_relationship.rep_1 representation_relationship {representation_relationship.name = 'external representation parameter association'} representation_relationship.rep_2 -> representation representation.items[i] -> representation_item => measure_representation_item
EXTERNAL_MODEL #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation	43		{representation [representation.context_of_items -> representation_context representation_context.context_type = 'external'] [representation.items[1] -> (axis2_placement_2d) (axis2_placement_3d)]}
description	representation. description	43		
model_id	representation.id	43		
external_model to multi_- language_string (as description)	#1: ([representation. description] [PATH]) #2: (PATH)	43	158	representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
external_model to digital_file (as is_defined_- as)	PATH			representation <- {representation.context_of_items ->>br>representation_context representation_context.context_type = 'external'} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->>br>represented_definition represented_definition = property_definition property_definition {property_definition.name = 'external definition'} property_definition.definition ->>br>characterized_definition characterized_definition = characterized_object characterized_object => document_file {document_file <= document document.representation_types[i] ->>br>document_representation_type document_representation_type.name = 'digital'}
external_model to cartesian_- coordinate_space (as is_defined_- in)	PATH			representation representation.context_of_items ->>br>representation_context => {representation_context.context_type = 'external'} geometric_representation_context
EXTERNAL_PICTURE	representation	43		{representation [representation.context_of_items ->>br>representation_context => {representation_context.context_type = 'external'} geometric_representation_context geometric_representation_context.coordinate_space_dimension = 2] [representation.items[1] ->>br>axis2_placement_2d]}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
external_picture to cartesian_- coordinate_space_- 2d (as is_defined_- in)	PATH			representation representation.context_of_items ->> representation_context => {representation_context.context_type = 'external'} geometric_representation_context {geometric_representation_context.coordinate_space_dimension = 2}
GEOMETRIC_MODEL #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the unit is assigned globally. #4: If the unit is not assigned globally.	shape_representation	503		{shape_representation <= representation representation.items[1] ->> (axis2_placement_2d) (axis2_placement_3d)}
description	representation. description	503		shape_representation <= representation representation.description
model_extent	#3: (value_- representation_item) #4: (measure_- representation_item)	503 503	30	shape_representation <= representation <- representation_relationship.rep_1 representation_relationship {representation_relationship.name = 'model extent association'} representation_relationship.rep_2 ->> representation {representation.name = 'model extent representation'} representation.items[i] ->> representation_item => {representation_item.name = 'model extent value'} #3: (value_representation_item) #4: (measure_representation_item)
model_id	representation.name	503		shape_representation <= representation representation.name

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
geometric_model to template_-instance (as additional_-element)	PATH			shape_representation <= representation representation.items[i] -> mapped_item
geometric_model to multi_-language_string (as description)	#1: ([representation. description] [PATH]) #2: (PATH)	503	158	shape_representation <= representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
geometric_model to cartesian_-coordinate_space (as is_defined_-in)	PATH			shape_representation <= representation representation.context_of_items -> representation_context => geometric_representation_context {(geometric_representation_context.coordinate_space_dimension = 2) (geometric_representation_context.coordinate_space_dimension = 3)}
GEOMETRIC_MODEL_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	representation_-relationship	43		

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
description	representation_- relationship. description	43		
relation_type	representation_- relationship.name	43		
geometric_model_- relationship to multi_language_- string (as description)	#1: ([representation_- relationship. description] [PATH]) #2: (PATH)	43	159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
geometric_model_- relationship to external_model (as related)	PATH			representation_relationship representation_relationship.rep_2 ->> representation {representation.context_of_items ->> representation_context representation_context.context_type = 'external'}
geometric_model_- relationship to geometric_model (as related)	PATH			representation_relationship representation_relationship.rep_2 ->> representation => shape_representation
geometric_model_- relationship to external_model (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->> representation {representation.context_of_items ->> representation_context representation_context.context_type = 'external'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
geometric_model_-relationship to geometric_model (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->representation =>shape_representation
GEOMETRIC_MODEL_-RELATIONSHIP_-WITH_-TRANSFORMATION #1: If the transformation is implicitely defined by two items. #2: For a two-dimensional transformation. #3: For a three-dimensional transformation. #4: If the item is a placement. #5: If the item is a transformation operator. #6: If the transformation is explicitly defined.	representation_-relationship_with_-transformation	43		
geometric_model_-relationship_-with_-transformation to transformation (as model_-placement)	PATH			representation_relationship_with_transformation representation_relationship_with_transformation.transformation_operator ->transformation #1: (transformation = item_defined_transformation item_defined_transformation {#2: ([item_defined_transformation.transform_item_1 ->representation_item =>geometric_representation_item =>placement =>axis2_placement_2d] [item_defined_transformation.transform_item_2 ->representation_item =>geometric_representation_item =>

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0} cartesian_transformation_operator_2d)]) #3: ([item_defined_transformation.transform_item_1 -> representation_item => geometric_representation_item => placement => axis2_placement_3d] [item_defined_transformation.transform_item_2 -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_3d) #5: (cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0} cartesian_transformation_operator_3d)])}) #6: (transformation = functionally_defined_transformation functionally_defined_transformation {functionally_defined_transformation => cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0} #2: (cartesian_transformation_operator_2d) #3: (cartesian_transformation_operator_3d)})
GEOMETRIC_MODEL_- VERSION	shape_representation	503		{shape_representation identification_item = shape_representation identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment identification_assignment.role -> identification_role identification_role.name = 'version'}
version_id	identification_- assignment.assigned_id	503	29,208	shape_representation identification_item = shape_representation

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
HARDCOPY	document_file	214		document_file <= [document {document.representation_types[i] ->> document_representation_type document_representation_type.name = 'physical'}] [characterized_object]
ITEM_SHAPE #1: If item_instance is used in the context of UoF S7. #2: If item_instance is not used in the context of UoF S7. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	product_definition_-shape	41		
description	property_definition.description	41		product_definition_shape <= property_definition property_definition.description
item_shape to design_-discipline_item_-definition (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
item_shape to item_instance (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition -> characterized_definition #1: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #2: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
item_shape to physical_-instance (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_shape to multi_language_-string (as description)	#3: ([property_-definition.description] [PATH]) #4: (PATH)	41	156	product_definition_shape <= property_definition #3: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
NAMED_SIZE #1: If no density is specified for the rectangular_size. #2: If a density is specified for the rectangular_size.	#1: ([planar_extent] [descriptive_-representation_item]) #2: ([planar_extent] [descriptive_-representation_item] [measure_-representation_item])	46 45 46 45 45		{#1: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=]) #2: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=] [measure_representation_item <=]) representation_item representation_item.name = 'size format'}
size	descriptive_-representation_item.description	45		{#1: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=]) #2: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=] [measure_representation_item <=]) representation_item representation_item.name = 'size format'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
named_size to classification_-system (as referenced_-standard)	PATH		90	planar_extent {#1: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=]) #2: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=] [measure_representation_item <=]) representation_item representation_item.name = 'size format'} classification_item = planar_extent classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {classification_assignment.role ->) classification_role classification_role.name = 'class system membership'} classification_assignment.assigned_class -> group => class_system
PARTIAL_DOCUMENT_-ASSIGNMENT	applied_document_usage_-constraint_assignment	214		applied_document_usage_constraint_assignment <= document_usage_constraint_assignment
document_portion	[document_usage_-constraint.subject_-element] [document_usage_-constraint.subject_-element_value]	41 41		applied_document_usage_constraint_assignment <= document_usage_constraint_assignment document_usage_constraint_assignment.assigned_document_usage -> document_usage_constraint [document_usage_constraint.subject_element] [document_usage_constraint.subject_element_value]
PHYSICAL_-DOCUMENT	product_definition	41		{product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical document definition'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_- document to hardcopy (as component)	PATH			product_definition => {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical document definition'} product_definition_with_associated_documents product_definition_with_associated_documents.documentation_ids[i] -> document => {document.representation_types[i] -> document_representation_type document_representation_type.name = 'physical'} document_file
PHYSICAL_MODEL	physically_modelled_- product_definition	214		physically_modelled_product_definition <= product_definition_with_associated_documents {[product_definition_with_associated_documents.documentation_ids[1] -> document document.representation_types[i] -> document_representation_type document_representation_type.name = 'physical'] [product_definition_with_associated_documents <= product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical model occurrence']}
PHYSICAL_- REPRESENTATION #1: If the physical_- representation is not a physical_model. #2: If the physical_- representation is a physical_model.	#1: (product_- definition) #2: (physically_- modelled_product_- definition)	41 214		#1: ({product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical document definition'}) #2: (physically_modelled_product_definition <= product_definition_with_associated_documents <= product_definition {product_definition product_definition.frame_of_reference -> product_definition_context <=

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element application_context_element.name = 'physical model occurrence'})
RECTANGULAR_SIZE #1: If no density is specified for the rectangular_size. #2: If a density is specified for the rectangular_size. #3: If the value_with_-unit is a numerical_value or a value_limit and the unit is not assigned globally. #4: If the value_with_-unit is a value_range. #5: If the value_with_-unit is a numerical_value or a value_limit and the unit is specified globally. #6: If the unit of the value range is not assigned globally. #7: If the unit of the value range is assigned globally. #8: If the rectangular_-size is a named_size. #9: If the rectangular_-size is not a named_size.	#1: (#8: ([planar_-extent] [descriptive_-representation_item])) #9: (planar_extent)) #2: (#8: ([planar_-extent] [measure_-representation_item] [descriptive_-representation_item])) #9: ([planar_extent] [measure_-representation_item]))	46 45 46 46 45 43 46 45		{#1: (#8: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=]) #9: (planar_extent <= geometric_representation_item <=)) #2: (#8: ([planar_extent <= geometric_representation_item <=] [descriptive_representation_item <=] [measure_representation_item <=]) #9: ([planar_extent <= geometric_representation_item <=] [measure_representation_item <=])) representation_item representation_item.name = 'size format'}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
rectangular_size to value_with_- unit (as density)	#3: (measure_- representation_item) #4: (value_range) #5: (value_- representation_item)	45 214 43		#3: ({measure_representation_item <= representation_item representation_item.name = 'size format'}) #4: ({value_range <= compound_representation_item <= representation_item representation_item.name = 'size format'}) #5: ({value_representation_item <= representation_item representation_item.name = 'size format'})
rectangular_size to value_with_- unit (as height)	PATH			planar_extent planar_extent.size_in_y -> length_measure measure_value = length_measure measure_value <- (measure_with_unit.value_component measure_with_unit #3: (measure_with_unit => measure_representation_item) #6: (measure_with_unit => measure_representation_item <= representation_item <- set_representation_item[i] set_representation_item compound_item_definition = set_representation_item compound_item_definition <- compound_representation_item.item_element compound_representation_item => value_range)) #7: (value_representation_item.value_component value_representation_item <= representation_item <- set_representation_item[i] set_representation_item compound_item_definition = set_representation_item compound_item_definition <-

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Table 54 Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				compound_representation_item.item_element compound_representation_item => value_range) #5: (value_representation_item.value_component value_representation_item)
rectangular_size to value_with_- unit (as width)	PATH			planar_extent planar_extent.size_in_x -> length_measure measure_value = length_measure measure_value <- (measure_with_unit.value_component measure_with_unit #3: (measure_with_unit => measure_representation_item) #6: (measure_with_unit => measure_representation_item <= representation_item <- set_representation_item[i] set_representation_item compound_item_definition = set_representation_item compound_item_definition <- compound_representation_item.item_element compound_representation_item => value_range)) #7: (value_representation_item.value_component value_representation_item <= representation_item <- set_representation_item[i] set_representation_item compound_item_definition = set_representation_item compound_item_definition <- compound_representation_item.item_element compound_representation_item => value_range) #5: (value_representation_item.value_component value_representation_item)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
SHAPE_- DESCRIPTION_- ASSOCIATION #1: The general case. #2: If the object is defining shape for a general feature or a feature definition.	#1: (shape_definition_- representation) #2: (property_- definition_- representation)	41		
role	property_definition_- representation.name	41		shape_definition_representation <= property_definition_representation property_definition_representation.name
shape_- description_- association to external_- geometric_model (as defining_- geometry)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.used_representation -> representation => {representation.context_of_items -> representation_context representation_context.context_type = 'external'} shape_representation
shape_- description_- association to geometric_model (as defining_- geometry)	PATH			#1: (shape_definition_representation <= property_definition_representation) #2: (property_definition_representation) property_definition_representation.used_representation -> representation => shape_representation
shape_- description_- association to feature_- definition (as is_defining_- shape_for)	PATH			property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition {property_definition => product_definition_shape} property_definition.definition -> characterized_definition

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = characterized_object characterized_object => feature_definition
shape_- description_- association to general_feature (as is_defining_- shape_for)	PATH			property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object
shape_- description_- association to item_shape (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition => product_definition_shape
shape_- description_- association to shape_element (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_- description_- association to shape_element_- relationship (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship
shape_- description_- association to thread_feature (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect => applied_area
shape_- description_- association to transition_- feature (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect => transition_feature
SHAPE_ELEMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	shape_aspect	41		
description	shape_aspect. description	41		
element_name	shape_aspect.name	41		
shape_element to item_shape (as composition)	PATH			shape_aspect shape_aspect.of_shape ->> product_definition_shape
shape_element to multi_language_- string (as description)	#1: ([shape_aspect. description] [PATH]) #2: (PATH)	41	164	shape_aspect #1: (attribute_language_item = shape_aspect attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = shape_aspect multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
SHAPE_ELEMENT_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	shape_aspect_- relationship	41		
description	shape_aspect_- relationship. description	41		
relation_type	shape_aspect_- relationship.name	41		
shape_element_- relationship to multi_language_- string (as description)	#1: ([shape_aspect_- relationship. description][PATH]) #2: (PATH)		165	shape_aspect_relationship #1: (attribute_language_item = shape_aspect_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = shape_aspect_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
shape_element_- relationship to shape_element (as related)	PATH			shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect
shape_element_- relationship to shape_element (as relating)	PATH			shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect

Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
SPECIFIC_- DOCUMENT_- CLASSIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_related_- product_category	41		
classification_- name	product_category.name	41		product_related_product_category <= product_category product_category.name {(product_category.name = 'catalogue') (product_category.name = 'manual') (product_category.name = 'specification')}
description	product_category. description	41		product_related_product_category <= product_category product_category.description
specific_- document_- classification to document (as associated_- document)	PATH			product_related_product_category product_related_product_category.products[i] ->) product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
specific_- document_- classification to multi_- language_string (as description)	#1: ([product_- category.description] [PATH]) #2: (PATH)	41	155	product_related_product_category #1: (attribute_language_item = product_related_product_category attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_related_product_category multi_language_attribute_item <-)

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
SPECIFIC_- DOCUMENT_- CLASSIFICATION_- HIERARCHY	product_category_- relationship	41		{product_category_relationship product_category_relationship.name = 'hierarchy'}
specific_- document_- classification_- hierarchy to specific_- document_- classification (as sub_- classification)	PATH			product_category_relationship product_category_relationship.sub_category ->> product_category => product_related_product_category
specific_- document_- classification_- hierarchy to specific_- document_- classification (as super_- classification)	PATH			product_category_relationship product_category_relationship.category ->> product_category => product_related_product_category

Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
TEMPLATE_- INSTANCE #1: If used in a two-dimensional context. #2: If used in a three-dimensional context. #3: If the styled_model is used with UoF P2. #4: If the styled_model is used without UoF P2.	mapped_item	43		
id	representation_item. name	43		mapped_item <= representation_item representation_item.name
scale	cartesian_- transformation_- operator.scale	42		mapped_item mapped_item.mapping_target ->> representation_item => geometric_representation_item => cartesian_transformation_operator cartesian_transformation_operator.scale {cartesian_transformation_operator => #1: (cartesian_transformation_operator_2d) #2: (cartesian_transformation_operator_3d)}
template_- instance to transformation (as model_- placement)	[mapped_item.mapping_- target] [representation_map. mapping_origin]	43 43		[mapped_item mapped_item.mapping_target] [mapped_item mapped_item.mapping_source ->> representation_map representation_map.mapping_origin]
template_- instance to external_model (as template_- definition)	PATH			mapped_item mapped_item.mapping_source ->> representation_map representation_map.mapped_representation ->> representation {representation.context_of_items ->> representation_context

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_context.context_type = 'external'}
template_-instance to geometric_model (as template_-definition)	PATH			mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->representation =>shape_representation
template_-instance to styled_model (as template_-definition)	PATH			mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
TRANSFORMATION #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined.	#1: ([mapped_item.mapping_target][representation_map.mapping_origin]) #2: (item_defined_-transformation) #3: (functionally_-defined_-transformation)	43 43 43 43		

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (continued)

Application element	AIM element	Source	Rules	Reference path
TRANSFORMATION_-2D #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined. #4: If the item is a placement. #5: If the item is a transformation operator.	#1: ([mapped_item.mapping_target] [representation_map.mapping_origin]) #2: (item_defined_transformation) #3: (functionally_defined_transformation)	43 43 43 43		{#1: ([mapped_item.mapping_target -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_2d)] [representation_map.mapping_origin -> representation_item => geometric_representation_item => placement => axis2_placement_2d]) #2: (item_defined_transformation [item_defined_transformation.transform_item_1 -> representation_item => geometric_representation_item => placement => axis2_placement_2d] [item_defined_transformation.transform_item_2 -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_2d)) #3: (functionally_defined_transformation => cartesian_transformation_operator => cartesian_transformation_operator_2d)}

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Table 5 – Mapping table external_reference_mechanism UoF (E1) (concluded)

Application element	AIM element	Source	Rules	Reference path
TRANSFORMATION_-3D #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined. #4: If the item is a placement. #5: If the item is a transformation operator.	#1: ([mapped_item.mapping_target] [representation_map.mapping_origin]) #2: (item_defined_transformation) #3: (functionally_defined_transformation)	43 43 43		{#1: ([mapped_item.mapping_target ->representation_item =>geometric_representation_item =>#4: (placement =>axis2_placement_3d)#5: (cartesian_transformation_operator =>cartesian_transformation_operator_3d)][representation_map.mapping_origin ->representation_item =>geometric_representation_item =>placement =>axis2_placement_3d])#2: (item_defined_transformation[item_defined_transformation.transform_item_1 ->representation_item =>geometric_representation_item =>placement =>axis2_placement_3d][item_defined_transformation.transform_item_2 ->representation_item =>geometric_representation_item =>#4: (placement =>axis2_placement_3d)#5: (cartesian_transformation_operator =>cartesian_transformation_operator_3d))#3: (functionally_defined_transformation =>cartesian_transformation_operator =>cartesian_transformation_operator_3d)}

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Table 6 – Mapping table user_defined_feature UoF (FF1)

Application element	AIM element	Source	Rules	Reference path
FEATURE_- OCCURRENCE	shape_aspect	41		
feature_- occurrence to plane (as maximum_- feature_limit)	PATH			shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'maximum feature limit'] [representation => shape_representation => planar_shape_representation]} representation.items [i] -> representation_item => geometric_representation_item => surface => elementary_surface => plane
GENERAL_COMPOUND_- FEATURE	general_feature	214		general_feature <= feature_definition <= characterized_object {characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => <- product_definition_shape <-

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'general compound feature'} composite_shape_aspect}
general_compound_- feature to feature_- definition (as elements)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'general compound feature'} composite_shape_aspect composite_shape_aspect.component_relationships[i] -> shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect -> shape_aspect => instanced_feature <= feature_definition
general_compound_- feature to general_feature (as elements)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'general compound feature'} composite_shape_aspect

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
				composite_shape_aspect.component_relationships[i] -> shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect ->) shape_aspect => instanced_feature <= feature_definition => general_feature
general_compound_- feature to thread_feature (as elements)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'general compound feature'} composite_shape_aspect composite_shape_aspect.component_relationships[i] ->) shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect ->) shape_aspect => applied_area
general_compound_- feature to transition_- feature (as elements)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <-

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'general compound feature'} composite_shape_aspect composite_shape_aspect.component_relationships[i] -> shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect -> shape_aspect => transition_feature
GENERAL_FEATURE	general_feature	214		general_feature <= feature_definition <= {feature_definition => instanced_feature <= shape_aspect} characterized_object
feature_category	characterized_object. description	41		general_feature <= feature_definition <= characterized_object characterized_object.description
feature_type	characterized_object. name	41		general_feature <= feature_definition <= characterized_object characterized_object.name
general_feature to general_- parameter (as additional_- parameter)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition <- property_definition_representation.definition

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => measure_representation_item
general_feature to axis_- placement (as location_and_- orientation)	PATH			general_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
INCLUDED_FEATURE #1: If it is the occurrence of a feature_-definition or a general_-feature. #2: If it is the occurrence of a transition. #3: If it is the occurrence of a thread. #4: If it is the occurrence of a compound feature.	#1: (instanced_-feature) #2: (transition_-feature) #3: (applied_area)	214 214 214		#1: (instanced_feature <= [shape_aspect] [feature_definition <= characterized_object]) #2: (transition_feature <= shape_aspect) #3: (applied_area <= shape_aspect)
included_feature to feature_-definition (as definition)	IDENTICAL MAPPING			
included_feature to general_-feature (as definition)	IDENTICAL MAPPING			
included_feature to thread_-feature (as definition)	IDENTICAL MAPPING			
included_feature to transition_-feature (as definition)	IDENTICAL MAPPING			
PATH_PARAMETER	shape_defining_-relationship	214		shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.name = 'course of travel'}
parameter_role	shape_aspect_-relationship. description	41		shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.description

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Table 6 – Mapping table user_defined_feature UoF (FF1) (continued)

Application element	AIM element	Source	Rules	Reference path
path_parameter to path (as associated_-path)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect => path_feature_component
path_parameter to general_-feature (as parameter_-context)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect {shape_aspect.description = 'course of travel occurrence'} shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => general_feature
PROFILE_-PARAMETER	shape_defining_-relationship	214		shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'}
parameter_role	shape_aspect_-relationship.name			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.name
profile_-parameter to profile (as associated_-profile)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect
profile_-parameter to general_feature (as parameter_-context)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect {shape_aspect.description = 'boundary occurrence'} shape_aspect.of_shape ->

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Table 6 – Mapping table user_defined_feature UoF (FF1) (concluded)

Application element	AIM element	Source	Roles	Reference path
				product_definition_shape <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => general_feature

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Table 7 – Mapping table included_feature UoF (FF2)

Application element	AIM element	Source	Rules	Reference path
ANGLE_- SPECIFICATION	directed_angle	214		directed_angle <= shape_aspect
angle_reference	shape_aspect. description	45		directed_angle <= shape_aspect shape_aspect.description {(shape_aspect.description = 'punch direction') (shape_aspect.description = 'profile normal') (shape_aspect.description = 'surface normal')}
angle_- specification to feature_- parameter (as angle)	PATH			directed_angle <= shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> {representation_item => {representation_item.name = 'angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
ANGLE_TAPER	taper	214		taper <= shape_aspect {shape_aspect.description = 'angle taper'}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
angle_taper to feature_- parameter (as angle)	PATH			taper <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'taper angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
BEAD_END_TYPE	bead_end	214		bead_end <= shape_aspect {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
is_applied_to	shape_aspect_relationship.description	41		bead_end <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'bead end usage'} shape_aspect_relationship.description {(shape_aspect_relationship.description = 'end condition at path start') (shape_aspect_relationship.description = 'end condition at path end')}
BEAD_FEATURE	bead	214		bead <= feature_definition <= characterized_object
bead_feature to feature_-parameter (as base_radius)	PATH			bead <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'base radius'} measure_representation_item {[measure_representation_item <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
bead_feature to open_profile_-usage (as bead_-profile)	PATH			bead <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'bead profile'] [shape_aspect.description = 'open profile occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship]}
bead_feature to bead_end_type (as end_-condition)	PATH			bead <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{[shape_aspect.name = 'end condition'] [shape_aspect.description = 'bead end occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'bead end usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => bead_end
bead_feature to path (as sweep_path)	PATH			bead <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'sweep path'] [shape_aspect.description = 'path feature component occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'path feature component usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => path_feature_component

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
BOSS_FEATURE #1: If the boss_feature is of type circular_boss. #2: If the boss_feature is of type rectangular_-boss. #3: If the boss_feature is of type general_boss.	boss	214		boss <= feature_definition <= characterized_object
boss_feature to feature_-parameter (as base_radius)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'fillet radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
boss_feature to linear_path (as boss_height)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'boss height occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'boss height'] [shape_aspect_relationship.description = 'path feature component usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'linear'} path_feature_component
boss_feature to closed_profile_-usage (as boundary)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect.of_shape shape_aspect <- {#1: (shape_aspect.description = 'circular profile occurrence') #2: (shape_aspect.description = 'rectangular profile occurrence') #3: (shape_aspect.description = 'enclosed profile occurrence')} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'} shape_aspect_relationship => shape_defining_relationship
boss_feature to angle_taper (as taper)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {#1: (shape_aspect.description = 'change in diameter occurrence') #2: (shape_aspect.description = 'change in boundary occurrence')} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'angle taper'} taper
boss_feature to diameter_taper (as taper)	#1: (PATH)			#1: (boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'change in diameter occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'diameter taper'} taper)
boss_feature to directed_taper (as taper)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'change in boundary occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'directed taper'} taper

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
boss_feature to boss_top_-condition (as top_-condition)	PATH			boss <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = ' top condition occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'boss top usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => boss_top
BOSS_TOP_-CONDITION	boss_top	214		boss_top <= shape_aspect {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}
is_applied_to	shape_aspect_-relationship.name	41		boss_top <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship shape_aspect_relationship.name {(shape_aspect_relationship.name = 'boss height start') (shape_aspect_relationship.name = 'boss height end')}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
boss_top_- condition to feature_- parameter (as top_radius)	PATH			boss_top <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'top radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
CATALOGUE_THREAD	externally_defined_- feature_definition	214		externally_defined_feature_definition <= [feature_definition <= characterized_object]

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				[externally_defined_item {[externally_defined_item.item_id = 'external thread'] [externally_defined_item.source = 'external feature specification']}]
CHAMFER	chamfer	214		chamfer <= transition_feature <= shape_aspect
chamfer to face (as chamfer_-face)	PATH			chamfer <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'chamfer face'] [representation => shape_representation => face_shape_representation]} representation.items [i] -> representation_item => topological_representation_item => face

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
chamfer to chamfer_-definition (as is_defined_-by)	PATH			chamfer <= transition_feature <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.related_shape_aspect ->shape_aspect => chamfer_offset} feature_component_relationship
CHAMFER_ANGLE	chamfer_offset	214		chamfer_offset <= shape_aspect {shape_aspect.description = 'second offset'}
chamfer_angle to feature_-parameter (as angle)	PATH			chamfer_offset <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->representation_item => {representation_item.name = 'offset angle'} measure_representation_item {measure_representation_item <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit => plane_angle_measure_with_unit}
CHAMFER_- DEFINITION	feature_component_- relationship	214		feature_component_relationship <= shape_aspect_relationship {shape_aspect_relationship.related_shape_aspect ->> shape_aspect => {(shape_aspect.description = 'first offset') (shape_aspect.description = 'second offset')} chamfer_offset}
chamfer_- definition to chamfer_offset (as offset_1)	PATH			feature_component_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect => {shape_aspect.description = 'first offset'} chamfer_offset
chamfer_- definition to chamfer_angle (as value_2)	PATH			feature_component_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect => {shape_aspect.description = 'second offset'} chamfer_offset
chamfer_- definition to chamfer_offset (as value_2)	PATH			feature_component_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect => {shape_aspect.description = 'second offset'} chamfer_offset
CHAMFER_OFFSET	chamfer_offset	214		chamfer_offset <= shape_aspect {(shape_aspect.description = 'first offset') (shape_aspect.description = 'second offset')}
chamfer_offset to feature_- parameter (as offset)	PATH			chamfer_offset <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'offset amount'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
CIRCULAR_BOSS	boss	214		boss <= feature_definition <= characterized_object {characterized_object.description = 'circular'}
CIRCULAR_CLOSED_- PROFILE	circular_closed_- profile	214		circular_closed_profile <= shape_aspect
circular_closed_- profile to feature_- parameter (as diameter)	PATH			circular_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
CIRCULAR_OFFSET_- PATTERN	shape_aspect	41		{[shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => feature_component_relationship => pattern_offset_membership] [shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition]}
angular_offset	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <-

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'offset'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
index	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'index number'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component ->> measure_value measure_value = count_measure count_measure}
CIRCULAR_OMIT_- PATTERN	shape_aspect	41		{[shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => feature_component_relationship => pattern_omit_membership] [shape_aspect shape_aspect.of_shape ->> product_definition_shape <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition]}
index	measure_representation_- item	45		shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'index number'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure count_measure}
CIRCULAR_PATH	path_feature_component	214		path_feature_component <= shape_aspect {(shape_aspect.description = 'partial circular') (shape_aspect.description = 'complete circular')}
circular_path to feature_- parameter (as radius)	PATH			path_feature_component <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
CIRCULAR_PATTERN	circular_pattern	214		circular_pattern <= replicate_feature <= feature_definition <= characterized_object
number_of_- features	measure_representation_- item	45	30	circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation_with_parameters} representation.items[i] ->& representation_item => {representation_item.name = 'number of features'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component ->& measure_value measure_value = count_measure count_measure}
circular_pattern to feature_- parameter (as angular_- spacing)	PATH			circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => {property_definition_shape} product_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->& representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->& representation_item => {representation_item.name = 'angular spacing'} measure_representation_item

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
circular_pattern to feature_- parameter (as diameter)	PATH			circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape{representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
circular_pattern to circular_omit_- pattern (as missing_- feature)	PATH			circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape [shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship => pattern_omit_membership} shape_aspect_relationship.related_shape_aspect ->] [shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => feature_component_relationship] [shape_aspect_relationship.description = 'base pattern']} shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect.of_shape -> product_definition_shape <= pproperty_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => replicate_feature ->] modified_pattern} shape_aspect_relationship.relating_shape_aspect

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect_relationship {[shape_aspect_relationship.description = 'modified pattern'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.related_shape_aspect ->] shape_aspect
circular_pattern to circular_- offset_pattern (as relocated_- feature)	PATH			circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape [shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship => pattern_offset_membership} shape_aspect_relationship.related_shape_aspect ->] [shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => feature_component_relationship] [shape_aspect_relationship.description = 'base pattern']} shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition]

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = characterized_object characterized_object => feature_definition => replicate_feature => modified_pattern} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'modified pattern'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.related_shape_aspect ->] shape_aspect
circular_pattern to feature_- parameter (as rotation)	PATH			circular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'base feature rotation'}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = plane_angle_measure (plane_angle_measure) (plane_angle_measure = 0.0)] [measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit]}
CLOSED_PROFILE	shape_aspect	41		{shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}
CLOSED_PROFILE_- USAGE	shape_defining_- relationship	214		shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'}
closed_profile_- usage to closed_- profile (as used_- profile)	PATH			shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'} shape_aspect_relationship.relating_shape_aspect -> shape_aspect
COMPLETE_- CIRCULAR_PATH	path_feature_component	214		path_feature_component <= shape_aspect {shape_aspect.description = 'complete circular'}
COMPOUND_FEATURE_- IN_PANEL	compound_feature	214		{compound_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect => composite_shape_aspect} shape_aspect.name = 'compound feature in panel'}
feature_type	characterized_object. name	41		compound_feature <= feature_definition <= characterized_object characterized_object.name
COMPOUND_FEATURE_- IN_PANEL_ELEMENT #1: If the component is an integral part of the compound. #2: If the component is defined independently and placed in the compound by a transformation. #3: If the component is a transition_feature.	#1: (instanced_- feature) #2: (placed_feature) #3: (transition_- feature)	214 214 214		#1: (instanced_feature <= [shape_aspect] [feature_definition <= characterized_object]) #2: (placed_feature <= shape_aspect) #3: (transition_feature <= shape_aspect)
compound_feature_- in_panel_element to transformation (as element_- placement)	PATH			#2: (placed_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items[i] -> representation_item => mapped_item)
compound_feature_- in_panel_element to process_- feature_in_panel (as feature)	#1: (IDENTICAL MAPPING) #2: (IDENTICAL MAPPING)			#1: (instanced_feature <= feature_definition) #2: (placed_feature <= shape_aspect {shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items[i] -> representation_item => mapped_item mapped_item.mapping_source ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_map representation_map.mapped_representation -> representation <- {representation => shape_representation => shape_representation_with_parameters} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition})
compound_feature_- in_panel_element to transition_- feature (as feature)	IDENTICAL MAPPING			
compound_feature_- in_panel_element to compound_- feature_in_panel (as is_element_- for)	PATH			#1: (instanced_feature <=) #2: (placed_feature <=) #3: (transition_feature <=) shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship <- {shape_aspect_relationship => feature_component_relationship} composite_shape_aspect.component_relationships[i] composite_shape_aspect <= shape_aspect

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{shape_aspect.name = 'compound feature in panel'} shape_aspect.of_shape ->product_definition_shape <= property_definition property_definition.definition ->characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => compound_feature
COMPOUND_FEATURE_-IN_PANEL_ELEMENT_-RELATIONSHIP #1: If the component is an integral part of the compound. #2: If the component is defined independently and placed in the compound by a transformation. #3: If the component is a transition_feature.	shape_aspect_-relationship	41	5	{shape_aspect_relationship shape_aspect_relationship.name = 'compound feature ordering'}
compound_feature_-in_panel_element_-relationship to compound_feature_-in_panel_element (as predecessor)	PATH			shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->shape_aspect => #1: (instanced_feature) #2: (placed_feature) #3: (transition_feature)
compound_feature_-in_panel_element_-relationship to compound_feature_-in_panel_element (as successor)	PATH			shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect ->shape_aspect => #1: (instanced_feature) #2: (placed_feature) #3: (transition_feature)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
COMPOUND_FEATURE_-IN_SOLID #1: If the compound_-feature_in_solid is of type general_compound_-feature_in_solid. #2: If the compound_-feature_in_solid is of type compound_hole.	compound_feature	214		{#1: (compound_feature <=) #2: (composite_hole <= compound_feature <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect => composite_shape_aspect} shape_aspect.name = 'compound feature in solid'}
feature_type	characterized_object. name	41		#1: (compound_feature <=) #2: (composite_hole <= compound_feature <=) feature_definition <= characterized_object characterized_object.name

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
COMPOUND_FEATURE_- IN_SOLID_ELEMENT #1: If the component is an integral part of the compound. #2: If the component is defined independently and placed in the compound by a transformation. #3: If the component is a transition_feature. #4: If the component is a thread_feature.	#1: (instanced_- feature) #2: (placed_feature) #3: (transition_- feature) #4: (applied_area)	214 214 214 214		#1: (instanced_feature <=) #2: (placed_feature <=) #3: (transition_feature <=) #4: (applied_area <=) shape_aspect
compound_feature_- in_solid_element to transformation (as element_- placement)	PATH			#2: (placed_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items [i] -> representation_item => mapped_item)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
compound_feature_- in_solid_element to process_- feature_in_solid (as feature)	#1: (IDENTICAL MAPPING) #2: (IDENTICAL MAPPING)			#1: (instanced_feature <= feature_definition) #2: (placed_feature <= shape_aspect {shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items [i] -> representation_item => mapped_item mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation <- {representation => shape_representation => shape_representation_with_parameters} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation}}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition})
compound_feature_- in_solid_element to thread_- feature (as feature)	IDENTICAL MAPPING			{applied_area <= shape_aspect}
compound_feature_- in_solid_element to transition_- feature (as feature)	IDENTICAL MAPPING			{transition_feature <= shape_aspect}
compound_feature_- in_solid_element to compound_- feature_in_solid (as is_element_- for)	PATH			#1: (instanced_feature <=) #2: (placed_feature <=) #3: (transition_feature <=) #4: (applied_area <=) shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship <- {shape_aspect_relationship => feature_component_relationship} composite_shape_aspect.component_relationships[i] composite_shape_aspect <= shape_aspect {shape_aspect.name = 'compound feature in solid'} shape_aspect.of_shape -> product_definition_shape => property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => compound_feature
COMPOUND_FEATURE_- IN_SOLID_ELEMENT_- RELATIONSHIP #1: If the component is an integral part of the compound. #2: If the component is defined independently and placed in the compound by a transformation. #3: If the component is a transition_feature. #4: If the component is a thread_feature.	shape_aspect_- relationship	41	5	{shape_aspect_relationship shape_aspect_relationship.name = 'compound feature ordering'}
compound_feature_- in_solid_element_- relationship to compound_feature_- in_solid_element (as predecessor)	PATH			shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect => #1: (instanced_feature) #2: (placed_feature) #3: (transition_feature) #4: (applied_area)
compound_feature_- in_solid_element_- relationship to compound_feature_- in_solid_element (as successor)	PATH			shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect => #1: (instanced_feature) #2: (placed_feature) #3: (transition_feature) #4: (applied_area)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
COMPOUND_HOLE #1: If the compound_hole is counterbore. #2: If the compound_hole is countersunk.	composite_hole	214		{composite_hole <= compound_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect => {shape_aspect.name = 'compound feature in solid'} composite_shape_aspect}
compound_hole_- type	characterized_object. description	41		composite_hole <= compound_feature <= feature_definition <= characterized_object {#1: (characterized_object.description = 'counterbore') #2: (characterized_object.description = 'countersunk')}
CONICAL_BOTTOM	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.description = 'conical'}
conical_bottom to feature_- parameter (as tip_angle)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'tip angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
conical_bottom to feature_- parameter (as tip_radius)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'tip radius'} measure_representation_item {[measure_representation_item <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
CONSTANT_RADIUS_- EDGE_ROUND	edge_round	214		edge_round <= transition_feature <= shape_aspect {shape_aspect.description = 'constant radius'}
constant_radius_- edge_round to feature_- parameter (as first_- offset)	PATH			edge_round <= transition_feature <= shape_aspect shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] => representation_item =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation_item.name = 'first offset'}
				measure_representation_item
				{measure_representation_item <=
				measure_with_unit =>
				length_measure_with_unit}
constant_radius_- edge_round to feature_- parameter (as radius)	PATH			edge_round <=
				transition_feature <=
				shape_aspect
				shape_aspect
				shape_definition = shape_aspect
				shape_definition
				characterized_definition = shape_definition
				characterized_definition <-
				property_definition.definition
				property_definition
				represented_definition = property_definition
				represented_definition <-
				property_definition_representation.definition
				property_definition_representation
				{property_definition_representation =>
				shape_definition_representation}
				property_definition_representation.used_representation ->
				representation
				{representation =>
				shape_representation =>
				shape_representation_with_parameters}
				representation.items[i] ->
				representation_item =>
				{representation_item.name = 'radius'}
				measure_representation_item
				{measure_representation_item <=
				measure_with_unit =>
				length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
constant_radius_- edge_round to feature_- parameter (as second_- offset)	PATH			edge_round <= transition_feature <= shape_aspect shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'second offset'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
CONSTANT_RADIUS_- FILLET	fillet	214		filler<= transition_feature <= shape_aspect {shape_aspect.description = 'constant radius'}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
constant_radius_- fillet to feature_- parameter (as first_- offset)	PATH			fillet <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'first offset'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
constant_radius_- fillet to feature_- parameter (as radius)	PATH			fillet <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
constant_radius_- fillet to feature_- parameter (as second_- offset)	PATH			fillet <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'second offset'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DEFAULT_CHAMFER #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation	43		{representation [representation.name = 'default chamfer'] [representation.context_of_items ->> representation_context representation_context.context_type = 'default setting']}
description	representation. description	43		
default_chamfer to multi_- language_string (as description)	PATH		158	#1: (representation.description {representation attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.attribute_name = 'description'}}) #2: (representation multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.attribute_name = 'description'} attribute_value_assignment.attribute_value)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
default_chamfer to feature_-parameter (as offset_-value)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'offset value'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DEFAULT_DRAFT_-ANGLE #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	representation	43		{representation [representation.name = 'default draft angle'] [representation.context_of_items ->> representation_context representation_context.context_type = 'default setting']}
description	representation.description	43		
default_draft_-angle to multi_-language_string (as description)	PATH		158	#1: (representation.description {representation attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.attribute_name = 'description'}}) #2: (representation multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.attribute_name = 'description'} attribute_value_assignment.attribute_value)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
default_draft_- angle to feature_- parameter (as draft_angle_- value)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'draft angle value'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
DEFAULT_EDGE_- ROUND #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation	43		{representation [representation.name = 'default edge round'] [representation.context_of_items ->> representation_context representation_context.context_type = 'default setting']}
description	representation. description	43		
default_edge_- round to multi_- language_string (as description)	PATH		158	#1: (representation.description {representation attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.attribute_name = 'description'}}) #2: (representation multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.attribute_name = 'description'} attribute_value_assignment.attribute_value)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
default_edge_- round to feature_- parameter (as radius_- value)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'radius value'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DEFAULT_FILLET #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation	43		{representation [representation.name = 'default fillet'] [representation.context_of_items ->> representation_context representation_context.context_type = 'default setting']}
description	representation. description	43		
default_fillet to multi_- language_string (as description)	PATH		158	#1: (representation.description {representation attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.attribute_name = 'description'}}) #2: (representation multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.attribute_name = 'description'} attribute_value_assignment.attribute_value)

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
default_fillet to feature_- parameter (as radius_- value)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'radius value'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DEFAULT_SETTING_- ASSOCIATION #1: If the default_- context is a digital_- document, a digital_file, or an item_shape. #2: If the default_- context is a drawing_sheet or a view_area.	#1: (property_- definition_- representation) #2: (representation_- relationship)	41 43		#1: ({property_definition_representation property_definition_representation.name = 'default setting association'}) #2: ({representation_relationship representation_relationship.name = 'default setting association'})
default_setting_- association to digital_document (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition
default_setting_- association to digital_file (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_object => document_file
default_setting_- association to drawing_sheet (as default_- context)	PATH			representation_relationship representation_relationship.rep_2 ->> representation => presentation_representation => presentation_area => drawing_sheet_revision
default_setting_- association to item_shape (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition => product_definition_shape
default_setting_- association to view_area (as default_- context)	PATH			representation_relationship representation_relationship.rep_2 ->> representation => presentation_representation => presentation_area
default_setting_- association to default_chamfer (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default chamfer'}
default_setting_- association to default_draft_- angle (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default draft angle'}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
default_setting_- association to default_edge_- round (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default edge round'}
default_setting_- association to default_fillet (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default fillet'}
DEFINED_THREAD	thread	214		thread <= feature_definition <= characterized_object
defined_thread to feature_- parameter (as crest)	PATH			thread <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation_with_parameters} representation.items[1] ->& representation_item => {representation_item.name = 'crest'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
defined_thread to feature_- parameter (as minor_- diameter)	PATH			thread <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] ->& representation_item => {representation_item.name = 'minor diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
defined_thread to feature_-parameter (as pitch_-diameter)	PATH			thread <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'pitch diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DIAMETER_TAPER	taper	214		taper <= shape_aspect {shape_aspect.description = 'diameter taper'}
diameter_taper to feature_-parameter (as final_-diameter)	PATH			taper <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'taper diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
DIRECTED_TAPER	taper	214		taper <= shape_aspect {shape_aspect.description = 'directed taper'}
direction	direction	42		taper <= shape_aspect shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation => {representation.name = 'direction'} shape_representation => direction_shape_representation} representation.items [i] ->> representation_item => geometric_representation_item => direction
directed_taper to feature_- parameter (as angle)	PATH			taper <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
EDGE_ROUND	edge_round	214		edge_round <=* 4; transition_feature <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect
edge_round to face (as edge_round_-face)	PATH			edge_round <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'edge round face'] [representation => shape_representation => face_shape_representation]} representation.items [i] -> representation_item => topological_representation_item => face
FACE_TERMINATION	joggle_termination	214		joggle_termination <= shape_aspect {shape_aspect.description = 'face termination'}
FEATURE_-DEFINITION	feature_definition	214		feature_definition <= characterized_object

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
feature_- definition to cartesian_- coordinate_space_- 3d (as is_defined_- in)	PATH			feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.context_of_items -> representation_context => geometric_representation_context {geometric_representation_context.coordinate_space_dimension = 3}
feature_- definition to axis_placement (as location_and_- orientation)	PATH			feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_definition_representation} property_definition_representation.used_representation ->representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement
FILLET	fillet	214		fillet <= transition_feature <= shape_aspect
fillet to face (as fillet_face)	PATH			fillet <= transition_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation {[representation.name = 'fillet face'] [representation => shape_representation => face_shape_representation]} representation.items [i] ->

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => topological_representation_item => face
FLAT_BOTTOM	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.description = 'flat'}
FLAT_SLOT_END_- TYPE	slot_end	214		slot_end <= shape_aspect {shape_aspect.description = 'flat'}
flat_slot_end_- type to feature_- parameter (as first_- radius)	PATH			slot_end <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'first radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
flat_slot_end_- type to feature_- parameter (as second_- radius)	PATH			slot_end <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'second radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
FLAT_WITH_RADIUS_- BOTTOM	hole_bottom	214		{hole_bottom <= shape_aspect shape_aspect.description = 'flat with radius'}
flat_with_radius_- bottom to feature_- parameter (as radius)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'corner radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
FLAT_WITH_TAPER_-BOTTOM	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.description = 'flat with taper'}
flat_with_taper_-bottom to feature_-parameter (as final_-diameter)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items [i] -> representation_item => {representation_item.name = 'final diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
flat_with_taper_- bottom to feature_- parameter (as taper_angle)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items [i] -> representation_item => {representation_item.name = 'taper angle'} measure_representation_item {measure_representation_item <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit => plane_angle_measure_with_unit}
FORM_FEATURE_IN_- PANEL	feature_in_panel	214		feature_in_panel <= feature_definition <= characterized_object
feature_type	characterized_object. description	41		feature_in_panel <= feature_definition <= characterized_object characterized_object.description {(characterized_object.description = 'pocket') (characterized_object.description = 'boss') (characterized_object.description = 'stairstep')}
form_feature_in_- panel to angle_- specification (as base_- boundary_defined_- by)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'base boundary'] [shape_aspect.description = 'directed angle occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'directed angle usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => directed_angle}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
form_feature_in_- panel to closed_- profile_usage (as base_- boundary_defined_- by)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'base boundary'] [shape_aspect.description = 'closed profile occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.description = 'profile usage'} shape_defining_relationship
form_feature_in_- panel to feature_- parameter (as base_radius)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'base radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
form_feature_in_- panel to angle_- specification (as target_- boundary_defined_- by)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'target boundary'] [shape_aspect.description = 'directed angle occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'directed angle usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => directed_angle
form_feature_in_- panel to closed_- profile_usage (as target_- boundary_defined_- by)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect <- {[shape_aspect.name = 'target boundary'] [shape_aspect.description = 'closed profile occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.description = 'profile usage'} shape_defining_relationship
form_feature_in_- panel to shell (as target_face)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'target face'] [representation => shape_representation => face_shape_representation]} representation.items[i] -> representation_item => topological_representation_item => connected_face_set => (closed_shell) (open_shell)

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
form_feature_in_- panel to surface (as target_face)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'target face'] [representation => shape_representation => face_shape_representation]} representation.items[i] -> representation_item => geometric_representation_item => face_surface face_surface.face_geometry -> surface
form_feature_in_- panel to feature_- parameter (as target_- radius)	PATH			feature_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'target radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
GENERAL_BOSS	boss	214		boss <= feature_definition <= characterized_object {characterized_object.description = 'complex'}
GENERAL_BOTTOM_- CONDITION	pocket_bottom	214		pocket_bottom <= shape_aspect {shape_aspect.description = 'complex'}
general_bottom_- condition to shell (as floor_face)	PATH			pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'floor'] [representation => shape_representation => face_shape_representation]} representation.items[i] -> representation_item => topological_representation_item => connected_face_set => (closed_shell) (open_shell)
general_bottom_- condition to surface (as floor_face)	PATH			pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'floor'] [representation => shape_representation => face_shape_representation]} representation.items[i] ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => geometric_representation_item => face_surface face_surface.face_geometry ->surface
general_bottom_-condition to feature_-parameter (as floor_-radius)	PATH			pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->representation_item => {representation_item.name = 'radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component ->measure_value measure_value = length_measure(length_measure) (length_measure = 0.0)[1:?] [measure_representation_item.?<=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit => length_measure_with_unit]}
GENERAL_CLOSED_- PROFILE	closed_path_profile	214		closed_path_profile <= shape_aspect
general_closed_- profile to curve (as profile_- shape)	PATH			closed_path_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => path_shape_representation} representation.items[i] -> representation_item => {representation_item.name = 'profile shape'} geometric_representation_item => (curve => bounded_curve) (edge_curve)
GENERAL_COMPOUND_- FEATURE_IN_SOLID	compound_feature	214		{compound_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect => composite_shape_aspect} shape_aspect.name = 'compound feature in solid'}
feature_type	characterized_object.name	41		compound_feature <= feature_definition <= characterized_object characterized_object.name
GENERAL_OPEN_-PROFILE	open_path_profile	214		open_path_profile <= shape_aspect
general_open_-profile to curve (as profile_-shape)	PATH			open_path_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => path_shape_representation} representation.items[i] -> representation_item => {representation_item.name = 'profile shape'} geometric_representation_item =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(curve => bounded_curve) (edge_curve)
GENERAL_PATH	path_feature_component	214		path_feature_component <= shape_aspect {shape_aspect.description = 'complex'}
general_path to curve (as path_-geometry)	PATH			path_feature_component <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'sweep path'] [representation => shape_representation => path_shape_representation]} representation.items[i] -> representation_item => {representation_item.name = 'path curve'} (geometric_representation_item => curve {curve => bounded_curve}) (geometric_representation_item => edge_curve) (topological_representation_item =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				path)
GENERAL_PATTERN	feature_pattern	214		{feature_pattern <= replicate_feature <= feature_definition <= characterized_object}
general_pattern to axis_- placement (as added_- instance)	PATH			feature_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.items[i] -> {representation_item representation_item.name = 'base feature placement'} representation_item => geometric_representation_item => placement
GENERAL_POCKET	pocket	214		pocket <= feature_definition <= characterized_object {characterized_object.description = 'complex'}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
GENERAL_TOP_- CONDITION	boss_top	214		boss_top <= shape_aspect {shape_aspect.description = 'complex'}
general_top_- condition to shell (as top_face)	PATH			boss_top <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => face_shape_representation} representation.items[i] -> representation_item => topological_representation_item => connected_face_set => (closed_shell) (open_shell)
general_top_- condition to surface (as top_face)	PATH			boss_top <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => face_shape_representation} representation.items[i] -> representation_item => geometric_representation_item => face_surface face_surface.face_geometry -> surface
HOLE_BOTTOM_- CONDITION	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}
is_applied_to	shape_aspect_- relationship.name	41		hole_bottom <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.name {(shape_aspect_relationship.name = 'hole depth start') (shape_aspect_relationship.name = 'hole depth end')}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
HOLE_FEATURE_IN_- PANEL	hole_in_panel	214		hole_in_panel <= feature_definition <= characterized_object
hole_type	characterized_object. description	41		hole_in_panel <= feature_definition <= characterized_object characterized_object.description
hole_feature_in_- panel to closed_- profile_usage (as hole_- profile)	PATH			hole_in_panel <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'hole profile'] [shape_aspect.description = 'closed profile occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.description = 'profile usage'} shape_defining_relationship
JOGGLE_FEATURE	joggle	214		joggle <= feature_definition <= characterized_object
joggle_feature to feature_- parameter (as base_radius_- 1)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'base radius 1'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
joggle_feature to feature_- parameter (as base_radius_- 2)	PATH			joggle <= feature_definition <= characterized_object characterized_object.definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'base radius 2'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
joggle_feature to linear_path (as defining_- path)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'defining path'] [shape_aspect.description = 'path feature component occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{[shape_aspect_relationship.description = 'path feature component usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'linear'} path_feature_component
joggle_feature to feature_- parameter (as direction_- angle_1)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'direction angle 1'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
joggle_feature to feature_-parameter (as direction_-angle_2)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'direction angle 2'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
joggle_feature to feature_-parameter (as height)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'height'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
joggle_feature to feature_- parameter (as slope_angle_- 1)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'slope angle 1'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
joggle_feature to feature_-parameter (as slope_angle_-2)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'slope angle 2'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
joggle_feature to joggle_- termination (as termination)	PATH			feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'termination'] [shape_aspect.description = 'joggle termination occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'joggle termination usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => joggle_termination
joggle_feature to feature_- parameter (as top_radius_- 1)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->) representation_item => {representation_item.name = 'top radius 1'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
joggle_feature to feature_- parameter (as top_radius_- 2)	PATH			joggle <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => [product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation_with_parameters} representation.items[i] ->& representation_item => {representation_item.name = 'top radius 2'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component ->& measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
JOGGLE_- TERMINATION	joggle_termination	214		joggle_termination <= shape_aspect {shape_aspect.of_shape ->& product_definition_shape <= property_definition property_definition.definition ->& characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}
LINEAR_BEAD_END_- TYPE	bead_end	214		bead_end <= shape_aspect {shape_aspect.description = 'linear'}
end_length	measure_representation_- item	45	30	bead_end <= shape_aspect shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'end length'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
end_shape	descriptive_- representation_item. description	45		bead_end <= shape_aspect shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'end shape'} descriptive_representation_item {(descriptive_representation_item.description = 'straight')

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(descriptive_representation_item.description = 'tapered')}
LINEAR_PATH	path_feature_component	214		path_feature_component <= shape_aspect {shape_aspect.description = 'linear'}
linear_path to feature_-parameter (as distance)	PATH			path_feature_component <= shape_aspect shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'distance'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
LOCATOR_FEATURE	locator	214		locator <= feature_definition <= characterized_object

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
locator_feature to feature_- parameter (as base_radius)	PATH			locator <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'base radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
locator_feature to feature_- parameter (as diameter)	PATH			locator <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
locator_feature to feature_- parameter (as tip_angle)	PATH			locator <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'tip angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
locator_feature to feature_- parameter (as tip_radius)	PATH			locator <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'tip radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
NGON_PROFILE #1: If circumscribed_or_- across_flats is TRUE. #2: If circumscribed_or_- across_flats is FALSE.	ngon_closed_profile	214		ngon_closed_profile <= shape_aspect
circumscribed_or_- across_flats	representation_item.- name	43		ngon_closed_profile <= shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item {#1: (representation_item.name = 'circumscribed diameter') #2: (representation_item.name = 'diameter across flats')}
number_of_sides	measure_representation_- item	45	30	ngon_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'number of sides'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure}
ngon_profile to feature_- parameter (as corner_- radius)	PATH			ngon_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'corner radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
ngon_profile to feature_-parameter (as diameter)	PATH			ngon_closed_profile <= shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {#1: (representation_item.name = 'circumscribed diameter') #2: (representation_item.name = 'diameter across flats')} measure_representation_item {measure_representation_item <= measure_with_unit =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				length_measure_with_unit}
OPEN_BEAD_END_- TYPE	bead_end	214		bead_end <= shape_aspect {shape_aspect.description = 'open'}
OPEN_PROFILE	shape_aspect	41		
OPEN_PROFILE_- USAGE	shape_defining_- relationship	214		shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'}
open_profile_- usage to plane (as profile_- limit)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation .used_representation -> representation {representation => {representation.name = 'profile limit'} shape_representation => planar_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => surface => elementary_surface => plane

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
open_profile_- usage to open_- profile (as used_- profile)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect
OPEN_SLOT_END_- TYPE	slot_end	214		slot_end <= shape_aspect {shape_aspect.description = 'open'}
PANEL_HOLE_WITH_- BARRING	barring_hole	214		barring_hole <= feature_definition <= characterized_object
panel_hole_with_- barring to angle_- specification (as angle_- defined_by)	PATH			barring_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'barring angle'] [shape_aspect.description = 'directed angle occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'directed angle usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => directed_angle

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
panel_hole_with_- barring to closed_profile_- usage (as barring_- profile)	PATH			barring_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.name = 'barring profile'] [shape_aspect.description = 'closed profile occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.description = 'profile usage'} shape_defining_relationship
panel_hole_with_- barring to feature_- parameter (as base_radius)	PATH			barring_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'base radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
PARTIAL_CIRCULAR_- PATH	path_feature_component	214		path_feature_component <= shape_aspect {shape_aspect.description = 'partial circular'}
partial_circular_- path to feature_- parameter (as sweep_angle)	PATH			path_feature_component <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'sweep angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
PARTIAL_CIRCULAR_-PROFILE	partial_circular_-profile	214		partial_circular_profile <= shape_aspect
partial_circular_-profile to feature_-parameter (as radius)	PATH			partial_circular_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->representation_item => {representation_item.name = 'radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
partial_circular_- profile to feature_- parameter (as sweep_angle)	PATH			partial_circular_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'sweep angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
PATH	path_feature_component	214		path_feature_component <= shape_aspect
path to axis_- placement (as is_defined_- by)	PATH			path_feature_component <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items [i] -> representation_item => geometric_representation_item => placement
path to cartesian_-coordinate_space (as is_defined_-in)	PATH			path_feature_component <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.context_of_items -> representation_context =}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				geometric_representation_context
PLANAR_BOTTOM_- CONDITION	pocket_bottom	214		pocket_bottom <= shape_aspect {shape_aspect.description = 'planar'}
floor_location	point	42		pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'floor location'} shape_representation => location_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => point
floor_normal	direction	42		pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'floor normal'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
planar_bottom_- condition to feature_- parameter (as floor_- radius)	PATH			pocket_bottom <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => {representation_item.name = 'radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
PLANAR_TOP_- CONDITION	boss_top	214		boss_top <= shape_aspect {shape_aspect.description = 'planar'}
top_location	point	42		boss_top <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'top location'} shape_representation => location_shape_representation}

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items [i] -> representation_item => geometric_representation_item => point
top_normal	direction	42		boss_top <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'top normal'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
POCKET_BOTTOM_-CONDITION	pocket_bottom	214		pocket_bottom <= shape_aspect {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_object => feature_component_definition}
is_applied_to	shape_aspect_- relationship.name	41		pocket_bottom <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.name {(shape_aspect_relationship.name = 'pocket depth start') (shape_aspect_relationship.name = 'pocket depth end')}
POCKET_FEATURE #1: If used as a planar_- bottom_condition. #2: If used as a general_- bottom_condition. #3: If the pocket is a general_pocket. #4: If the pocket is a rectangular_open_pocket. #5: If the pocket is a rectangular_closed_pocket.	pocket	214		pocket <= feature_definition <= characterized_object
pocket_feature to feature_- parameter (as base_radius)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'base radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
pocket_feature to pocket_bottom_- condition (as bottom_- condition)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect.description = 'bottom condition occurrence'} shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => feature_component_relationship] [shape_aspect_relationship.description = 'pocket bottom usage']} shape_aspect_relationship.relating_shape_aspect -> shape_aspect {#1: (shape_aspect.description = 'planar') #2: (shape_aspect.description = 'complex')}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
pocket_feature to through_- pocket_bottom_- condition (as bottom_- condition)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect.description = 'bottom condition occurrence'} shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => feature_component_relationship] [shape_aspect_relationship.description = 'pocket bottom usage']} shape_aspect_relationship.relating_shape_aspect ->> shape_aspect {shape_aspect.description = 'through'}
pocket_feature to profile_usage (as boundary)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {#3: (shape_aspect.description = 'boundary occurrence') #4: (shape_aspect.description = 'open boundary occurrence') #5: (shape_aspect.description = 'closed boundary occurrence')} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage']

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				[shape_aspect_relationship => shape_defining_relationship]}
pocket_feature to linear_path (as pocket_- depth)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'pocket depth occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'pocket depth'] [shape_aspect_relationship => shape_defining_relationship] [shape_aspect_relationship.description = 'path feature component usage']} shape_aspect_relationship.relating_shape_aspect ->> shape_aspect => {shape_aspect.description = 'linear'} path_feature_component
pocket_feature to angle_taper (as taper)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.description = 'change in boundary occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'angle taper'} taper
pocket_feature to directed_- taper (as taper)	PATH			pocket <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {[shape_aspect.description = 'change in boundary occurrence']} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'directed taper'} taper
PROCESS_FEATURE_- IN_PANEL	feature_definition	214		feature_definition <= {feature_definition => (barring_hole) (bead) (hole_in_panel) (feature_in_panel) (joggle) (locator) (compound_feature)}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_object
punch_direction	direction	42		feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'punch direction'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
PROCESS_FEATURE_-IN_SOLID	feature_definition	214		feature_definition <= {feature_definition => (slot) (pocket) (boss) (round_hole) (rib) (compound_feature)} characterized_object

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
process_feature_- in_solid to axis_- placement (as location_and_- orientation)	PATH			feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement
PROFILE	shape_aspect	41		shape_aspect {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
profile to cartesian_-coordinate_space (as is_defined_-in)	PATH			shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.context_of_items -> representation_context => geometric_representation_context
profile to axis_-placement (as location_and_-orientation)	PATH			shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement
PROFILE_USAGE	shape_defining_- relationship	214		shape_defining_relationship <= shape_aspect_relationship {shape_aspect_relationship.description = 'profile usage'}
profile_usage to transformation (as profile_- placement)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation => shape_representation_with_parameters} representation_map.mapped_representation representation_map <- mapped_item.mapping_source mapped_item

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
profile_usage to profile (as used_-profile)	PATH			shape_defining_relationship <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect
RADIUSED_BEAD_-END_TYPE	bead_end	214		bead_end <= shape_aspect {shape_aspect.description = 'radiused'}
RADIUSED_SLOT_-END_TYPE	slot_end	214		slot_end <= shape_aspect {shape_aspect.description = 'radiused'}
RECTANGULAR_BOSS	boss	214		boss <= feature_definition <= characterized_object {characterized_object.description = 'rectangular'}
RECTANGULAR_-CLOSED_POCKET	pocket	214		pocket <= feature_definition <= characterized_object {characterized_object.description = 'closed rectangular'}
rectangular_-closed_pocket to closed_profile_-usage (as boundary)	PATH			pocket <= feature_definition <= characterized_object {characterized_object.description = 'closed rectangular'} characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'closed boundary occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship] [shape_aspect_relationship.relating_shape_aspect ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect => rectangular_closed_profile]}
RECTANGULAR_- CLOSED_PROFILE	rectangular_closed_- profile	214		rectangular_closed_profile <= shape_aspect
rectangular_- closed_profile to feature_- parameter (as corner_- radius)	PATH			rectangular_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'corner radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				length_measure_with_unit]}
rectangular_- closed_profile to feature_- parameter (as profile_- length)	PATH			rectangular_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'length'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
rectangular_- closed_profile to feature_- parameter (as profile_- width)	PATH			rectangular_closed_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
RECTANGULAR_- OFFSET_PATTERN	shape_aspect	41		{[shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => feature_component_relationship => pattern_offset_membership] [shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition]}
column_index	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <-2001

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'column index'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure count_measure}
offset_direction	direction	42		shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.used_representation -> representation {representation => {representation.name = 'offset direction'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
row_index	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'row index'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_value = count_measure count_measure}
rectangular_- offset_pattern to feature_- parameter (as offset_- distance)	PATH			shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'offset distance'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
RECTANGULAR_OMIT_- PATTERN	shape_aspect	41		{shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship => feature_component_relationship => pattern_omit_membership] [shape_aspect shape_aspect.of_shape ->] product_definition_shape <= property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_component_definition]}
column_index	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'column index'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure count_measure}
row_index	measure_representation_- item	45	30	shape_aspect shape_definition = shape_aspect shape_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'row index'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure count_measure}
RECTANGULAR_OPEN_- POCKET	pocket	214		pocket <= feature_definition <= characterized_object {characterized_object.description = 'open rectangular'}
rectangular_open_- pocket to open_- profile_usage (as boundary)	PATH			pocket <= feature_definition <= characterized_object {characterized_object.description = 'open rectangular'} characterized_definition = characterized_object characterized_definition <- property_definition.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'open boundary occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship] [shape_aspect_relationship.relating_shape_aspect -> shape_aspect => square_u_profile]}
RECTANGULAR_- PATTERN	rectangular_pattern	214		{rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object}
column_layout_- direction	direction	42		rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition.representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation.name = 'column layout direction'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
columns	measure_representation_item	45	30	rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'number of columns'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_value = count_measure count_measure}
row_layout_- direction	direction	42		rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => {representation.name = 'row layout direction'} shape_representation => direction_shape_representation} representation.items [i] -> representation_item => geometric_representation_item => direction
rows	measure_representation_- item	45	30	rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'number of rows'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = count_measure count_measure}
rectangular_- pattern to feature_- parameter (as column_- spacing)	PATH			rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'column spacing'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
rectangular_- pattern to rectangular_omit_- pattern (as missing_- feature)	PATH			rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape [shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship => pattern_omit_membership} shape_aspect_relationship.related_shape_aspect ->] [shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship =>]

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				feature_component_relationship] [shape_aspect_relationship.description = 'base pattern']} shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => replicate_feature => modified_pattern} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'modified pattern'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.related_shape_aspect ->]
rectangular_- pattern to rectangular_- offset_pattern (as relocated_- feature)	PATH			rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape [shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship] =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				pattern_offset_membership} shape_aspect_relationship.related_shape_aspect ->] [shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => feature_component_relationship] [shape_aspect_relationship.description = 'base pattern']} shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => replicate_feature => modified_pattern} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'modified pattern'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.related_shape_aspect ->] shape_aspect
rectangular_- pattern to feature_- parameter (as row_spacing)	PATH			rectangular_pattern <= replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'row spacing'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
REPLICATE_BASE_- ASSIGNMENT #1: If the base feature is an integral part of shape. #2: If the base feature is defined independently and placed in the replicate_feature by a transformation.	feature_component_- relationship	214		{feature_component_relationship <= shape_aspect_relationship {[shape_aspect_relationship.name = 'pattern basis'] [shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => replicate_feature}]};

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
replicate_base_- assignment to feature_- definition (as base_- feature)	PATH			feature_component_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> #1: (shape_aspect => instanced_feature <= feature_definition) #2: (shape_aspect {[shape_aspect => placed_feature] [shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items [i] -> representation_item => mapped_item mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation <- {representation => shape_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation_with_parameters} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition]})
replicate_base_- assignment to transformation (as replicate_- placement)	PATH			#2: (feature_component_relationship <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->> shape_aspect {shape_aspect => placed_feature} shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->> representation {[representation.name = 'feature definition placement']}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				[representation => shape_representation]} representation.items [i] -> representation_item => mapped_item)
REPLICATE_- FEATURE #1: For orientation and location of a single axis. #2: For orientation and location of two mutually perpendicular axes in two-dimensional space. #3: For orientation and location of two mutually perpendicular axes in three-dimensional space.	replicate_feature	214		replicate_feature <= feature_definition <= characterized_object
replicate_- feature to axis_- placement (as location_and_- orientation)	PATH			replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters{} representation.items[i] ->> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement => #1: (axis1_placement) #2: (axis2_placement_2d) #3: (axis2_placement_3d)
replicate_- feature to replicate_base_- assignment (as replicate_- base)	PATH			replicate_feature <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship => feature_component_relationship
RIB_FEATURE	rib	214		rib <= feature_definition <= characterized_object
rib_feature to directed_taper (as draft_taper)	PATH			rib <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{shape_aspect.description = 'change in boundary occurrence'}
				shape_aspect_relationship.related_shape_aspect
				shape_aspect_relationship
				{[shape_aspect_relationship.description = 'taper usage']}
				[shape_aspect_relationship =>]
				feature_component_relationship]}
				shape_aspect_relationship.relating_shape_aspect ->
				shape_aspect =>
				{shape_aspect.description = 'directed taper'}
				taper
rib_feature to feature_- parameter (as fillet_- radius)	PATH			rib <=
				feature_definition <=
				characterized_object
				characterized_definition = characterized_object
				characterized_definition <-
				property_definition.definition
				property_definition
				{property_definition =>
				product_definition_shape}
				represented_definition = property_definition
				represented_definition <-
				property_definition_representation.definition
				property_definition_representation
				{property_definition_representation =>
				shape_definition_representation}
				property_definition_representation.used_representation ->
				representation
				{representation =>
				shape_representation_with_parameters}
				representation.items[1] ->
				representation_item =>
				{representation_item.name = 'fillet radius'}
				measure_representation_item
				{[measure_representation_item <=
				measure_with_unit

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
rib_feature to open_profile_- usage (as rib_profile)	PATH			rib <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'swept shape occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship]}
rib_feature to feature_- parameter (as shoulder_- radius)	PATH			rib <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'shoulder radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
rib_feature to path (as sweep_path)	PATH			rib <= feature_definition <= characterized_object characterized_object = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'course of travel occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'course of travel']}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				[shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => path_feature_component
ROUND_HOLE	round_hole	214		round_hole <= feature_definition <= characterized_object
round_hole to hole_bottom_-condition (as bottom_-condition)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'bottom condition occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'hole bottom usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => hole_bottom
round_hole to through_hole_-bottom_condition (as bottom_-condition)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect <- {shape_aspect.description = 'bottom condition occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'hole bottom usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'through'} hole_bottom
round_hole to closed_profile_-usage (as diameter)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'diameter occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'diameter'] [shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship] [shape_aspect_relationship.relating_shape_aspect -> shape_aspect => circular_closed_profile]}
round_hole to linear_path (as hole_depth)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'hole depth occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'hole depth'] [shape_aspect_relationship.description = 'path feature component usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'linear'} path_feature_component
round_hole to angle_taper (as taper)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'change in diameter occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'angle taper'} taper

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
round_hole to diameter_taper (as taper)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'change in diameter occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'diameter taper'} taper
round_hole to directed_taper (as taper)	PATH			round_hole <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'change in diameter occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'taper usage'] [shape_aspect_relationship => feature_component_relationship]}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect_relationship.relating_shape_aspect -> shape_aspect => {shape_aspect.description = 'directed taper'} taper
ROUNDED_U_- PROFILE	rounded_u_profile	214		rounded_u_profile <= shape_aspect
rounded_u_- profile to feature_- parameter (as width)	PATH			rounded_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
SLOT_END_TYPE	slot_end	214		slot_end <= shape_aspect
is_applied_to	shape_aspect_- relationship.name	41		slot_end <= shape_aspect <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {(shape_aspect_relationship.name = 'course of travel start') (shape_aspect_relationship.name = 'course of travel end')}
SLOT_FEATURE	slot	214		slot <= feature_definition <= characterized_object
slot_feature to slot_end_type (as end_-condition)	PATH			slot <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'end condition occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {(shape_aspect_relationship.description = 'slot end usage'] [shape_aspect_relationship => feature_component_relationship]} shape_aspect_relationship.relating_shape_aspect ->> shape_aspect => slot_end
slot_feature to open_profile_-usage (as slot_-profile)	PATH			slot <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <-

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{shape_aspect.description = 'swept shape occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'profile usage'] [shape_aspect_relationship => shape_defining_relationship]}
slot_feature to path (as sweep_path)	PATH			slot <= feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect <- {shape_aspect.description = 'course of travel occurrence'} shape_aspect_relationship.related_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.name = 'course of travel'] [shape_aspect_relationship.description = 'path feature component usage'] [shape_aspect_relationship => shape_defining_relationship]} shape_aspect_relationship.relating_shape_aspect -> shape_aspect => path_feature_component
SPHERICAL_BOTTOM	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.description = 'spherical'}
spherical_bottom to feature_-parameter (as radius)	PATH			hole_bottom <= shape_aspect shape_definition = shape_aspect characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
SQUARE_U_PROFILE	square_u_profile	214		square_u_profile <= shape_aspect
square_u_profile to feature_- parameter (as first_angle)	PATH			square_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'first angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
square_u_profile to feature_- parameter (as first_- radius)	PATH			square_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'first radius'} measure_representation_item {[measure_representation_item <= measure_with_unit => measure_with_unit.value_component ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
square_u_profile to feature_- parameter (as second_- angle)	PATH			square_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'second angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
square_u_profile to feature_-parameter (as second_-radius)	PATH			square_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'second radius'} measure_representation_item {measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
square_u_profile to feature_-parameter (as width)	PATH			square_u_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
TEE_PROFILE	tee_profile	214		tee_profile <= shape_aspect
tee_profile to feature_-parameter (as cross_bar_-depth)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'cross bar depth'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
tee_profile to feature_- parameter (as cross_bar_- width)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'cross bar width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
tee_profile to feature_-parameter (as depth)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'depth'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
tee_profile to feature_-parameter (as first_angle)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'first angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
tee_profile to feature_-parameter (as first_-offset)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'first offset'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
tee_profile to feature_- parameter (as radius)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => {representation_item.name = 'radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)] [measure_representation_item <= measure_with_unit => length_measure_with_unit]}
tee_profile to feature_-parameter (as second_-angle)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'second angle'} measure_representation_item

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
tee_profile to feature_-parameter (as second_-offset)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'second offset'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
tee_profile to feature_-parameter (as width)	PATH			tee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
THREAD_FEATURE #1: If the thread_-specification is a defined_-thread. #2: If the thread_-specification is a catalogue_thread.	applied_area	214		applied_area <= shape_aspect
effective_thread_-length	measure_representation_-item	45	30	applied_area <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'effective length'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
maximum_thread_- length	measure_representation_- item	45	30	applied_area <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'maximum length'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
thread_feature to axis_- placement (as location_and_- orientation)	PATH			applied_area <= shape_aspect shape_definition = shape_aspect characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement
thread_feature to thread_- specification (as thread_- definition)	PATH			applied_area <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship.description = 'applied area usage'] [shape_aspect_relationship =>]

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_defining_relationship]} shape_aspect_relationship.related_shape_aspect ->>> shape_aspect {shape_aspect.description = 'partial area occurrence'} shape_aspect.of_shape ->>> product_definition_shape <= property_definition property_definition.definition ->>> characterized_definition characterized_definition = characterized_object characterized_object =>> feature_definition =>> #1: (thread) #2: (externally_defined_feature_definition)
THREAD_- SPECIFICATION #1: If the thread_- specification is a defined_- thread. #2: If the thread_- specification is a catalogue_thread. #3: If Thread_- specification.metric is TRUE. #4: If Thread_- specification.metric is FALSE. #5: If the Thread_- specification.inner is TRUE. #6: If the Thread_- specification.inner is FALSE.	#1: (thread) #2: (externally_- defined_feature_- definition)	214 214		#1: (thread <= feature_definition <= characterized_object) #2: (externally_defined_feature_definition <= [feature_definition <= characterized_object] [externally_defined_item {[externally_defined_item.item_id = 'external thread'] [externally_defined_item.source = 'external thread specification']}])

Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
fit_class	descriptive_- representation_item. description	45		#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'fit class'} descriptive_representation_item descriptive_representation_item.description
form_type	descriptive_- representation_item. description	45		#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'form'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description) (descriptive_representation_item.description = 'G') (descriptive_representation_item.description = 'M') (descriptive_representation_item.description = 'R') (descriptive_representation_item.description = 'Tr') (descriptive_representation_item.description = 'UNC') (descriptive_representation_item.description = 'UNF')}
hand	descriptive_- representation_item. description	45		#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape}

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'hand'} descriptive_representation_item descriptive_representation_item.description {(descriptive_representation_item.description = 'left hand') (descriptive_representation_item.description = 'right hand')}
inner	descriptive_- representation_item. description	45		#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition <- {property_definition => product_definition_shape} property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'thread side'} descriptive_representation_item descriptive_representation_item.description {#5: (descriptive_representation_item.description = 'internal') #6: (descriptive_representation_item.description = 'external')}
qualifier	descriptive_- representation_item. description	45		#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition <- {property_definition => product_definition_shape} property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] ->> representation_item => {representation_item.name = 'qualifier'} descriptive_representation_item descriptive_representation_item.description

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
thread_- specification to feature_- parameter (as density)	PATH			#1: (thread <=) #2: (externally_defined_feature_definition <=) feature_definition <= characterized_object characterized_definition = characterized_object characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'number of threads'} measure_representation_item {measure_representation_item <= measure_with_unit => ratio_measure_with_unit}
thread_- specification to feature_- parameter (as major_- diameter)	PATH			#1: (thread <=) #2: (externally_defined_feature_definition<=) feature_definition_<= characterized_object characterized_definition = characterized_object characterized_definition <-

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'major diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
THROUGH_HOLE_- BOTTOM_CONDITION	hole_bottom	214		hole_bottom <= shape_aspect {shape_aspect.description = 'through'}
THROUGH_POCKET_- BOTTOM_CONDITION	pocket_bottom	214		pocket_bottom <= shape_aspect {shape_aspect.description = 'through'}
TRANSITION_- FEATURE #1: If the object is a Fillet or an Edge_round. #2: If the object is of type Chamfer.	transition_feature	214		transition_feature <= shape_aspect

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
transition_- feature to face (as face_1)	PATH			#1: (transition_feature <=) #2: (transition_feature <= {transition_feature => chamfer} shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect ->) chamfer_offset <=) shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->) representation {[representation.name = 'first face shape'] [representation => shape_representation => face_shape_representation]} representation.items[i] ->) representation_item => topological_representation_item => face

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
transition_- feature to face (as face_2)	PATH			#1: (transition_feature <=) #2: (transition_feature <= {transition_feature => chamfer} shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => feature_component_relationship} shape_aspect_relationship.related_shape_aspect -> chamfer_offset <=) shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'second face shape'] [representation => shape_representation => face_shape_representation]} representation.items[i] -> representation_item => topological_representation_item => face

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
VALUE_-TERMINATION	joggle_termination	214		joggle_termination <= shape_aspect {shape_aspect.description = 'value termination'}
value_-termination to feature_-parameter (as angle)	PATH			joggle_termination <= shape_aspect shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] -> representation_item => {representation_item.name = 'angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
value_-termination to feature_-parameter (as depth)	PATH			joggle_termination <= shape_aspect shape_aspect <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_definition_representation} property_definition_representation.used_representation ->> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] ->> representation_item => {representation_item.name = 'depth'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
VEE_PROFILE	vee_profile	214		vee_profile <= shape_aspect
vee_profile to feature_-parameter (as profile_-angle)	PATH			vee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[1] ->> representation_item =>

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation_item.name = 'profile angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
vee_profile to feature_- parameter (as radius)	PATH			vee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'profile radius'} measure_representation_item {[measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = length_measure (length_measure) (length_measure = 0.0)) [measure_representation_item <=

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Table 7 – Mapping table included_feature UoF (FF2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit => length_measure_with_unit[]}
vee_profile to feature_-parameter (as tilt_angle)	PATH			vee_profile <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'tilt angle'} measure_representation_item {measure_representation_item <= measure_with_unit => plane_angle_measure_with_unit}
WOODRUFF_SLOT_-END_TYPE	slot_end	214		slot_end <= shape_aspect {shape_aspect.description = 'woodruff'}

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Table 7 – Mapping table included_feature UoF (FF2) (concluded)

Application element	AIM element	Source	Rules	Reference path
woodruff_slot_- end_type to feature_- parameter (as radius)	PATH			slot_end <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation => shape_representation_with_parameters} representation.items[i] -> representation_item => {representation_item.name = 'radius'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 8 – Mapping table generative_featured_shape UoF (FF3)

Application element	AIM element	Source	Rules	Reference path
FEATURE_- PLACEMENT	mapped_item	43		
feature_- placement to feature_- definition (as placed_- definition)	PATH			mapped_item mapped_item.mapping_source ->> representation_map representation_map.mapped_representation ->> representation <- {representation => shape_representation => shape_representation_with_parameters} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.definition ->> represented_definition represented_definition = property_definition {property_definition => product_definition_shape} property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition
feature_- placement to transformation (as placement)	PATH			mapped_item [mapped_item.mapping_source ->> representation_map {representation_map.mapped_representation ->> representation <- {representation => shape_representation => shape_representation_with_parameters} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 8 – Mapping table generative_featured_shape UoF (FF3) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition -> represented_definition represented_definition = property_definition {property_definition => product_definition_shape} property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition} representation_map.mapping_origin {representation_map.mapping_origin -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement}] [mapped_item.mapping_target {mapped_item.mapping_target -> representation_item => geometric_representation_item => placement}]
feature_- placement to geometric_model (as placement_- reference)	PATH			mapped_item <= representation_item <- representation.items [i] representation {[representation.name = 'feature definition placement'] [representation => shape_representation]}
FEATURED_SHAPE	featured_shape	214		featured_shape <= product_definition_shape
featured_shape to item_shape (as base_shape)	PATH			featured_shape <= product_definition_shape <= property_definition <- property_definition_relationship.related_property_definition property_definition_relationship {property_definition_relationship.name = 'featured shape sequence'}

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Table 8 – Mapping table generative_featured_shape UoF (FF3) (concluded)

Application element	AIM element	Source	Rules	Reference path
				property_definition_relationship.relating_property_definition -> product_definition_shape
PLACED_FEATURE	placed_feature	214		placed_feature <= shape_aspect
placed_feature to feature_- placement (as is_placed_- by)	PATH			placed_feature <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {[representation.name = 'feature definition placement'] [representation => shape_representation]} representation.items [i] -> representation_item => mapped_item

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Table 9 – Mapping table wireframe_model_2d UoF (G1)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	503		
CARTESIAN_POINT	cartesian_point	503		
CIRCLE	circle	503		
COMPOSITE_CURVE	composite_curve	503		
CURVE	curve	503		
CURVE_SET_2D #1: If the point is a cartesian point. #2: If the point is part of a curve.	geometric_curve_set	503		
curve_set_2d to curve (as element)	PATH			geometric_curve_set <= geometric_set geometric_set.elements[i] ->> geometric_set_select = curve curve
curve_set_2d to point (as element)	PATH			geometric_curve_set <= geometric_set geometric_set.elements[i] ->> geometric_set_select = point point => #1: (cartesian_point) #2: (point_on_curve)
DETAILED_ELEMENT #1: If the detailed_-element is part of a geometric model. #2: If the detailed_-element is a template instance. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: (geometric_-representation_item) #2: (mapped_item)	503 503		

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Table 9 – Mapping table wireframe_model_2d UoF (G1) (continued)

Application element	AIM element	Source	Rules	Reference path
name	representation_item. name	503		#1: (geometric_representation_item <=) #2: (mapped_item <=) representation_item representation_item.name
detailed_element to multi_- language_string (as name)	#3: ([representation_ item.name] [PATH]) #4: (PATH)	503	129,135	#3: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (mapped_item attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})) #4: (#1: (geometric_representation_item multi_language_attribute_item = geometric_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #2: (mapped_item multi_language_attribute_item = mapped_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 9 – Mapping table wireframe_model_2d UoF (G1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'name'}))
DETAILED_- GEOMETRIC_MODEL_- ELEMENT	geometric_- representation_item	42		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template instance.	#1: (geometric_- representation_item) #2: (mapped_item)	503 503		
ELLIPSE	ellipse	503		
HYPERBOLA	hyperbola	503		
LINE	line	503		
OFFSET_CURVE	offset_curve_2d	503		
PARABOLA	parabola	503		
POINT #1: If the point is a cartesian point. #2: If the point is part of a curve.	#1: (cartesian_point) #2: (point_on_curve)	503 503		
POINT_ON_CURVE	point_on_curve	503		
POLYLINE	polyline	503		
TRIMMED_CURVE	trimmed_curve	503		
WIREFRAME_MODEL_- 2D	geometrically_bounded_- 2d_wireframe_- representation	503		geometrically_bounded_2d_wireframe_representation <= shape_representation
wireframe_model_- 2d to curve_set_- 2d (as element)	PATH			geometrically_bounded_2d_wireframe_representation <= shape_representation <= representation representation.items[i] => representation_item => geometric_representation_item =>

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Table 9 – Mapping table wireframe_model_2d UoF (G1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				geometric_set => geometric_curve_set

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Table 10 – Mapping table wireframe_model_3d UoF (G2)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	510		
CARTESIAN_POINT	cartesian_point	510		
CIRCLE	circle	510		
COMPOSITE_CURVE	composite_curve	510		
CURVE	curve	510		
CURVE_SET_3D #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is derived from another.	geometric_curve_set	510		
curve_set_3d to curve (as element)	PATH			geometric_curve_set <= geometric_set geometric_set.elements[i] -> geometric_set_select = curve curve
curve_set_3d to point (as element)	PATH			geometric_curve_set <= geometric_set geometric_set.elements[i] -> geometric_set_select = point point => #1: (cartesian_point) #2: (point_on_curve) #3: (point_replica)

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Table 10 – Mapping table wireframe_model_3d UoF (G2) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_ELEMENT #1: If the detailed_- element is part of a geometric model. #2: If the detailed_- element is a template instance. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	#1: (geometric_- representation_item) #2: (mapped_item)	510 510		
name	representation_item. name	510		#1: (geometric_representation_item <=) #2: (mapped_item <=) representation_item representation.name
detailed_element to multi_- language_string (as name)	#3: ([representation_- item.name] [PATH]) #4: (PATH)	510	129,135	#3: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (mapped_item attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})) #4: (#1: (geometric_representation_item multi_language_attribute_item = geometric_representation_item multi_language_attribute_item <-

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Table 10 – Mapping table wireframe_model_3d UoF (G2) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #2: (mapped_item multi_language_attribute_item = mapped_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}))
DETAILED_- GEOMETRIC_MODEL_- ELEMENT	geometric_- representation_item	510		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template instance.	#1: (geometric_- representation_item) #2: (mapped_item)	510 510		
ELLIPSE	ellipse	510		
HYPERBOLA	hyperbola	510		
LINE	line	510		
OFFSET_CURVE	offset_curve_3d	510		
PARABOLA	parabola	510		

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Table 10 – Mapping table wireframe_model_3d UoF (G2) (concluded)

Application element	AIM element	Source	Rules	Reference path
POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is derived from another.	#1: (cartesian_point) #2: (point_on_curve) #3: (point_replica)	510 510 510		
POINT_ON_CURVE	point_on_curve	510		
POLYLINE	polyline	510		
TRIMMED_CURVE	trimmed_curve	510		
WIREFRAME_MODEL_-3D	geometrically_bounded_-wireframe_shape_-representation	510		geometrically_bounded_wireframe_shape_representation <= shape_representation
wireframe_model_-3d to curve_set_-3d (as element)	PATH			geometrically_bounded_wireframe_shape_representation <= shape_representation <= representation representation.items[i] ->> representation_item => geometric_representation_item => geometric_set => geometric_curve_set

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Table 11 – Mapping table connected_surface_model UoF (G3)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	509		
B_SPLINE_SURFACE	b_spline_surface	509		
CARTESIAN_POINT	cartesian_point	509		
CIRCLE	circle	509		
CONICAL_SURFACE	conical_surface	509		
CURVE	curve	509		
CURVE_ON_SURFACE #1: If the curve is a 2D curve in the parameter space of a surface. #2: If the curve is a curve on a surface.	#1: (pcurve) #2: (surface_curve)	509 509		
CYLINDRICAL_-SURFACE	cylindrical_surface	509		
DETAILED_ELEMENT #1: If the detailed_-element is part of a geometric model. #2: If the detailed_-element is part of a topological model. #3: If the detailed_-element is a template instance. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string.	#1: (geometric_-representation_item) #2: (topological_-representation_item) #3: (mapped_item)	509 509 509		
name	representation_item.name	509		#1: (geometric_representation_item <=) #2: (topological_representation_item <=) #3: (mapped_item <=) representation_item representation_item.name

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
detailed_element to multi_-language_string (as name)	#4: (representation_-item.name] [PATH]) #5: (PATH)	509	129,135, 168	#4: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (topological_representation_item attribute_language_item = topological_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #3: (mapped_item attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})) #5: (#1: (geometric_representation_item multi_language_attribute_item = geometric_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #2: (topological_representation_item multi_language_attribute_item = topological_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i]

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #3: (mapped_item multi_language_attribute_item = mapped_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}))
DETAILED_- GEOMETRIC_MODEL_- ELEMENT #1: If the deatiled_- geometric_model_element is a geometric element. #2: If the detailed_- geometric_model_element is a topological element.	#1: (geometric_- representation_item) #2: (topological_- representation_item)	509 509		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the element is a template instance. #3: If the detailed_model_- element is a topological element.	#1: (geometric_- representation_item) #2: (mapped_item) #3: (topological_- representation_item)	509 509 509		
EDGE_LOOP	edge_loop	509		

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
edge_loop to oriented_edge_-curve (as edge)	PATH			edge_loop<= path path.edge_list[i] -> oriented_edge
EDGE_TRANSITION	shape_aspect_-transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_-relationship.name	509		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name {(shape_aspect_relationship.name = 'g0') (shape_aspect_relationship.name = 'g1') (shape_aspect_relationship.name = 'g2')}
edge_transition to oriented_edge_-curve (as edge_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
edge_transition to oriented_edge_- curve (as edge_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation representation.items[i] ->representation_item => topological_representation_item =>edge => oriented_edge
edge_transition to vertex_point (as vertex_- joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => vertex => vertex_point
ELLIPSE	ellipse	509		
FACE #1: If the face_bound does not define an outer bound. #2: If the face_bound defines an outer boundary.	advanced_face	509		advanced_face <= face_surface

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
face to face_- bound (as bound)	PATH			advanced_face <= face_surface <= face face.bounds[i] ->> #1: (face_bound) #2: (face_bound => face_outer_bound)
face to surface (as face_- geometry)	PATH			advanced_face <= face_surface face_surface.face_geometry ->> surface
FACE_BOUND #1: If the face_bound does not define an outer bound. #2: If the face_bound defines an outer boundary.	#1: (face_bound) #2: (face_outer_- bound)	509 509		{face_outer_bound <= face_bound}
outer	face_outer_bound	509		
face_bound to edge_loop (as loop)	PATH			face_bound face_bound.bound ->> loop => edge_loop
face_bound to vertex_loop (as loop)	PATH			face_bound face_bound.bound ->> loop => vertex_loop
FACE_TRANSITION #1: If the edge is defined by another edge. #2: If the edge is fully defined.	shape_aspect_- transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_- relationship.name	509		shape_aspect_transition.<= shape_aspect_relationship shape_aspect_relationship.name

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Table11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
				{(shape_aspect_relationship.name = 'g0') (shape_aspect_relationship.name = 'g1') (shape_aspect_relationship.name = 'g2')}
face_transition to oriented_edge_- curve (as edge_joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect ->] shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->] representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect ->] shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation}

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => edge => #1: (oriented_edge) #2: (edge_curve)
face_transition to face (as face_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation representation.items[i] ->representation_item => topological_representation_item => face => face_surface => advanced_face
face_transition to face (as face_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->shape_aspect

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition<- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => face_surface => advanced_face
HYPERBOLA	hyperbola	509		
LINE	line	509		
OFFSET_CURVE	offset_curve_3d	509		
OFFSET_SURFACE	offset_surface	509		

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
ORIENTED_EDGE_- CURVE #1: If the edge is defined by another edge. #2: If the edge is fully defined. #3: If the curve is a 2D curve in the parameter space of a surface. #4: If the curve is a curve on a surface.	#1: (oriented_edge) #2: (edge_curve)	509 509		{#1: ((oriented_edge) (oriented_edge => seam_edge))}
oriented_edge_- curve to vertex_- point (as edge_end)	PATH			oriented_edge <= edge edge.edge_end -> vertex => vertex_point
oriented_edge_- curve to b_- spline_curve (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => bounded_curve => b_spline_curve
oriented_edge_- curve to circle (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => conic => circle

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to curve_- on_surface (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => #3: (pcurve) #4: (surface_curve)
oriented_edge_- curve to ellipse (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => conic => ellipse
oriented_edge_- curve to hyperbola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => conic => hyperbola
oriented_edge_- curve to line (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => line
oriented_edge_- curve to parabola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => conic => parabola

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to polyline (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => bounded_curve => polyline
oriented_edge_- curve to vertex_- point (as edge_start)	PATH			oriented_edge <= edge edge.edge_start -> vertex => vertex_point
PARABOLA	parabola	509		
PLANE	plane	509		
POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is derived from another. #4: If a curve collapses into a point in a 3D model space.	#1: (cartesian_point) #2: (point_on_curve) #3: (point_on_- surface) #4: (degenerate_- pcurve)	509 509 509 509		
POINT_ON_CURVE	point_on_curve	509		
POINT_ON_SURFACE	point_on_surface	509		
POLYLINE	polyline	509		
SHELL #1: If the boundary of the shell is closed. #2: If the boundary of the shaell is not closed.	#1: (closed_shell) #2: (open_shell)	509 509		

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Table 11 – Mapping table connected_surface_model UoF (G3) (continued)

Application element	AIM element	Source	Rules	Reference path
shell to face (as included_-face)	PATH			#1: (closed_shell <=) #2: (open_shell <=) connected_face_set connected_face_set.cfs_faces[i] ->face =>face_surface =>advanced_face
SPHERICAL_-SURFACE	spherical_surface	509		
SURFACE #1: If no orientation is specified for the surface. #2: If an orientation is specified for the surface.	#1: (surface) #2: (oriented_-surface)	509 42		
SURFACE_MODEL #1: If the boundary of the shell is closed. #2: If the boundary of the shaell is not closed.	manifold_surface_shape_-representation	509		manifold_surface_shape_representation <=shape_representation
surface_model to shell (as element)	PATH			manifold_surface_shape_representation <=shape_representation <=representation representation.items[i] ->representation_item =>geometric_representation_item =>shell_based_surface_model shell_based_surface_model.sbsm_boundary[i] ->shell #1: (shell = closed_shellclosed_shell) #2: (shell = open_shellopen_shell)

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Table 11 – Mapping table connected_surface_model UoF (G3) (concluded)

Application element	AIM element	Source	Rules	Reference path
SURFACE_OF_- LINEAR_EXTRUSION	surface_of_linear_- extrusion	509		
SURFACE_OF_- REVOLUTION	surface_of_revolution	509		
TOROIDAL_SURFACE #1: If the major radius of the toroidal_surface is grater than the minor radius. #2: If the minor radius is greater than the major radius.	#1: (toroidal_- surface) #2: (degenerate_- toroidal_surface)	509 509		
VERTEX_LOOP	vertex_loop	509		
vertex_loop to vertex_point (as loop_vertex)	PATH			vertex_loop vertex_loop.loop_vertex ->vertex => vertex_point
VERTEX_POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is derived from another. #4: If a curve collapses into a point in a 3D model space.	vertex_point	509		
vertex_point to point (as vertex_- geometry)	PATH			vertex_point vertex_point.vertex_geometry ->point => #1: (cartesian_point) #2: (point_on_curve) #3: (point_on_surface) #4: (degenerate_pcurve)

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Table 12 – Mapping table faceted_b_rep_model UoF (G4)

Application element	AIM element	Source	Rules	Reference path
CARTESIAN_POINT	cartesian_point	512		
DETAILED_ELEMENT #1: If the detailed_-element is part of a geometric model. #2: If the detailed_-element is part of a topological model. #3: If the detailed_-element is a template instance. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string.	#1: (geometric_-representation_item) #2: (topological_-representation_item) #3: (mapped_item)	512 512 512		
name	representation_item.name	512		#1: (geometric_representation_item <=) #2: (topological_representation_item <=) #3: (mapped_item <=) representation_item representation_item.name
detailed_element to multi_-language_string (as name)	#4: ([representation_-item.name] [PATH]) #5: (PATH)	512	129,135, 168	#4: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (topological_representation_item attribute_language_item = topological_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

Table 12 – Mapping table faceted_b_rep_model UoF (G4) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #3: (mapped_item attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})) #5: (#1: (geometric_representation_item multi_language_attribute_item = geometric_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #2: (topological_representation_item multi_language_attribute_item = topological_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #3: (mapped_item multi_language_attribute_item = mapped_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}))

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Table 12 – Mapping table faceted_b_rep_model UoF (G4) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_- GEOMETRIC_MODEL_- ELEMENT #1: If the detailed_- geometric_model_element is part of a geometric model. #2: If the detailed_- geometric_model_element is part of a topological model.	#1: (geometric_- representation_item) #2: (topological_- representation_item)	512 512		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template instance. #3: If the detailed_model_- element is part of a topological model.	#1: (geometric_- representation_item) #2: (mapped_item) #3: (topological_- representation_item)	512 512 512		
FACETED_B_REP #1: If all faces of the brep are planar and all edges are straight lines. #2: If the brep has at least one void in its interior.	#1: (faceted_brep) #2: (brep_with_voids)	512 512		
faceted_b_rep to faceted_closed_- shell (as outer)	PATH			#1: (faceted_brep <=) #2: (brep_with_voids <=) manifold_solid_brep manifold_solid_brep.outer ->

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Table 12 – Mapping table faceted_b_rep_model UoF (G4) (continued)

Application element	AIM element	Source	Rules	Reference path
				closed_shell
faceted_b_rep to faceted_closed_-shell (as void)	PATH			brep_with_voids brep_with_voids.voids[i] ->oriented_closed_shell <= closed_shell
FACETED_B_REP_-MODEL #1: If all faces of the brep are planar and all edges are straight lines. #2: If the brep has at least one void in its interior.	faceted_brep_shape_-representation	512		faceted_brep_shape_representation <= shape_representation
faceted_b_rep_-model to faceted_-b_rep (as element)	PATH			faceted_brep_shape_representation <= shape_representation representation representation.items[i] ->representation_item => geometric_representation_item => solid_model => manifold_solid_brep => #1: (faceted_brep) #2: (brep_with_voids)
FACETED_CLOSED_-SHELL	closed_shell	512		
faceted_closed_-shell to faceted_-face (as shell_-boundary)	PATH			closed_shell <= connected_face_set connected_face_set.cfs_faces[i] ->face => face_surface
FACETED_FACE	face_surface	512		
faceted_face to poly_loop (as bound)	PATH			face_surface <= face face.bounds[i] ->face_bound

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Table 12 – Mapping table faceted_b_rep_model UoF (G4) (concluded)

Application element	AIM element	Source	Rules	Reference path
				face_bound.bound -> loop => poly_loop
faceted_face to plane (as face_-geometry)	PATH			face_surface face_surface.face_geometry -> surface => elementary_surface => plane
PLANE	plane	512		
POINT	cartesian_point	512		
POLY_LOOP	poly_loop	512		
outer	face_outer_bound	512		poly_loop <= loop <- face_bound.bound face_bound => face_outer_bound
poly_loop to cartesian_point (as polygon)	PATH			poly_loop poly_loop.polygon[i] -> cartesian_point

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Table 13 – Mapping table b_rep_model UoF (G5)

Application element	AIM element	Source	Rules	Reference path
B_REP #1: If the b_rep does not contain any interior voids. #2: If the brep has at least one void in its interior.	#1: (manifold_solid_-brep) #2: (brep_with_voids)	514 514		
b_rep to closed_-shell (as outer)	PATH			#1: (|manifold_solid_brep|) #2: (brep_with_voids <= manifold_solid_brep) manifold_solid_brep.outer -> |closed_shell|
b_rep to closed_-shell (as void)	PATH			brep_with_voids brep_with_voids.voids[i] -> oriented_closed_shell <= closed_shell
B_REP_MODEL #1: If the b_rep does not contain any interior voids. #2: If the brep has at least one void in its interior.	advanced_brep_shape_-representation	514		advanced_brep_shape_representation <= shape_representation
b_rep_model to b_-rep (as element)	PATH			advanced_brep_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => #1: (|manifold_solid_brep|) #2: (manifold_solid_brep => brep_with_voids)

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	514		
B_SPLINE_SURFACE	b_spline_surface	514		
CARTESIAN_POINT	cartesian_point	514		
CIRCLE	circle	514		
CLOSED_SHELL #1: If no orientation is specified for the closed_-shell. #2: If an orientation is specified for the closed_-shell.	#1: (|closed_shell|) #2: (oriented_closed_-shell)	514 514		
closed_shell to face (as shell_-boundary)	PATH			#1: (|closed_shell <=|) #2: (oriented_closed_shell <= closed_shell <=) connected_face_set connected_face_set.cfs_faces[i] ->> face => face_surface => advanced_face
CONICAL_SURFACE	conical_surface	514		
CURVE	curve	514		
CURVE_ON_SURFACE #1: If the curve is a 2D curve in the parameter space of a surface. #2: If the curve is a curve on a surface.	#1: (pcurve) #2: (surface_curve)	514 514		
CYLINDRICAL_-SURFACE	cylindrical_surface	514		

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_ELEMENT #1: If the detailed_- element is part of a geometric model. #2: If the detailed_- element is part of a topological model. #3: If the detailed_- element is a template_- instance. #4: For the primary_- language_dependent_string. #5: For any additional_- language_dependent_string.	#1: (geometric_- representation_item) #2: (topological_- representation_item) #3: (mapped_item)	514 514 514		
name	representation_item. name	514		#1: (geometric_representation_item <=) #2: (topological_representation_item <=) #3: (mapped_item <=) representation_item representation_item.name
detailed_element to multi_- language_string (as name)	#4: ([representation_- item.name] [PATH]) #5: (PATH)	514	129,135, 168	#4: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (topological_representation_item attribute_language_item = topological_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'name'})
				#3: (mapped_item
				attribute_language_item = mapped_item
				attribute_language_item <-
				attribute_language_assignment.items[i]
				attribute_language_assignment
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'name'}))
				#5: (#1: (geometric_representation_item
				multi_language_attribute_item = geometric_representation_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'})
				#2: (topological_representation_item
				multi_language_attribute_item = topological_representation_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'})
				#3: (mapped_item
				multi_language_attribute_item = mapped_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'}))

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_- GEOMETRIC_MODEL_- ELEMENT #1: If the detailed_- geometric_model_element is part of a geometric model. #2: If the detailed_- geometric_model_element is part of a topological model.	#1: (geometric_- representation_item) #2: (topological_- representation_item)	514 514		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template instance. #3: If the detailed_model_- element is part of a topological model.	#1: (geometric_- representation_item) #2: (mapped_item) #3: (topological_- representation_item)	514 514 514		
EDGE_LOOP	edge_loop	514		
edge_loop to oriented_edge_- curve (as edge)	PATH			edge_loop<= path path.edge_list[i] ->> oriented_edge
EDGE_TRANSITION	shape_aspect_- transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_- relationship.name	514		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
edge_transition to oriented_edge_- curve (as edge_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge
edge_transition to oriented_edge_- curve (as edge_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge
edge_transition to vertex_point (as vertex_-joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => vertex => vertex_point
ELLIPSE	ellipse	514		
FACE	advanced_face	514		advanced_face <= face_surface
face to face_- bound (as bound)	PATH			advanced_face <= face_surface <= face face.bounds[i] -> (face_bound) (face_bound => face_outer_bound)
face to surface (as face_- geometry)	PATH			advanced_face <= face_surface face_surface.face_geometry -> surface
FACE_BOUND #1: If the face_bound does not define an outer boundary. #2: If the face_bound defines an outer boundary.	#1: (face_bound) #2: (face_outer_- bound)	514 514		{face_outer_bound <= face_bound}

Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
outer	face_outer_bound	514		
face_bound to edge_loop (as loop)	PATH			face_bound face_bound.bound -> loop => edge_loop
face_bound to vertex_loop (as loop)	PATH			face_bound face_bound.bound -> loop => vertex_loop
FACE_TRANSITION #1: If the face is oriented. #2: If the face is not oriented. #3: If the edge is defined by another edge. #4: If the edge is fully defined.	shape_aspect_-transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_-relationship.name	514		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name
face_transition to oriented_edge_-curve (as edge_joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => edge => #3: (oriented_edge) #4: (edge_curve)
face_transition to face (as face_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => #1: (oriented_face) #2: (face_surface)
face_transition to face (as face_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item =>

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
				face => #1: (oriented_face) #2: (face_surface)
HYPERBOLA	hyperbola	514		
LINE	line	514		
ORIENTED_EDGE_- CURVE #1: If the edge is defined by another edge. #2: If the edge is fully defined. #3: If the curve is a 2D curve in the parameter space of a surface. #4: If the curve is a curve on a surface.	#1: (oriented_edge) #2: (edge_curve)	514 514		{#1: ((oriented_edge) (oriented_edge => seam_edge))}
oriented_edge_- curve to vertex_- point (as edge_end)	PATH			oriented_edge <= edge edge.edge_end ->> vertex => vertex_point
oriented_edge_- curve to b_- spline_curve (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => bounded_curve => b_spline_curve
oriented_edge_- curve to circle (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => conic => circle

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to curve_- on_surface (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => #3: (pcurve) #4: (surface_curve)
oriented_edge_- curve to ellipse (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => conic => ellipse
oriented_edge_- curve to hyperbola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => conic => hyperbola
oriented_edge_- curve to line (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => line
oriented_edge_- curve to parabola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->> edge_curve edge_curve.edge_geometry ->> curve => conic => parabola

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Table 13 – Mapping table b_rep_model UoF (G5) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to polyline (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => bounded_curve => polyline
oriented_edge_- curve to vertex_- point (as edge_start)	PATH			oriented_edge <= edge edge.edge_start -> vertex => vertex_point
PARABOLA	parabola	514		
PLANE	plane	514		
POINT	cartesian_point	514		
POLYLINE	polyline	514		
SPHERICAL_- SURFACE	spherical_surface	514		
SURFACE #1: If no orientation is specified for the surface. #2: If an orientation is specified for the surface.	#1: (surface) #2: (oriented_- surface)	514 42		
SURFACE_OF_- LINEAR_EXTRUSION	surface_of_linear_- extrusion	514		
SURFACE_OF_- REVOLUTION	surface_of_revolution	514		
TOROIDAL_SURFACE	toroidal_surface	514		
VERTEX_LOOP	vertex_loop	514		
vertex_loop to vertex_point (as loop_vertex)	PATH			vertex_loop vertex_loop.loop_vertex -> vertex => vertex_point
VERTEX_POINT	vertex_point	514		

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Table 13 – Mapping table b_rep_model UoF (G5) (concluded)

Application element	AIM element	Source	Rules	Reference path
vertex_point to point (as vertex_-geometry)	PATH			vertex_point vertex_point.vertex_geometry ->point =>cartesian_point

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Table 14 – Mapping table compound_model UoF (G6)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	501		
B_SPLINE_SURFACE	b_spline_surface	501		
CARTESIAN_POINT	cartesian_point	501		
CIRCLE	circle	501		
COMPOUND_MODEL #1: If the compound_model contains both connected edge sets and connected face sets. #2: If the compound_model is edge based. #3: If the compound_model is face based.	#1: (compound_shape_-representation) #2: (edge_based_-wireframe_shape_-representation) #3: (non_manifold_-surface_shape_-representation)	214 501 508		#1: (compound_shape_representation <=) #2: (edge_based_wireframe_shape_representation <=) #3: (non_manifold_surface_shape_representation <=) shape_representation
compound_model to topologically_-connected_set (as element)	PATH			#2: ((compound_shape_representation <=) (edge_based_wireframe_shape_representation <=) shape_representation <= representation representation.items[i] ->> representation_item => geometric_representation_item => edge_based_wireframe_model) #3: ((compound_shape_representation <=) (non_manifold_surface_shape_representation <=) shape_representation <= representation representation.items[i] ->> representation_item => geometric_representation_item => face_based_surface_model)
CONICAL_SURFACE	conical_surface	508		
CURVE	curve	501		

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
CURVE_ON_SURFACE #1: If the curve is a 2D curve in the parameter space of a surface. #2: If the curve is a curve on a surface.	#1: (pcurve) #2: (surface_curve)	508 508		
CYLINDRICAL_-SURFACE	cylindrical_surface	508		
DETAILED_ELEMENT #1: If the detailed_-element is part of a geometric model. #2: If the detailed_-element is part of a topological model. #3: If the detailed_-element is a template_-instance. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string.	#1: (geometric_-representation_item) #2: (topological_-representation_item) #3: (mapped_item)	501 501 501		
name	representation_item.name	501		#1: (geometric_representation_item <=) #2: (topological_representation_item <=) #3: (mapped_item <=) representation_item representation_item.name
detailed_element to multi_-language_string (as name)	#4: ([representation_-item.name] [PATH]) #5: (PATH)	501	129,135, 168	#4: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (topological_representation_item attribute_language_item = topological_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #3: (mapped_item attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})) #5: (#1: (geometric_representation_item multi_language_attribute_item = geometric_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #2: (topological_representation_item multi_language_attribute_item = topological_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}) #3: (mapped_item multi_language_attribute_item = mapped_item

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}))
DETAILED_- GEOMETRIC_MODEL_- ELEMENT #1: If the detailed_- geometric_model_element is part of a geometric model. #2: If the detailed_- geometric_model_element is part of a topological model.	#1: (geometric_- representation_item) #2: (topological_- representation_item)	501 501		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template_- instance. #3: If the detailed_model_- element is part of a topological model.	#1: (geometric_- representation_item) #2: (mapped_item) #3: (topological_- representation_item)	501 501 501		
EDGE_LOOP	edge_loop	508		
edge_loop to oriented_edge_- curve (as edge)	PATH			edge_loop<= path path.edge_list[i]->; oriented_edge
EDGE_TRANSITION	shape_aspect_- transition	214		shape_aspect_transition<= shape_aspect_relationship

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
transition	shape_aspect_- relationship.name	501		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name
edge_transition to oriented_edge_- curve (as edge_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->representation representation.items[i] ->representation_item => topological_representation_item => edge => oriented_edge
edge_transition to oriented_edge_- curve (as edge_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge
edge_transition to vertex_point (as vertex_-joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => vertex => vertex_point
ELLIPSE	ellipse	501		
FACE #1: If the face is defined by an associated surface. #2: If the face is not defined by an associated surface.	#1: (face_surface) #2: (oriented_face)	501 501		
face to face_-bound (as bound)	PATH			#1: (face_surface <=) #2: (oriented_face <=) face face.bounds[i] -> face_bound
face to surface (as face_-geometry)	PATH			#1: (face_surface) #2: (oriented_face oriented_face.face_element ->face =>)

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				face_surface) face_surface.face_geometry -> surface
FACE_BOUND #1: If the face_bound does not define an outer boundary. #2: If the face_bound defines an outer boundary.	#1: (face_bound) #2: (face_outer_bound)	508 508		
outer	face_outer_bound	508		
face_bound to edge_loop (as loop)	PATH			face_bound face_bound.bound -> loop => edge_loop
face_bound to vertex_loop (as loop)	PATH			face_bound face_bound.bound -> loop => vertex_loop
FACE_TRANSITION #1: If the face is not defined by an associated surface. #2: If the face is defined by an associated surface. #3: If the edge is defined by another edge. #4: If the edge is fully defined.	shape_aspect_-transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_-relationship.name	501		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
face_transition to oriented_edge_- curve (as edge_joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect ->] shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect ->] shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->]

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => topological_representation_item => edge => #3: (oriented_edge) #4: (edge_curve)
face_transition to face (as face_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => #1: (oriented_face) #2: (face_surface)
face_transition to face (as face_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => #1: (oriented_face) #2: (face_surface)
HYPERBOLA	hyperbola	501		
LINE	line	501		
OFFSET_SURFACE	offset_surface	508		
ORIENTED_EDGE_- CURVE #1: If the edge is defined by another edge. #2: If the edge is fully defined. #3: If the curve is a 2D curve in the parameter space of a surface. #4: If the curve is a curve on a surface.	#1: (oriented_edge) #2: (edge_curve)	508 508		{#1: ((oriented_edge) (oriented_edge => seam_edge))}

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to vertex_- point (as edge_end)	PATH			oriented_edge <= edge edge.edge_end ->: vertex => vertex_point
oriented_edge_- curve to b_- spline_curve (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->: edge_curve edge_curve.edge_geometry ->: curve => bounded_curve => b_spline_curve
oriented_edge_- curve to circle (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->: edge_curve edge_curve.edge_geometry ->: curve => conic => circle
oriented_edge_- curve to curve_- on_surface (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->: edge_curve edge_curve.edge_geometry ->: curve => #3: (pcurve) #4: (surface_curve)
oriented_edge_- curve to ellipse (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->: edge_curve edge_curve.edge_geometry ->: curve => conic => ellipse

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to hyperbola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve =>conic =>hyperbola
oriented_edge_- curve to line (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve =>line
oriented_edge_- curve to parabola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve =>conic =>parabola
oriented_edge_- curve to polyline (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve =>bounded_curve =>polyline
oriented_edge_- curve to vertex_- point (as edge_start)	PATH			oriented_edge <=edge edge.edge_start ->vertex =>vertex_point
PARABOLA	parabola	501		
PLANE	plane	508		

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Table 140 - Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is part of a surface. #4: If a curve collapses into a point in a 3D model space.	#1: (cartesian_point) #2: (point_on_curve) #3: (point_on_-surface) #4: (degenerate_-pcurve)	501 508 508 508		
POINT_ON_CURVE	point_on_curve	508		
POINT_ON_SURFACE	point_on_surface	508		
POLYLINE	polyline	501		
SPHERICAL_-SURFACE	spherical_surface	508		
SURFACE #1: If no orientation is specified for the surface. #2: If an orientation is specified for the surface.	#1: (surface) #2: (oriented_-surface)	508 42		
SURFACE_OF_-LINEAR_EXTRUSION	surface_of_linear_-extrusion	509		
SURFACE_OF_-REVOLUTION	surface_of_revolution	509		

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Table 14 – Mapping table compound_model UoF (G6) (continued)

Application element	AIM element	Source	Rules	Reference path
TOPOLOGICALLY_- CONNECTED_SET #1: If the model is constructed using edges. #2: If the model is constructed using faces. #3: If the face is defined by an associated surface. #4: If the face is not defined by an associated surface. #5: If the edge is defined by another edge. #6: If the edge is fully defined.	#1: (edge_based_- wireframe_model) #2: (face_based_- surface_model)	501 508		
topologically_- connected_set to face (as element)	PATH			face_based_surface_model face_based_surface_model.fbsm_faces[i] ->connected_face_set connected_face_set.cfs_faces[i] ->face => #3: (face_surface) #4: (oriented_face)
topologically_- connected_set to oriented_edge_- curve (as element)	PATH			edge_based_wireframe_model edge_based_wireframe_model.ebwm_boundary[i] ->connected_edge_set connected_edge_set.ces_edges[i] ->edge => #5: (oriented_edge) #6: (edge_curve)
TOROIDAL_SURFACE	toroidal_surface	508		
VERTEX_LOOP	vertex_loop	508		

Table 14 – Mapping table compound_model UoF (G6) (concluded)

Application element	AIM element	Source	Rules	Reference path
vertex_loop to vertex_point (as loop_vertex)	PATH			vertex_loop vertex_loop.loop_vertex -> vertex => vertex_point
VERTEX_POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is part of a surface. #4: If a curve collapses into a point in a 3D model space.	vertex_point	501		
vertex_point to point (as vertex_-geometry)	PATH			vertex_point vertex_point.vertex_geometry -> point => #1: (cartesian_point) #2: (point_on_curve) #3: (point_on_surface) #4: (degenerate_pcurve)

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Table 15 – Mapping table csg_model UoF (G7)

Application element	AIM element	Source	Rules	Reference path
B_REP #1: If the b_rep does nt contain any interior bounds. #2: If the b_rep has at least one void in its interior.	#1: (manifold_solid_-brep) #2: (brep_with_voids)	515 515		
b_rep to closed_-shell (as outer)	PATH			#1: (manifold_solid_brep) #2: (brep_with_voids <= manifold_solid_brep) manifold_solid_brep.outer -> closed_shell
b_rep to closed_-shell (as void)	PATH			brep_with_voids brep_with_voids.voids[i] -> oriented_closed_shell <= closed_shell
B_REP_MODEL #1: If the b_rep does nt contain any interior bounds. #2: If the b_rep has at least one void in its interior.	advanced_brep_shape_-representation	515		advanced_brep_shape_representation <= shape_representation
b_rep_model to b_-rep (as element)	PATH			advanced_brep_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => #1: (manifold_solid_brep) #2: (manifold_solid_brep => brep_with_voids)

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	515		
B_SPLINE_SURFACE	b_spline_surface	515		
BLOCK	block	515		
BOOLEAN_RESULT #1: If the b_rep does nt contain any interior bounds. #2: If the b_rep has at least one void in its interior. #3: If the primitive is a sphere. #4: If the primitive is a block. #5: If the primitive is a right angular wedge. #6: If the primitive is a torus. #7: If the primitive is a right angular cone. #8: If the element is a right angular cylinder. #9: If all faces are planar and all edges are straight lines. #10: If the brep has at least one void in its interior. #11: If the solid is created by a sweep of revolution. #12: If the solid is created by a sweep of extrusion.	boolean_result	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
boolean_- operation	boolean_result. operator	515		
boolean_result to b_rep_model (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = solid_model solid_model <= {solid_model => #1: (|manifold_solid_brep|) #2: (manifold_solid_brep => brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => advanced_brep_shape_representation
boolean_result to boolean_- result (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = boolean_result boolean_result
boolean_result to csg_primitive (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = csg_primitive csg_primitive #3: (csg_primitive = sphere sphere) #4: (csg_primitive = block block) #5: (csg_primitive = right_angular_wedge right_angular_wedge) #6: (csg_primitive = torus torus) #7: (csg_primitive = right_circular_cone

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				right_circular_cone) #8: (csg_primitive = right_circular_cylinder right_circular_cylinder)
boolean_result to faceted_b_rep_- model (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = solid_model solid_model <= {solid_model => manifold_solid_brep => #9: (faceted_brep) #10: (brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => faceted_brep_shape_representation
boolean_result to half_space_- solid (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = half_space_solid half_space_solid
boolean_result to solid_replica (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = solid_model solid_model => solid_replica
boolean_result to swept_face_- solid (as first_- operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = solid_model solid_model => swept_face_solid => #11: (revolved_face_solid)

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				#12: (extruded_face_solid)
boolean_result to b_rep_model (as second_-operand)	PATH			boolean_result boolean_result.second_operand -> boolean_operand boolean_operand = solid_model solid_model <= {solid_model => #1: (|manifold_solid_brep|) #2: (manifold_solid_brep => brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => advanced_brep_shape_representation
boolean_result to boolean_-result (as second_-operand)	PATH			boolean_result boolean_result.second_operand -> boolean_operand boolean_operand = boolean_result boolean_result
boolean_result to csg_primitive (as second_-operand)	PATH			boolean_result boolean_result.first_operand -> boolean_operand boolean_operand = csg_primitive #3: (csg_primitive = sphere sphere) #4: (csg_primitive = block block) #5: (csg_primitive = right_angular_wedge right_angular_wedge) #6: (csg_primitive = torus torus) #7: (csg_primitive = right_circular_cone right_circular_cone) #8: (csg_primitive = right_circular_cylinder

Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				right_circular_cylinder)
boolean_result to faceted_b_rep_- model (as second_- operand)	PATH			boolean_result boolean_result.first_operand ->) boolean_operand boolean_operand = solid_model solid_model <= {solid_model => manifold_solid_brep => #9: (faceted_brep) #10: (brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => faceted_brep_shape_representation
boolean_result to half_space_- solid (as second_- operand)	PATH			boolean_result boolean_result.second_operand ->) boolean_operand boolean_operand = half_space_solid half_space_solid
boolean_result to solid_replica (as second_- operand)	PATH			boolean_result boolean_result.second_operand ->) boolean_operand boolean_operand = solid_model solid_model => solid_replica
boolean_result to swept_face_- solid (as second_- operand)	PATH			boolean_result boolean_result.second_operand ->) boolean_operand boolean_operand = solid_model solid_model => swept_face_solid => #11: (revolved_face_solid) #12: (extruded_face_solid)

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
CARTESIAN_POINT	cartesian_point	515		
CIRCLE	circle	515		
CLOSED_SHELL #1: If no orientation is specified for the closed_-shell. #2: If an orientation is specified for the closed_-shell. #3: If the face is defined by an associated surface. #4: If the face is not defined by an associated surface.	#1: ([closed_shell]) #2: (oriented_closed_-shell)	515 515		
closed_shell to face (as shell_-boundary)	PATH			#1: ([closed_shell <=]) #2: (oriented_closed_shell <= closed_shell <=) connected_face_set connected_face_set.cfs_faces[i] ->face => #3: (face_surface) #4: (oriented_face)
CONICAL_SURFACE	conical_surface	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
CSG_MODEL #1: If the primitive is a sphere. #2: If the primitive is a block. #3: If the primitive is a right angular wedge. #4: If the primitive is a torus. #5: If the primitive is a right angular cone. #6: If the element is a right angular cylinder. #7: If the solid is created by a sweep of revolution. #8: If the solid is created by a sweep of extrusion.	csg_shape_- representation	515		csg_shape_representation <= shape_representation
csg_model to b_- rep_model (as tree_root_- expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] ->) representation_item => mapped_item mapped_item.mapping_source ->) representation_map representation_map.mapped_representation ->) representation=> shape_representation => advanced_brep_shape_representation

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
csg_model to boolean_result (as tree_root_-expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => csg_solid csg_solid.tree_root_expression -> csg_select csg_select = boolean_result boolean_result
csg_model to csg_-primitive (as tree_root_-expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => csg_solid csg_solid.tree_root_expression -> csg_select csg_select = csg_primitive csg_primitive #1: (csg_primitive = sphere sphere) #2: (csg_primitive = block block) #3: (csg_primitive = right_angular_wedge right_angular_wedge) #4: (csg_primitive = torus torus) #5: (csg_primitive = right_circular_cone right_circular_cone) #6: (csg_primitive = right_circular_cylinder right_circular_cylinder)

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
csg_model to faceted_b_rep_-model (as tree_root_-expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => mapped_item mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation => shape_representation => faceted_brep_shape_representation
csg_model to solid_replica (as tree_root_-expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => solid_replica
csg_model to swept_face_solid (as tree_root_-expression)	PATH			csg_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => geometric_representation_item => solid_model => swept_face_solid => #7: (revolved_face_solid) #8: (extruded_face_solid)

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
CSG_PRIMITIVE #1: If the primitive is a sphere. #2: If the primitive is a block. #3: If the primitive is a right angular wedge. #4: If the primitive is a torus. #5: If the primitive is a right angular cone. #6: If the element is a right angular cylinder.	#1: (sphere) #2: (block) #3: (right_angular_-wedge) #4: (torus) #5: (right_circular_-cone) #6: (right_circular_-cylinder)	515 515 515 515 515 515		
CURVE	curve	515		
CURVE_ON_SURFACE #1: If the curve is a curve on a surface. #2: If the curve is a 2D curve in the parameter space of a surface.	#1: (surface_curve) #2: (pcurve)	515 515		
CYLINDRICAL_-SURFACE	cylindrical_surface	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_ELEMENT #1: If the detailed_- element is part of a geometric model. #2: If the detailed_- element is part of a topological model. #3: If the detailed_- element is a template_- instance. #4: For the primary_- language_dependent_string. #5: For any additional_- language_dependent_string.	#1: (geometric_- representation_item) #2: (topological_- representation_item) #3: (mapped_item)	515 515 515		
name	representation_item. name	515		#1: (geometric_representation_item <=) #2: (topological_representation_item <=) #3: (mapped_item <=) representation_item representation_item.name
detailed_element to multi_- language_string (as name)	#4: ([representation_- item.name] [PATH]) #5: (PATH)	515	129,135, 168	#4: (#1: (geometric_representation_item attribute_language_item = geometric_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (topological_representation_item attribute_language_item = topological_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'name'})
				#3: (mapped_item
				attribute_language_item = mapped_item
				attribute_language_item <-
				attribute_language_assignment.items[i]
				attribute_language_assignment
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'name'}))
				#5: (#1: (geometric_representation_item
				multi_language_attribute_item = geometric_representation_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'})
				#2: (topological_representation_item
				multi_language_attribute_item = topological_representation_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'})
				#3: (mapped_item
				multi_language_attribute_item = mapped_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'}))

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
DETAILED_- GEOMETRIC_MODEL_- ELEMENT #1: If the detailed_- geometric_model_element is part of a geometric model. #2: If the detailed_- geometric_model_element is part of a topological model.	#1: (geometric_- representation_item) #2: (topological_- representation_item)	515 515		
DETAILED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template_- instance. #3: If the detailed_model_- element is part of a topological model.	#1: (geometric_- representation_item) #2: (mapped_item) #3: (topological_- representation_item)	515 515 515		
EDGE_LOOP	edge_loop	515		
edge_loop to oriented_edge_- curve (as edge)	PATH			edge_loop<= path path.edge_list[i] ->> oriented_edge
EDGE_TRANSITION	shape_aspect_- transition	214		shape_aspect_transition <= shape_aspect_relationship
transition	shape_aspect_- relationship.name	515		shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.name

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
edge_transition to oriented_edge_- curve (as edge_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge
edge_transition to oriented_edge_- curve (as edge_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => edge => oriented_edge
edge_transition to vertex_point (as vertex_- joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] representation_item => topological_representation_item => vertex => vertex_point
ELLIPSE	ellipse	515		
FACE #1: If the face is defined by an associated surface. #2: If the face is not defined by an associated surface.	#1: (face_surface) #2: (oriented_face)	515 515		
face to face_-bound (as bound)	PATH			#1: (face_surface <=) #2: (oriented_face <=) face face.bounds[i] -> face_bound
face to surface (as face_-geometry)	PATH			#1: (face_surface) #2: (oriented_face oriented_face.face_element -> face => face_surface) face_surface.face_geometry ->

Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				surface
FACE_BOUND #1: The general case. #2: If the face defines an outer boundary.	#1: (face_bound) #2: (face_outer_bound)	515 515		
outer	face_outer_bound	515		
face_bound to edge_loop (as loop)	PATH			(face_bound) (face_outer_bound <= face_bound) face_bound.bound ->loop =>edge_loop
face_bound to vertex_loop (as loop)	PATH			(face_bound) (face_outer_bound <= face_bound) face_bound.bound ->loop =>vertex_loop
FACE_TRANSITION #1: If the face is not defined by an associated surface. #2: If the face is defined by an associated surface. #3: If the edge is defined by another edge. #4: If the edge is fully defined.	shape_aspect_-transition	214		shape_aspect_transition <=shape_aspect_relationship
transition	shape_aspect_-relationship.name	515		shape_aspect_transition <=shape_aspect_relationship shape_aspect_relationship.name

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
face_transition to oriented_edge_- curve (as edge_joint)	PATH			shape_aspect_transition <= shape_aspect_relationship [shape_aspect_relationship.relating_shape_aspect ->] shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->] [shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] ->

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => topological_representation_item => edge => #3: (oriented_edge) #4: (edge_curve)
face_transition to face (as face_1)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => #1: (oriented_face) #2: (face_surface)
face_transition to face (as face_2)	PATH			shape_aspect_transition <= shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => topological_representation_item => face => #1: (oriented_face) #2: (face_surface)
FACETED_B_REP #1: If all faces are planar and all edges are straight lines. #2: If the brep has at least one void in its interior.	#1: (faceted_brep) #2: (brep_with_voids)	515 515		
faceted_b_rep to faceted_closed_-shell (as outer)	PATH			#1: (faceted_brep <=) #2: (brep_with_voids <=) manifold_solid_brep manifold_solid_brep.outer -> closed_shell
faceted_b_rep to faceted_closed_-shell (as void)	PATH			#1: (faceted_brep <=) #2: (brep_with_voids <=) manifold_solid_brep manifold_solid_brep.outer ->

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				closed_shell
FACETED_B_REP_- MODEL #1: If all faces are planar and all edges are straight lines. #2: If the brep has at least one void in its interior.	faceted_brep_shape_- representation	515		faceted_brep_shape_representation <= shape_representation
faceted_b_rep_- model to faceted_- b_rep (as element)	PATH			faceted_brep_shape_representation <= shape_representation representation representation.items[i] ->> representation_item => geometric_representation_item => solid_model => manifold_solid_brep => #1: (faceted_brep) #2: (brep_with_voids)
FACETED_CLOSED_- SHELL	closed_shell	515		
faceted_closed_- shell to faceted_- face (as shell_- boundary)	PATH			closed_shell <= connected_face_set connected_face_set.cfs_faces[i] ->> face => face_surface
FACETED_FACE	face_surface	515		
faceted_face to poly_loop (as bound)	PATH			face_surface <= face face.bounds[i] ->> face_bound face_bound.bound ->> loop => poly_loop

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
faceted_face to plane (as face_-geometry)	PATH			face_surface face_surface.face_geometry -> surface => elementary_surface => plane
HALF_SPACE_SOLID	half_space_solid	515		
HYPERBOLA	hyperbola	515		
LINE	line	515		
ORIENTED_EDGE_-CURVE #1: If the edge is defined by another edge. #2: If the edge is fully defined. #3: If the curve is a 2D curve in the parameter space of a surface. #4: If the curve is a curve on a surface.	#1: (oriented_edge) #2: (edge_curve)	515 515		{#1: ((oriented_edge) (oriented_edge => seam_edge))}
oriented_edge_-curve to vertex_-point (as edge_end)	PATH			oriented_edge <= edge edge.edge_end -> vertex => vertex_point
oriented_edge_-curve to b_-spline_curve (as edge_-geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => bounded_curve => b_spline_curve

Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to circle (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve => conic => circle
oriented_edge_- curve to curve_- on_surface (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve => #3: (pcurve) #4: (surface_curve)
oriented_edge_- curve to ellipse (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve => conic => ellipse
oriented_edge_- curve to hyperbola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve => conic => hyperbola
oriented_edge_- curve to line (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element ->edge_curve edge_curve.edge_geometry ->curve => line

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
oriented_edge_- curve to parabola (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => conic => parabola
oriented_edge_- curve to polyline (as edge_- geometry)	PATH			oriented_edge oriented_edge.edge_element -> edge_curve edge_curve.edge_geometry -> curve => bounded_curve => polyline
oriented_edge_- curve to vertex_- point (as edge_start)	PATH			oriented_edge <= edge edge.edge_start -> vertex => vertex_point
PARABOLA	parabola	515		
PLANE	plane	515		
POINT	cartesian_point	515		
POLY_LOOP	poly_loop	515		
outer	face_outer_bound	515		poly_loop <= loop <- face_bound.bound face_bound => face_outer_bound
poly_loop to cartesian_point (as polygon)	PATH			poly_loop poly_loop.polygon[i] -> cartesian_point
POLYLINE	polyline	515		
RIGHT_ANGULAR_- WEDGE	right_angular_wedge	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
RIGHT_CIRCULAR_-CONE	right_circular_cone	515		
RIGHT_CIRCULAR_-CYLINDER	right_circular_-cylinder	515		
SOLID_OF_LINEAR_-EXTRUSION	extruded_face_solid	515		
SOLID_OF_-REVOLUTION	revolved_face_solid	515		
SOLID_REPLICA #1: If the b_rep does nt contain any interior bounds. #2: If the b_rep has at least one void in its interior. #3: If the primitive is a sphere. #4: If the primitive is a block. #5: If the primitive is a right angular wedge. #6: If the primitive is a torus. #7: If the primitive is a right angular cone. #8: If the element is a right angular cylinder. #9: If all faces are planar and all edges are straight lines. #10: If the brep has at least one void in its interior. #11: If the solid is created by a sweep of revolution. #12: If the solid is created by a sweep of extrusion.	solid_replica	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
solid_replica to b_rep_model (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid -> solid_model <= {solid_model => #1: (|manifold_solid_brep|) #2: (manifold_solid_brep => brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => advanced_brep_shape_representation
solid_replica to boolean_result (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid -> solid_model => csg_solid csg_solid.tree_root_expression -> csg_select csg_select = boolean_result boolean_result
solid_replica to csg_primitive (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid -> solid_model => csg_solid csg_solid.tree_root_expression -> csg_select csg_select = csg_primitive csg_primitive #3: (csg_primitive = sphere sphere) #4: (csg_primitive = block block) #5: (csg_primitive = right_angular_wedge right_angular_wedge) #6: (csg_primitive = torus

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
				torus) #7: (csg_primitive = right_circular_cone right_circular_cone) #8: (csg_primitive = right_circular_cylinder right_circular_cylinder)
solid_replica to faceted_b_rep_-model (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid ->solid_model <= {solid_model => manifold_solid_brep => #9: (faceted_brep) #10: (brep_with_voids)} geometric_representation_item <= representation_item <- representation.items[i] representation => shape_representation => faceted_brep_shape_representation
solid_replica to solid_replica (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid ->solid_model => solid_replica
solid_replica to swept_face_solid (as replicated_-solid)	PATH			solid_replica solid_replica.parent_solid ->solid_model => swept_face_solid => #11: (revolved_face_solid) #12: (extruded_face_solid)
SPHERE	sphere	515		
SPHERICAL_-SURFACE	spherical_surface	515		

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Table 15 – Mapping table csg_model UoF (G7) (continued)

Application element	AIM element	Source	Rules	Reference path
SURFACE #1: If no orientation is specified for the surface. #2: If an orientation is specified for the surface.	#1: (surface) #2: (oriented_-surface)	515 42		
SURFACE_OF_-LINEAR_EXTRUSION	surface_of_linear_-extrusion	515		
SURFACE_OF_-REVOLUTION	surface_of_revolution	515		
SWEPT_FACE_SOLID #1: If the solid is created by a sweep of revolution. #2: If the solid is created by a sweep of extrusion.	#1: (revolved_face_-solid) #2: (extruded_face_-solid)	515 515		
swept_face_solid to face (as swept_face)	PATH			#1: (revolved_face_solid <=) #2: (extruded_face_solid <=) swept_face_solid swept_face_solid.swept_face -> face_surface
TOROIDAL_SURFACE	toroidal_surface	515		
TORUS	torus	515		
VERTEX_LOOP	vertex_loop	515		
vertex_loop to vertex_point (as loop_vertex)	PATH			vertex_loop vertex_loop.loop_vertex -> vertex => vertex_point
VERTEX_POINT	vertex_point	515		

Table 15 – Mapping table csg_model UoF (G7) (concluded)

Application element	AIM element	Source	Rules	Reference path
vertex_point to point (as vertex_-geometry)	PATH			vertex_point vertex_point.vertex_geometry ->point =>cartesian_point

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Table 16 – Mapping table geometrically_bounded_surface_model UoF (G8)

Application element	AIM element	Source	Rules	Reference path
B_SPLINE_CURVE	b_spline_curve	507		
B_SPLINE_SURFACE	b_spline_surface	507		
CARTESIAN_POINT	cartesian_point	507		
CIRCLE	circle	507		
COMPOSITE_CURVE	composite_curve	507		
CONICAL_SURFACE	conical_surface	507		
CURVE	curve	507		
CURVE_ON_SURFACE #1: If the curve is a 2D curve in the parameter space of a surface. #2: If the curve is a curve on a surface.	#1: (pcurve) #2: (surface_curve)	507 507		
CYLINDRICAL_-SURFACE	cylindrical_surface	507		
ELLIPSE	ellipse	507		
GEOMETRIC_SET_3D #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is part of a surface. #4: If a curves collapses into a point in a 3D model space.	geometric_set	507		
geometric_set_3d to curve (as element)	PATH			geometric_set geometric_set.elements[i] ->curve
geometric_set_3d to point (as element)	PATH			geometric_set geometric_set.elements[i] ->point {point => #1: (cartesian_point)

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Table 16 – Mapping table geometrically_bounded_surface_model UoF (G8) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (point_on_curve) #3: (point_on_surface) #4: (degenerate_pcurve)}
geometric_set_3d to surface (as element)	PATH			geometric_set geometric_set.elements[i] ->surface
GEOMETRICALLY_- BOUNDED_SURFACE_- MODEL	geometrically_bounded_- surface_shape_- representation	507		geometrically_bounded_surface_shape_representation <= shape_representation
geometrically_- bounded_surface_- model to geometric_set_3d (as element)	PATH			geometrically_bounded_surface_shape_representation <= shape_representation <= representation representation.items[i] ->representation_item => geometric_representation_item => geometric_set
HYPERBOLA	hyperbola	507		
LINE	line	507		
OFFSET_CURVE	offset_curve_3d	507		
OFFSET_SURFACE	offset_surface	507		
PARABOLA	parabola	507		
PLANE	plane	507		
POINT #1: If the point is a cartesian point. #2: If the point is part of a curve. #3: If the point is part of a surface. #4: If a curves collapses into a point in a 3D model space.	#1: (cartesian_point) #2: (point_on_curve) #3: (point_on_- surface) #4: (degenerate_- pcurve)	507 507 507 507		
POINT_ON_CURVE	point_on_curve	507		
POINT_ON_SURFACE	point_on_surface	507		

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Table 16 – Mapping table geometrically_bounded_surface_model UoF (G8) (concluded)

Application element	AIM element	Source	Rules	Reference path
POLYLINE	polyline	507		
SPHERICAL_-SURFACE	spherical_surface	507		
SURFACE	surface	507		
SURFACE_OF_-LINEAR_EXTRUSION	surface_of_linear_-extrusion	507		
SURFACE_OF_-REVOLUTION	surface_of_revolution	507		
TOROIDAL_SURFACE #1: If the major diameter of the toroidal_suface is greater than the minor radius. #2: If the minor radius of the toroidal_surface is greater than the major radius.	#1: (toroidal_-surface) #2: (degenerate_-toroidal_surface)	507 507		
TRIMMED_CURVE	trimmed_curve	507		
TRIMMED_SURFACE #1: If the surface is composed of an rectangualr array of patches. #2: The general case for rectangular surfaces. #3: If the surface is bounded by one ore more curves.	#1: (rectangular_-composite_surface) #2: (rectangular_-trimmed_surface) #3: (curve_bounded_-surface)	507 507 507		

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Table 17 – Mapping table kinematics UoF (K1)

Application element	AIM element	Source	Rules	Reference path
ACTUATOR #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	pair_actuator	106		
name	pair_actuator.name	106		
actuator to kinematic_pair (as is_applied_- to)	PATH			pair_actuator pair_actuator.actuated_pair ->> kinematic_pair
actuator to multi_language_- string (as name)	#1: ([pair_actuator. name] [PATH]) #2: (PATH)	106	141	pair_actuator #1: (attribute_language_item = pair_actuator attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = pair_actuator multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
GROUND_- REPRESENTATION	kinematic_ground_- representation	106		
ground_- representation to geometric_- model (as shape_- description)	PATH			kinematic_ground_representation <= representation <- representation_relationship.rep_1 representation_relationship {representation_relationship.name = 'shape description'} representation_relationship.rep_2 ->> representation => shape_representation

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
INITIAL_- CONFIGURATION	initial_state	106		
initial_- configuration to pair_value (as initial_pair_- values)	PATH			initial_state initial_state.pair_values[i] ->> pair_value
initial_- configuration to kinematic_- mechanism (as is_applied_- to)	PATH			initial_state initial_state.applies_to_mechanism ->> mechanism
INTERPOLATED_- CONFIGURATION_- SEQUENCE	interpolated_- configuration_sequence	106		
interpolated_- configuration_- sequence to kinematic_- configuration_- interpolation (as interpolation)	PATH			interpolated_configuration_sequence interpolated_configuration_sequence.interpolation[i] ->> configuration_interpolation
KINEMATIC_- CONFIGURATION_- DEFINITION #1: The general case for path_approximation. #2: If time aspects are considered for path_- approximation.	configuration_- definition	106		

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- configuration_- definition to pair_value (as pair_values)	PATH			configuration_definition configuration_definition.pair_values[i] ->> pair_value
kinematic_- configuration_- definition to path_- approximation (as t_parameter)	PATH			configuration_definition configuration_definition.t_parameter ->> motion_parameter_measure #1: (motion_parameter_measure = parameter_value parameter_value) #2: (motion_parameter_measure = measure_with_unit measure_with_unit)
KINEMATIC_- CONFIGURATION_- INTERPOLATION	configuration_- interpolation	106		
interpolation_- type	configuration_- interpolation. interpolation	106		
kinematic_- configuration_- interpolation to kinematic_- configuration_- definition (as next_- definition)	PATH			configuration_interpolation configuration_interpolation.next_configuration_definition ->> configuration_definition
kinematic_- configuration_- interpolation to kinematic_- configuration_- definition (as previous_- definition)	PATH			configuration_interpolation configuration_interpolation.previous_configuration_definition ->> configuration_definition

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
KINEMATIC_-CONTROL	kinematic_control	106		
kinematic_-control to kinematic_-mechanism (as is_-controlling)	PATH			kinematic_control kinematic_control.controlled_mechanism ->mechanism
kinematic_-control to interpolated_-configuration_-sequence (as program)	PATH			kinematic_control kinematic_control.contained_kinematic_programs [i] ->kinematic_analysis_definition kinematic_analysis_definition = interpolated_configuration_sequence interpolated_configuration_sequence
kinematic_-control to kinematic_-transformation_-result (as related_-result)	PATH			kinematic_control <- kinematic_analysis_consistency.control kinematic_analysis_consistency kinematic_analysis_consistency.result ->kinematic_analysis_result

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
KINEMATIC_- ELEMENT #1: If the kinematic_- element represents a structure. #2: If the kinematic_- element represents a joint. #3: If the kinematic_- element represents a link. #4: If the kinematic_- element represents a pair. #5: For the primary_- language_dependent_string. #6: For any additional_- language_dependent_string.	#1: (kinematic_- structure) #2: (kinematic_joint) #3: (kinematic_link) #4: (kinematic_pair)	106 106 106 106		{kinematic_pair <= item_defined_transformation}
name	#1: (name_assignment. assigned_name) #2: (name_assignment. assigned_name) #3: (name_assignment. assigned_name) #4: (item_defined_- transformation.name)	41 41 41 43	32,172, 173,174	#1: (kinematic_structure name_item = kinematic_structure) #2: (kinematic_joint name_item = kinematic_joint) #3: (kinematic_link name_item = kinematic_link) name_item <- applied_name_assignment.items[i] applied_name_assignment <= name_assignment {name_assignment.role ->> object_role object_role.name = 'kinematic element name'} name_assignment.assigned_name

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- element to multi_- language_string (as name)	#1: (#5: ([name_- assignment.assigned_- name] [PATH]) #6: (PATH))	41	134,136	(#1: (kinematic_structure name_item = kinematic_structure) #2: (kinematic_joint name_item = kinematic_joint) #3: (kinematic_link name_item = kinematic_link) name_item <- applied_name_assignment.items[i] applied_name_assignment <= name_assignment {name_assignment.role ->> object_role object_role.name = 'kinematic element name'} #5: (attribute_language_item = name_assignment attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'assigned_name'}) #6: (multi_language_attribute_item = name_assignment multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'assigned_name'})) #4: (kinematic_pair #5: (attribute_language_item = kinematic_pair attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})
	#2: (#5: ([name_- assignment.assigned_- name] [PATH]) #6: (PATH))	41		
	#3: (#5: ([name_- assignment.assigned_- name] [PATH]) #6: (PATH))	41		
	#4: (#5: ([item_- defined_transformation. name] [PATH]) #6: (PATH))	43		

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (multi_language_attribute_item = kinematic_pair multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'}))
KINEMATIC_JOINT	kinematic_joint	106		
kinematic_joint to kinematic_-link (as first_link)	PATH			kinematic_joint kinematic_joint.first_link ->kinematic_link
kinematic_joint to kinematic_-pair (as pair)	PATH			kinematic_joint <- kinematic_pair.joint kinematic_pair
kinematic_joint to kinematic_-link (as second_link)	PATH			kinematic_joint kinematic_joint.second_link ->kinematic_link
KINEMATIC_LINK	kinematic_link	106		
kinematic_link to kinematic_-link_-representation (as representation)	PATH			kinematic_link <- kinematic_link_representation_relation.topological_aspects kinematic_link_representation_relation kinematic_link_representation_relation.geometric_aspects ->kinematic_link_representation

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
KINEMATIC_LINK_- REPRESENTATION #1: If a transformation_- to_reference_frame is used as a relative reference. #2: If the transformation_- to_reference_frame is used as a tool attachment point frame or a tool cetre point frame.	kinematic_link_- representation	106		
kinematic_link_- representation to transformation_- to_reference_- frame (as additional_- reference_frame)	PATH			kinematic_link_representation <= representation representation.items [i] ->) representation_item => {representation_item.name = 'additional reference frame'} geometric_representation_item => #1: (cartesian_transformation_operator => cartesian_transformation_operator_3d) #2: (placement => axis2_placement_3d)
kinematic_link_- representation to geometric_- model (as physical_- description)	PATH			kinematic_link_representation <= representation <- representation_relationship.rep_1 representation_relationship {representation_relationship => kinematic_link_representation_association} representation_relationship.rep_2 ->) representation => shape_representation
KINEMATIC_- MECHANISM	mechanism	106		

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- mechanism to kinematic_link (as base_link)	PATH			mechanism mechanism.base ->) kinematic_link
kinematic_- mechanism to transformation_- to_reference_- frame (as base_- placement)	PATH			mechanism <- mechanism_base_placement.base_of_mechanism mechanism_base_placement <= representation_relationship_with_transformation representation_relationship_with_transformation.transformation_operator ->) cartesian_transformation_operator_3d
kinematic_- mechanism to kinematic_- structure (as structure_- definition)	PATH			mechanism mechanism.structure_definition ->) kinematic_structure
KINEMATIC_PAIR	kinematic_pair	106		{kinematic_pair => (cylindrical_pair) (fully_constrained_pair) (gear_pair) (universal_pair => homokinetic_pair) ([planar_curve_pair]) (planar_curve_pair => rolling_curve_pair) (planar_curve_pair => sliding_curve_pair) (planar_pair) (point_on_planar_curve_pair) (point_on_surface_pair) (prismatic_pair) (rack_and_pinion_pair) (revolute_pair) (screw_pair) (spherical_pair)

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(|surface_pair|) (surface_pair => rolling_surface_pair) (surface_pair => sliding_surface_pair) (unconstrained_pair) (universal_pair)}
pair_type	(cylindrical_pair)	106		{(universal_pair => homokinetic_pair)}
	(fully_constrained_- pair)	106		
	(gear_pair)	106		
	(homokinetic_pair)	214		
	(|planar_curve_pair|)	106		
	(rolling_curve_pair)	106		
	(sliding_curve_pair)	106		
	(planar_pair)	106		
	(point_on_planar_curve_- pair)	106		
	(point_on_surface_- pair)	106		
	(prismatic_pair)	106		
	(rack_and_pinion_pair)	106		
	(revolute_pair)	106		
	(screw_pair)	106		
	(spherical_pair)	106		
	(|surface_pair|)	106		
	(rolling_surface_pair)	106		
	(sliding_surface_pair)	106		
	(unconstrained_pair)	106		
	(universal_pair)	106		

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_pair to transformation_- to_reference_- frame (as transformation_- item_1)	PATH			kinematic_pair kinematic_pair.pair_placement_in_first_link_context -> rigid_placement rigid_placement = axis2_placement_3d axis2_placement_3d
kinematic_pair to transformation_- to_reference_- frame (as transformation_- item_2)	PATH			kinematic_pair kinematic_pair.pair_placement_in_second_link_context -> rigid_placement rigid_placement = axis2_placement_3d axis2_placement_3d

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
KINEMATIC_- SIMULATION_- INFORMATION #1: If item_instance is used in the context of UoF S7. #2: If item_instance is not used in the context of UoF S7. #3: If item_instance_-relationship is a general_-item_instance_-relationship, or a same_-time_machining_-relationship. #4: If item_instance_-relationship is a replaced_-usage_relationship with a process_operation_input_or_-output as usage_context. #5: For the primary_-language_dependent_string. #6: For any additional_-language_dependent_string. #7: If product_class is used with UoFS4. #8: If product_class is used with UoF S7.	kinematic_property_-definition	106		
description	property_definition	41		kinematic_property_definition <= property_definition property_definition.description

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- simulation_- information to complex_product (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->> product_definition_formation
kinematic_- simulation_- information to design_- discipline_item_- definition (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
kinematic_- simulation_- information to item_definition_- instance_- relationship (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- simulation_- information to item_definition_- relationship (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
kinematic_- simulation_- information to item_instance (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition #1: (characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #2: (characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
kinematic_- simulation_- information to item_instance_- relationship (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition #3: (characterized_product_definition = product_definition_relationship product_definition_relationship) #4: (characterized_product_definition = product_definition_substitute product_definition_substitute)

Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- simulation_- information to product_class (as described_- element)	PATH			#7: (see NOTE 1[b]) #8: (kinematic_property_definition <= property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => product_class)
kinematic_- simulation_- information to product_- specification (as described_- element)	PATH			kinematic_property_definition <= property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => product_specification
kinematic_- simulation_- information to multi_language_- string (as description)	#5: ([property_- definition. description][PATH]) #6: (PATH)		156	kinematic_property_definition <= property_definition #5: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #6: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- simulation_- information to ground_- representation (as ground)	PATH			kinematic_property_definition <= property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => kinematic_property_representation_relation} property_definition_representation.used_representation -> representation => kinematic_ground_representation
kinematic_- simulation_- information to kinematic_- mechanism (as mechanism)	PATH			kinematic_property_definition <- mechanism.containing_property mechanism
KINEMATIC_- STRUCTURE	kinematic_structure	106		
kinematic_- structure to kinematic_joint (as joint)	PATH			kinematic_structure kinematic_structure.joints[i] -> kinematic_joint
KINEMATIC_- TRANSFORMATION_- RESULT	kinematic_analysis_- result	106		{kinematic_analysis_result kinematic_analysis_result.contained_kinematic_results[i] -> (resulting_path) (interpolated_configuration_sequence)}
kinematic_- transformation_- result to kinematic_- mechanism (as is_applied_- to)	PATH			kinematic_analysis_result kinematic_analysis_result.analysed_mechanism -> mechanism

Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
kinematic_- transformation_- result to interpolated_- configuration_- sequence (as result)	PATH			kinematic_analysis_result kinematic_analysis_result.contained_kinematic_results[i] ->kinematic_result kinematic_result = interpolated_configuration_sequence interpolated_configuration_sequence
PAIR_VALUE	pair_value	106		{pair_value => (cylindrical_pair_value) (gear_pair_value) (planar_pair_value) (point_on_planar_curve_pair_value) (point_on_surface_pair_value) (prismatic_pair_value) (rack_and_pinion_pair_value) (revolute_pair_value) (rolling_curve_pair_value) (rolling_surface_pair_value) (screw_pair_value) (sliding_curve_pair_value) (sliding_surface_pair_value) (spherical_pair_value) (unconstrained_pair_value) (universal_pair_value)}
pair_value to kinematic_pair (as is_applied_- to)	PATH			pair_value pair_value.applies_to_pair ->kinematic_pair

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Table 17 – Mapping table kinematics UoF (K1) (continued)

Application element	AIM element	Source	Rules	Reference path
PATH_-APPROXIMATION #1: The general case for path_approximation. #2: If time aspects are considered for path_-approximation.	#1: (parameter_value) #2: (measure_with_-unit)	41 41	30	
SIMPLE_PAIR_-RANGE	simple_pair_range	106		{simple_pair_range => (cylindrical_pair_range {[cylindrical_pair_range.lower_limit_actual_rotation -> rotational_range_measure (rotational_range_measure = plane_angle_measure plane_angle_measure) (rotational_range_measure = unlimited_range unlimited_range)] [cylindrical_pair_range.lower_limit_actual_translation -> translational_range_measure (translational_range_measure = length_measure length_measure) (translational_range_measure = unlimited_range unlimited_range)]}) (gear_pair_range) (planar_curve_pair_range) (planar_pair_range) (point_on_planar_curve_pair_range) (point_on_surface_pair_range) (prismatic_pair_range) (rack_and_pinion_pair_range) (revolute_pair_range) (screw_pair_range) (spherical_pair_range) (surface_pair_range) (universal_pair_range)})

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Table 17 – Mapping table kinematics UoF (K1) (concluded)

Application element	AIM element	Source	Rules	Reference path
simple_pair_- range to kinematic_pair (as is_applied_- to)	PATH			simple_pair_range simple_pair_range.applies_to_pair ->) kinematic_pair
TOOL_ATTACHMENT_- POINT_FRAME	axis2_placement_3d	42		{axis2_placement_3d <= placement <= geometric_representation_item <= representation_item <- {representation_item.name = 'tool attachment point frame'} representation.items[i] representation => kinematic_link_representation}
TOOL_CENTRE_- POINT_FRAME	axis2_placement_3d	42		{axis2_placement_3d <= placement <= geometric_representation_item <= representation_item <- {representation_item.name = 'tool center point frame'} representation.items[i] representation => kinematic_link_representation}
TRANSFORMATION_- TO_REFERENCE_- FRAME #1: If a transformation_- to_reference_frame is used as a relative reference. #2: If the transformation_- to_reference_frame is used as a tool attachment point frame or a tool cetre point frame.	#1: (cartesian_- transformation_- operator_3d) #2: (axis2_placement_- 3d)	42 42		

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The use of this alternative is not applicable.

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Table 18 – Mapping table measured_data UoF (MD1)

Application element	AIM element	Source	Rules	Reference path
POINT_DIRECTION	axis1_placement	42		
vector	axis1_placement.axis	42		
point_direction to cartesian_-point (as location)	PATH			axis1_placement <= placement placement.location -> cartesian_point
POINT_DIRECTION_-MODEL	point_placement_shape_-representation	214		point_placement_shape_representation <= shape_representation
point_direction_-model to point_-direction_-sequence (as point_-direction_-elements)	PATH			point_placement_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => compound_representation_item {compound_representation_item <= representation_item representation_item.name = 'point direction sequence'}
point_direction_-model to point_-sequence (as point_-elements)	PATH			point_placement_shape_representation <= shape_representation <= representation representation.items[i] -> representation_item => compound_representation_item {compound_representation_item <= representation_item representation_item.name = 'point sequence'}
POINT_DIRECTION_-SEQUENCE	compound_-representation_item	43		{compound_representation_item <= representation_item representation_item.name = 'point direction sequence'}
point_direction_-sequence to point_direction (as element)	PATH			compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = list_representation_item list_representation_item list_representation_item[i] -> representation_item =>

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Table 18 – Mapping table measured_data UoF (MD1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				geometric_representation_item => placement => axis1_placement
point_direction_- sequence to point_on_surface (as element)	PATH			compound_representation_item compound_representation_item.item_element ->) compound_item_definition compound_item_definition = list_representation_item list_representation_item list_representation_item[i] ->) representation_item => geometric_representation_item => point => point_on_surface
POINT_SEQUENCE	compound_- representation_item	43		{compound_representation_item <= representation_item representation_item.name = 'point sequence'}
point_sequence to cartesian_- point (as element)	PATH			compound_representation_item compound_representation_item.item_element ->) compound_item_definition compound_item_definition = list_representation_item list_representation_item list_representation_item[i] ->) representation_item => geometric_representation_item => point => cartesian_point

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Table 19 – Mapping table geometric_presentation UoF (P1)

Application element	AIM element	Source	Rules	Reference path
APPEARANCE_-ASSIGNMENT #1: If the hatching is pre-defined. #2: If the hatching is user-defined. #3: If text mirroring is not required. #4: If text mirroring is required. #5: If the tiling is pre-defined. #6: If the tiling is user-defined.	presentation_style_-assignment	46	44	{presentation_style_assignment presentation_style_assignment.styles[i] ->presentation_style_select (presentation_style_select = pre_defined_presentation_style pre_defined_presentation_style) (presentation_style_select = point_style point_style) (presentation_style_select = curve_style curve_style) (presentation_style_select = surface_style_usage surface_style_usage) (presentation_style_select = symbol_style symbol_style) (presentation_style_select = fill_area_style fill_area_style) (presentation_style_select = text_style text_style) (presentation_style_select = approximation_tolerance approximation_tolerance {approximation_tolerance.tolerance ->tolerance_select (tolerance_select = approximation_tolerance_deviation approximation_tolerance_deviation) (tolerance_select = approximation_tolerance_parameter approximation_tolerance_parameter)}) (presentation_style_select = externally_defined_style externally_defined_style) (presentation_style_select = null_style null_style)}
appearance_-assignment to curve_appearance (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->presentation_style_select curve_style

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
appearance_- assignment to hatching (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select = fill_area_style fill_area_style fill_area_style.fill_styles[i] ->> fill_style_select #1: (fill_style_select = fill_area_style_hatching fill_area_style_hatching) #2: (fill_style_select = externally_defined_hatch_style externally_defined_hatch_style)
appearance_- assignment to point_appearance (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select = point_style point_style
appearance_- assignment to solid_fill_area (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select = fill_area_style fill_area_style fill_area_style.fill_styles[i] ->> fill_style_select fill_style_select = fill_area_style_colour fill_area_style_colour
appearance_- assignment to surface_- appearance (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select = surface_style_usage surface_style_usage
appearance_- assignment to text_appearance (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select = text_style text_style => #3: (text_style_with_box_characteristics) #4: ([text_style_with_mirror] [text_style_with_box_characteristics])

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Table 19– Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
appearance_- assignment to tiling (as component)	PATH			presentation_style_assignment presentation_style_assignment.styles[i] ->>> presentation_style_select = fill_area_style fill_area_style fill_area_style.fill_styles[i] ->>> fill_style_select #5: (fill_style_select = fill_area_style_tiles fill_area_style_tiles) #6: (fill_style_select = externally_defined_tile_style externally_defined_tile_style)
CONTEXT_- DEPENDENT_- APPEARANCE_- ASSIGNMENT #1: The general case for the group. #2: If the group is member of a layer. #3: The general case for a view_area. #4: If the view_area is in a single window and in 3D context.	presentation_style_by_- context	46		
context_- dependent_- appearance_- assignment to drawing_sheet (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->>> style_context_select style_context_select = representation representation =>> presentation_representation =>> presentation_area =>> drawing_sheet_revision

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
context_- dependent_- appearance_- assignment to group (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->> style_context_select style_context_select = group #1: (group) #2: (group => rep_item_group)
context_- dependent_- appearance_- assignment to layer (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->> style_context_select style_context_select = presentation_layer_assignment presentation_layer_assignment
context_- dependent_- appearance_- assignment to model_image (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->> style_context_select style_context_select = representation_item representation_item => mapped_item => camera_image
context_- dependent_- appearance_- assignment to view (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->> style_context_select style_context_select = representation representation => presentation_representation => presentation_view
context_- dependent_- appearance_- assignment to view_area (as appearance_- context)	PATH		39	presentation_style_by_context presentation_style_by_context.style_context ->> style_context_select style_context_select = representation representation => presentation_representation => #3: (presentation_area) #4: (presentation_area =>

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				mechanical_design_geometric_presentation_area)
CURVE_APPEARANCE #1: If the colour is user-defined. #2: If the colour is pre-defined. #3: If the font is user-defined. #4: If the font is pre-defined. #5: If the font is externally defined. #6: If the curve_-appearance is independent of the kind of presentation. #7: If the curve_-appearance is dependent on the kind of presentation. #8: If no global unit is available. #9: If a global unit is available.	#6: (curve_style) #7: (curve_style_-rendering)	46 46	16	
colour	curve_style.curve_-colour	46	14,36, 263	{curve_style curve_style.curve_colour -> colour => #1: (colour_specification => colour_rgb) #2: (pre_defined_colour => draughting_pre_defined_colour)}
font	curve_style.curve_font	46	8,264	{curve_style curve_style.curve_font -> curve_font_or_scaled_curve_font_select curve_font_or_scaled_curve_font_select = curve_style_font_select curve_style_font_select}

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#3: (curve_style_font_select = curve_style_font curve_style_font) #4: (curve_style_font_select = pre_defined_curve_font pre_defined_curve_font => draughting_pre_defined_curve_font) #5: (curve_style_font_select = externally_defined_curve_font externally_defined_curve_font)}
width	curve_style.curve_- width	46	30	{curve_style curve_style.curve_width -> size_select #8: (size_select = measure_with_unit measure_with_unit => length_measure_with_unit) #9: (size_select = positive_length_measure positive_length_measure)}
HIDDEN_ELEMENT_- HANDLING #1: If hidden_element_- appearance is not required. #2: If hidden_element_- appearance is required. #3: If the geometry for display is two-dimensional. #4: If the geometry for display is three-dimensional.	#1: (camera_model_d3_- with_hlhsr) #2: ([camera_model_d3_- with_hlhsr] [hidden_element_over_- riding_styled_item])	46 46 214	255	#1: (camera_model_d3_with_hlhsr) #2: ([camera_model_d3_with_hlhsr] [hidden_element_over_riding_styled_item <= context_dependent_over_riding_styled_item])
switch	camera_model_d3_with_- hlhsr.hidden_line_- surface_removal	46		

Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
hidden_element_- handling to appearance_- assignment (as hidden_- element_- appearance)	PATH			hidden_element_over_riding_styled_item <= context_dependent_over_riding_styled_item <= over_riding_styled_item <= styled_item styled_item.styles[i] ->) presentation_style_assignment
hidden_element_- handling to model_image (as is_defined_- for)	PATH			camera_model_d3_with_hlhsr <= camera_model_d3 <= camera_model <= geometric_representation_item <= representation_item <- representation_map.mapping_origin representation_map <- {representation_map => camera_usage} mapped_item.mapping_source mapped_item => camera_image => #3: (camera_image_2d_with_scale) #4: (camera_image_3d_with_scale)

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
MODEL_IMAGE #1: If the geometry for display is two-dimensional. #2: If the geometry for display is three-dimensional. #3: If the styled_model is used with UoF P2. #4: If the styled_model is used without UoF P2. #5: For the primary_-language_dependent_string. #6: For any additional_-language_dependent_string. #7: If no hidden element handling is required. #8: If hidden element handling is required.	#1: (camera_image_2d_-with_scale) #2: (camera_image_3d_-with_scale)	214 517	254	#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image
clipping	#1: (camera_model_d2.view_window) #2: (view_volume.view_-window)	46 46	255	#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item mapped_item.mapping_source ->representation_map {representation_map => camera_usage} representation_map.mapping_origin ->representation_item => geometric_representation_item => camera_model => #1: (camera_model_d2 camera_model_d2.view_window) #2: (camera_model_d3

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				camera_model_d3.perspective_of_volume -> view_volume view_volume.view_window)
name	representation_item. name	43		#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item <= representation_item representation_item.name
scale	#1: (camera_image_2d_- with_scale.scale) #2: (camera_image_3d_- with_scale.scale)	214 517		
view_projection	#1: (see NOTE 1) #2: (view_volume. projection_type)	46 46		#1: ([1]) #2: (camera_image_3d_with_scale <= camera_image <= mapped_item mapped_item.mapping_source -> representation_map {representation_map => camera_usage} representation_map.mapping_origin -> representation_item => geometric_representation_item => camera_model => camera_model_d3 {#7: (camera_model_d3) #8: (camera_model_d3 => camera_model_d3_with_hlhsr)} camera_model_d3.perspective_of_volume -> view_volume view_volume.projection_type)
view_volume_- placement	#1: (planar_box. placement) #2: (camera_model_d3.	46 46		#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=)

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
	view_reference_system)			camera_image <= mapped_item mapped_item.mapping_source ->representation_map {representation_map =>camera_usage} representation_map.mapping_origin ->representation_item =>geometric_representation_item =>camera_model =>#1: (camera_model_d2camera_model_d2.view_window ->planar_box planar_box.placement) #2: (camera_model_d3camera_model_d3.view_reference_system)
model_image to external_model (as is_- displaying)	PATH			#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->representation {representation.context_of_items ->representation_context representation_context.context_type = 'external'}
model_image to styled_model (as is_- displaying)	PATH			#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
model_image to view (as is_presented_- in)	PATH		84	#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item <= representation_item <- representation.items[i] representation => presentation_representation => presentation_view
model_image to multi_language_- string (as name)	#5: ([representation_- item.name] [PATH]) #6: (PATH)	43	135	#1: (camera_image_2d_with_scale <=) #2: (camera_image_3d_with_scale <=) camera_image <= mapped_item #5: (attribute_language_item = mapped_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #6: (multi_language_attribute_item = mapped_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
POINT_APPEARANCE #1: If the colour is user-defined. #2: If the colour is pre-defined.	point_style	46		
colour	point_style.marker_-colour	46	14,36, 263	{point_style point_style.marker_colour -> colour => #1: (colour_specification => colour_rgb) #2: (pre_defined_colour => draughting_pre_defined_colour)}
point_appearance to point_marker_-symbol (as marker)	PATH			point_style point_style.marker -> marker_select marker_select = pre_defined_marker pre_defined_marker => pre_defined_point_marker_symbol
POINT_MARKER_-SYMBOL	pre_defined_point_-marker_symbol	214	60,266	pre_defined_point_marker_symbol <= [pre_defined_marker] [pre_defined_symbol]
STYLED_ELEMENT	styled_item	46	215	
invisible	invisibility	46		styled_item invisible_item = styled_item invisible_item <- invisibility.invisible_items[i] invisibility
styled_element to appearance_-assignment (as appearance)	PATH			styled_item styled_item.styles[i] -> presentation_style_assignment

Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
STYLED_GEOMETRIC_- MODEL #1: If the styled_model is used with UoF P2. #2: If the styled_model is used without UoF P2.	#1: (draughting_- model) #2: (mechanical_- design_geometric_- presentation_- representation)	520 517		#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation
styled_geometric_- model to geometric_model (as styled_- geometry_- context)	PATH			#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation => {representation.context_of_items -> representation_context <- representation_context => geometric_representation_context} shape_representation
STYLED_MODEL #1: If the styled_model is used with UoF P2. #2: If the styled_model is used without UoF P2. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	#1: (draughting_- model) #2: (mechanical_- design_geometric_- presentation_- representation)	520 517		#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation
description	representation. description	43		#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation representation.description
model_id	representation.id	43		#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation representation.id

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
styled_model to template_-instance (as additional_-elements)	PATH			#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation representation.items[i] ->>> representation_item => mapped_item {mapped_item.mapping_source ->> representation_map representation_map.mapped_representation ->> representation => #1: (draughting_model) #2: (mechanical_design_geometric_presentation_representation)}
styled_model to multi_language_-string (as description)	#3: ([representation.description][PATH]) #4: (PATH)	43	158	#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
styled_model to styled_element (as element)	PATH			#1: (draughting_model <=) #2: (mechanical_design_geometric_presentation_representation <=) representation representation.items[i] ->>

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => styled_item
STYLED_MODEL_- ELEMENT #1: If the detailed_model_- element is part of a geometric model. #2: If the detailed_model_- element is a template instance. #3: If the detailed_model_- element is a topological element.	styled_item	46		
styled_model_- element to detailed_model_- element (as element)	PATH			styled_item styled_item.item -> representation_item => #1: (geometric_representation_item) #2: (mapped_item) #3: (topological_representation_item)
STYLED_MODEL_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the styled_model is used with UoF P2. #4: If the styled_model is used without UoF P2.	representation_- relationship	43		
description	representation_- relationship. description	43		
relation_type	representation_- relationship.name	43		

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
styled_model_- relationship to multi_language_- string (as description)	#1: (representation_- relationship. description] [PATH]) #2: (PATH)	43	159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
styled_model_- relationship to styled_model (as related)	PATH			representation_relationship representation_relationship.rep_2 representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
styled_model_- relationship to styled_model (as relating)	PATH			representation_relationship representation_relationship.rep_1 representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
STYLED_MODEL_- VERSION #1: If the styled_model is used with UoF P2. #2: If the styled_model is used without UoF P2.	#1: (draughting_- model) #2: (mechanical_- design_geometric_- presentation_- representation)	214 517		#1: (draughting_model <= identification_item = draughting_model) #2: (mechanical_design_geometric_presentation_representation identification_item = \ mechanical_design_geometric_presentation_representation) identification_item identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_assignment.role -> identification_role identification_role.name = 'version'}
version_id	identification_- assignment.assigned_id	41	201	#1: (draughting_model identification_item = draughting_model) #2: (mechanical_design_geometric_presentation_representation identification_item = \ mechanical_design_geometric_presentation_representation) identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
SURFACE_- APPEARANCE #1: If the surface_- appearance_element is independent of the kind of presentation. #2: If the surface_- appearance_element is used for shaded presentation.	surface_style_usage	517		
side	surface_style_usage. side	517		
surface_- appearance to surface_- appearance_- element (as element)	PATH			surface_style_usage surface_style_usage.style -> surface_side_style_select surface_side_style_select = surface_side_style surface_side_style.styles[i] -> surface_style_element_select #1: ((surface_style_element_select = surface_style_fill_area

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				surface_style_fill_area) (surface_style_element_select = surface_style_boundary surface_style_boundary) (surface_style_element_select = surface_style_parameter_line surface_style_parameter_line)) #2: ((surface_style_element_select = surface_style_control_grid surface_style_control_grid) (surface_style_element_select = surface_style_segmentation_curve surface_style_segmentation_curve) (surface_style_element_select = surface_style_silhouette surface_style_silhouette) (surface_style_element_select = surface_style_rendering surface_style_rendering) (surface_style_element_select = surface_style_rendering surface_style_rendering => surface_style_rendering_with_properties))
SURFACE_- APPEARANCE_- ELEMENT #1: If the surface_- appearance_element is independent of the kind of presentation. #2: If the surface_- appearance_element is used for shaded presentation.	#1: ((surface_style_- boundary) (surface_style_- parameter_line) (surface_style_fill_- area)) #2: ((surface_style_- control_grid) (surface_style_- segmentation_curve) (surface_style_- silhouette) (surface_style_- rendering) (surface_style_- rendering_with_- properties))	46 46 46 46 46 46 46		{#1: ((surface_style_parameter_line surface_style_parameter_line.direction_counts[i] -> direction_count_select (direction_count_select = u_direction_count u_direction_count) (direction_count_select = v_direction_count v_direction_count)) (surface_style_fill_area surface_style_fill_area.fill_area -> fill_area_style fill_area_style.fill_styles[i] -> fill_style_select fill_style_select = fill_area_style_colour fill_area_style_colour)) #2: (surface_style_rendering_with_properties surface_style_rendering_with_properties.properties[i] -> rendering_properties_select (rendering_properties_select = surface_style_reflectance_ambient surface_style_reflectance_ambient) (rendering_properties_select = surface_style_reflectance_ambient

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				surface_style_reflectance_ambient => surface_style_reflectance_ambient_diffuse) (rendering_properties_select = surface_style_reflectance_ambient surface_style_reflectance_ambient => surface_style_reflectance_ambient_diffuse => surface_style_reflectance_ambient_diffuse_specular) (rendering_properties_select = surface_style_transparent surface_style_transparent))}
surface_- appearance_- element to visual_- appearance (as presented_- surface_- condition)	PATH		39	#1: ((surface_style_boundary surface_style_element_select = surface_style_boundary) (surface_style_parameter_line surface_style_element_select = surface_style_parameter_line) (surface_style_fill_area surface_style_element_select = surface_style_fill_area)) #2: ((surface_style_control_grid surface_style_element_select = surface_style_control_grid) (surface_style_segmentation_curve surface_style_element_select = surface_style_segmentation_curve) (surface_style_silhouette surface_style_element_select = surface_style_silhouette) (surface_style_rendering surface_style_element_select = surface_style_rendering) (surface_style_rendering_with_properties <= surface_style_rendering surface_style_element_select = surface_style_rendering)) surface_style_element_select surface_style_element_select <- surface_side_style.styles[i] surface_side_style surface_side_style_select = surface_side_style surface_side_style_select <- surface_style_usage.style surface_style_usage presentation_style_select = surface_style_usage presentation_style_select <-2001

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				presentation_style_assignment.styles[i] presentation_style_assignment => presentation_style_by_context presentation_style_by_context.style_context -> representation => visual_appearance_representation
TERMINATOR_- SYMBOL	pre_defined_terminator_- symbol	214	60,266	pre_defined_terminator_symbol <= pre_defined_symbol
VECTOR_- APPEARANCE	vector_style	214	16	vector_style <= [pre_defined_terminator_symbol <= pre_defined_symbol] [curve_style]
vector_- appearance to terminator_- symbol (as arrow_head_- type)	IDENTICAL MAPPING			
VIEW #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the view_area is in a single window and in 3D context. #4: If the view_area is in a single window and in 3D context.	presentation_view	46		
description	representation. description	43		presentation_view <= presentation_representation <= representation representation.description
id	representation.id	43		presentation_view <= presentation_representation <=

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation representation.id
name	representation.name	43		presentation_view <= presentation_representation <= representation representation.name
view to multi_- language_string (as description)	#1: ([representation. description] [PATH]) #2: (PATH)	43	158	presentation_view <= presentation_representation <= representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
view to drawing_- sheet (as layout)	PATH		70	presentation_view <= presentation_representation <= representation <- representation_map.mapped_representation representation_map <- mapped_item.mapping_source mapped_item <= representation_item <- representation.items[i] representation => presentation_representation => presentation_area => drawing_sheet_revision

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
view to view_- area (as layout)	PATH		70	presentation_view <= presentation_representation <= representation <- representation_map.mapped_representation representation_map <- mapped_item.mapping_source mapped_item <= representation_item <- representation.items[i] representation => presentation_representation => #3: (presentation_area) #4: (presentation_area => mechanical_design_geometric_presentation_area)
view to multi_- language_string (as name)	#1: ([representation. name] [PATH]) #2: (PATH)	43	158	presentation_view <= presentation_representation <= representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
view to transformation_-2d (as view_-placement)	PATH			presentation_view <= presentation_representation <= representation <- representation_map.mapped_representation representation_map {representation_map.mapping_origin -> representation_item => geometric_representation_item => placement => axis2_placement_2d} representation_map <- mapped_item.mapping_source mapped_item {mapped_item <- representation.items[i] representation => presentation_representation => presentation_area (presentation_area) (presentation_area => drawing_sheet_revision)} mapped_item.mapping_target {mapped_item.mapping_target -> representation_item => geometric_representation_item => (placement => axis2_placement_2d) (cartesian_transformation_operator => cartesian_transformation_operator_2d)}
view to cartesian_-coordinate_space_-2d (as view_space)	PATH			presentation_view <= presentation_representation <= representation representation.context_of_items -> representation_context => geometric_representation_context {geometric_representation_context.coordinate_space_dimension = 2}

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
VIEW_AREA #1: The general case for a view_area. #2: If the view_area is in a single window and in 3D context. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: (presentation_-area) #2: (mechanical_-design_geometric_-presentation_area)	46 517		#2: ({mechanical_design_geometric_presentation_area <= presentation_area})
description	representation.description	43		#1: (presentation_area <=) #2: (mechanical_design_geometric_presentation_area <= presentation_area <=) presentation_representation <= representation representation.description
id	representation.id	43		#1: (presentation_area <=) #2: (mechanical_design_geometric_presentation_area <= presentation_area <=) presentation_representation <= representation representation.id
name	representation.name	43		#1: (presentation_area) #2: (mechanical_design_geometric_presentation_area <= presentation_area) presentation_representation <= representation representation.name
revision_id	identification_-assignment.assigned_id	41	29,205	#1: (presentation_area) #2: (mechanical_design_geometric_presentation_area <= presentation_area)

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_item = presentation_area identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->= identification_role identification_role.name = 'version'} identification_assignment.assigned_id
size	presentation_size.size	46		#1: (presentation_area) #2: (mechanical_design_geometric_presentation_area <= presentation_area) presentation_size_assignment_select = presentation_area presentation_size_assignment_select <- presentation_size.unit presentation_size presentation_size.size
view_area to cartesian_- coordinate_space_- 2d (as area_space)	PATH			#1: (presentation_area <=) #2: (mechanical_design_geometric_presentation_area <= presentation_area <=) presentation_representation <= representation representation.context_of_items ->= representation_context => geometric_representation_context {geometric_representation_context.coordinate_space_dimension = 2}
view_area to multi_language_- string (as description)	#3: ([representation. description] [PATH]) #4: (PATH)	43	158	#1: (presentation_area <=) #2: (mechanical_design_geometric_presentation_area <= presentation_area <=) presentation_representation <= representation #3: (attribute_language_item = representation attribute_language_item <-)

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Table 19– Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
view_area to multi_language_- string (as name)	#3: ([representation. name] [PATH]) #4: (PATH)	43	158	#1: (presentation_area <=) #2: (mechanical_design_geometric_presentation_area <= presentation_area <=) presentation_representation <= representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
VIEW_AREA_- ASSIGNMENT #1: If item_instance is not used in the context of UoF S7. #2: If item_instance is used in the context of UoF S7. #3: If no item_version is associated. #4: If an item_version is associated. #5: If product_class is used with UoF S4. #6: If product_class is used with UoF S7. #7: If specification_-category.implicit_-exclusive_condition is FALSE. #8: If specification_-category.implicit_-exclusive_condition is TRUE.	presented_item_-representation	46		
view_area_-assignment to view_area (as associated_-view_area)	PATH			presented_item_representation presented_item_representation.presentation -> presentation_representation_select presentation_representation_select = presentation_representation presentation_representation => presentation_area

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
view_area_- assignment to complex_product (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_formation product_definition_formation
view_area_- assignment to design_- constraint (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_formation product_definition_formation
view_area_- assignment to design_- discipline_item_- definition (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition product_definition
view_area_- assignment to item_definition_- instance_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship

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Table 197 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
view_area_- assignment to item_definition_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship
view_area_- assignment to item_instance (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select #1: (presented_item_select = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #2: (presented_item_select = product_definition product_definition)
view_area_- assignment to item_instance_- relationship (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_definition_relationship product_definition_relationship

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Table 19 – Mapping table geometric_presentation UoF (P1) (continued)

Application element	AIM element	Source	Rules	Reference path
view_area_- assignment to item_version (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = product_definition_formation product_definition_formation
view_area_- assignment to process_- operation_- definition (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = action_method action_method => process_operation
view_area_- assignment to process_- operation_- occurrence (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select presented_item_select = action_relationship action_relationship {action_relationship.name = 'process operation occurrence'}
view_area_- assignment to process_plan (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->> presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->> presented_item_select

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Table 19 – Mapping table geometric_presentation UoF (P1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				presented_item_select = action action => #3: (process_plan) #4: (product_definition_process => product_process_plan)
view_area_- assignment to product_class (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_concept #5: (product_concept) #6: (product_concept => product_class)
view_area_- assignment to specification (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_concept_feature product_concept_feature
view_area_- assignment to specification_- category (as is_- describing)	PATH			presented_item_representation presented_item_representation.item ->) presented_item presented_item => applied_presented_item applied_presented_item.items[i] ->) presented_item_select presented_item_select = product_concept_feature_category #7: (product_concept_feature_category) #8: (product_concept_feature_category => exclusive_product_concept_feature_category)

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 Projection is not available in 2D context

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Table 20 – Mapping table annotated_presentation UoF (P2)

Application element	AIM element	Source	Rules	Reference path
ANNOTATION_CURVE	annotation_curve_-occurrence	46		
annotation_curve_-type	curve_style.name	46	16	annotation_curve_occurrence <= annotation_occurrence <= {annotation_occurrence => draughting_annotation_occurrence} styled_item styled_item.styles[i] ->> presentation_style_assignment presentation_style_assignment.styles[i] ->> presentation_style_select presentation_style_select = curve_style curve_style curve_style.name
ANNOTATION_-ELEMENT	draughting_annotation_-occurrence	46	53,54,56	draughting_annotation_occurrence <= annotation_occurrence
ANNOTATION_-SUBFIGURE	annotation_subfigure_-occurrence	46		annotation_subfigure_occurrence <= annotation_symbol_occurrence
ANNOTATION_-SYMBOL #1: If the symbol is externally defined. #2: If the symbol is user-defined.	annotation_symbol_-occurrence	46		annotation_symbol_occurrence <= annotation_occurrence {annotation_occurrence => draughting_annotation_occurrence}
annotation_-symbol to dimension_symbol (as symbol_-definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->> representation_item representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->> defined_symbol_select defined_symbol_select = pre_defined_symbol

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				pre_defined_symbol => pre_defined_dimension_symbol
annotation_- symbol to general_symbol (as symbol_- definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->* representation_item representation_item => #1: (geometric_representation_item => defined_symbol defined_symbol.definition ->* defined_symbol_select defined_symbol_select = externally_defined_symbol externally_defined_symbol) #2: (mapped_item {mapped_item => annotation_symbol} mapped_item.mapping_source ->* representation_map {representation_map => symbol_representation_map} representation_map.mapped_representation ->* representation => symbol_representation)
annotation_- symbol to geometric_- tolerance_symbol (as symbol_- definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->* representation_item representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->* defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol =>

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				pre_defined_dimension_symbol
annotation_- symbol to point_- marker_symbol (as symbol_- definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->> representation_item representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->> defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol => pre_defined_point_marker_symbol
annotation_- symbol to surface_- condition_symbol (as symbol_- definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->> representation_item representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->> defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol => pre_defined_surface_condition_symbol
annotation_- symbol to terminator_- symbol (as symbol_- definition)	PATH		37	annotation_symbol_occurrence <= annotation_occurrence <= styled_item styled_item.item ->> representation_item representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol => pre_defined_terminator_symbol
AREA_PLACED_- ANNOTATION #1: If the object referenced as 'element' is an annotation_element. #2: If the object referenced as 'element' is a draughting_callout.	#1: (draughting_- annotation_occurrence) #2: (draughting_- elements)	504 506		#1: (draughting_annotation_occurrence <= annotation_occurrence) #2: (draughting_elements <= draughting_callout)
area_placed_- annotation to annotation_- element (as element)	IDENTICAL MAPPING			
area_placed_- annotation to draughting_- callout (as element)	IDENTICAL MAPPING			
area_placed_- annotation to drawing_sheet (as reference_- area)	PATH			#1: (draughting_annotation_occurrence <= annotation_occurrence <= styled_item <=) #2: (draughting_elements <= draughting_callout <= geometric_representation_item <=) representation_item <- representation.items[i] representation => presentation_representation => presentation_area => drawing_sheet_revision

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
area_placed_- annotation to view_area (as reference_- area)	PATH			#1: (draughting_annotation_occurrence <= annotation_occurrence <= styled_item <=) #2: (draughting_elements <= draughting_callout <= geometric_representation_item <=) representation_item <- representation.items[i] representation => presentation_representation => presentation_area
DETAILED_ELEMENT #1: If the detailed_- element is a styled_- element. #2: If the detailed_- element is a draughting_- callout. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	#1: (styled_item) #2: (draughting_- elements)	46 506	259	{draughting_elements <= draughting_callout}
name	representation_item. name	43		#1: (styled_item <=) #2: (draughting_elements <= draughting_callout <= geometric_representation_item <=) representation_item representation_item.name
detailed_element to multi_- language_string (as name)	#3: ([representation_- item.name] [PATH]) #4: (PATH)	43	129	#3: (#1: (styled_item attribute_language_item = styled_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'name'})
				#2: (draughting_elements <=
				draughting_callout <=
				geometric_representation_item
				attribute_language_item = geometric_representation_item
				attribute_language_item <-
				attribute_language_assignment.items[i]
				attribute_language_assignment
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'name'}))
				#4: (#1: (styled_item
				multi_language_attribute_item = styled_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'})
				#2: (draughting_elements <=
				draughting_callout <=
				geometric_representation_item
				multi_language_attribute_item = geometric_representation_item
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'name'}))
DIMENSION_SYMBOL	pre_defined_dimension_-symbol	214	60,266	pre_defined_dimension_symbol <=
				pre_defined_symbol
DRAUGHTING_-CALLOUT	draughting_elements	506	259	draughting_elements <=
				draughting_callout
				{draughting_callout =>

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(datum_feature_callout) (datum_target_callout)}
draughting_- callout to annotation_curve (as contents)	PATH			draughting_elements <= draughting_callout draughting_callout.contents [i] ->>>draughting_callout_element draughting_callout_element = annotation_curve_occurrence annotation_curve_occurrence
draughting_- callout to annotation_- subfigure (as contents)	PATH			draughting_elements <= draughting_callout draughting_callout.contents [i] ->>>draughting_callout_element draughting_callout_element = annotation_symbol_occurrence annotation_symbol_occurrence => annotation_subfigure_occurrence
draughting_- callout to annotation_- symbol (as contents)	PATH			draughting_elements <= draughting_callout draughting_callout.contents [i] ->>>draughting_callout_element draughting_callout_element = annotation_symbol_occurrence annotation_symbol_occurrence
draughting_- callout to text (as contents)	PATH			draughting_elements <= draughting_callout draughting_callout.contents [i] ->>>draughting_callout_element draughting_callout_element = annotation_text_occurrence annotation_text_occurrence
FILL_AREA	annotation_fill_area_- occurrence	46		
reference_point	annotation_fill_area_- occurrence.fill_style_- target	46		
fill_area to annotation_curve (as boundary)	PATH			annotation_fill_area_occurrence <= annotation_occurrence <= styled_item styled_item.item ->>

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => geometric_representation_item => annotation_fill_area annotation_fill_area.boundaries[i] ->> curve <= geometric_representation_item <= representation_item <- styled_item.item styled_item => annotation_occurrence => annotation_curve_occurrence
GENERAL_SYMBOL #1: If the symbol is externally defined. #2: If the symbol is user-defined.	#1: (externally_-defined_symbol) #2: (symbol_-representation)	46 46	26,55	#2: ({(symbol_representation) (symbol_representation => draughting_symbol_representation) (symbol_representation => draughting_symbol_representation => drawing_sheet_layout)})
GEOMETRIC_-TOLERANCE_SYMBOL	pre_defined_-geometrical_tolerance_-symbol	214	60,266	pre_defined_geometrical_tolerance_symbol <= pre_defined_symbol
HATCHING #1: If the hatching is pre-defined. #2: If the hatching is user-defined.	#1: (fill_area_style_-hatching) #2: (externally_-defined_hatch_style)	46 46	27	
LEADER	leader_curve	101		
leader to terminator_-symbol (as terminator)	PATH		37	leader_curve <= annotation_curve_occurrence <- terminator_symbol.annotated_curve terminator_symbol <= {terminator_symbol => leader_terminator} annotation_symbol_occurrence <= annotation_occurrence <= {annotation_occurrence =>

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				draughting_annotation_occurrence} styled_item styled_item.item ->) representation_item => geometric_representation_item => defined_symbol defined_symbol.definition ->) defined_symbol_select defined_symbol_select = pre_defined_symbol pre_defined_symbol => pre_defined_terminator_symbol
POINT_MARKER_- SYMBOL	pre_defined_point_- marker_symbol	214	60,266	pre_defined_point_marker_symbol <= [pre_defined_marker] [pre_defined_symbol]
SOLID_FILL_AREA	fill_area_style_colour	46	27,28	
STYLED_- ANNOTATION_MODEL	draughting_model	520		draughting_model <= representation {representation.items[i] ->) representation_item => (styled_item => annotation_occurrence => draughting_annotation_occurrence) (geometric_representation_item => draughting_callout => draughting_elements)}
styled_- annotation_model to cartesian_- coordinate_space (as is_defined_- in)	PATH			draughting_model <= representation representation.context_of_items ->) representation_context => geometric_representation_context
SURFACE_- CONDITION_SYMBOL	pre_defined_surface_- condition_symbol	214	60,266	pre_defined_surface_condition_symbol <= pre_defined_symbol
TERMINATOR_- SYMBOL	pre_defined_terminator_- symbol	214	60,266	pre_defined_terminator_symbol <= pre_defined_symbol

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
TEXT #1: If the text contains only one text string. #2: If the text contains multiple text strings. #3: If the text is defined in a different representation.	annotation_text_occurrence	504	267,269	{annotation_text_occurrence <= annotation_occurrence <= {annotation_occurrence => draughting_annotation_occurrence} styled_item styled_item.item ->) representation_item => #1: (geometric_representation_item => text_literal {text_literal.font ->) font_select (font_select = pre_defined_text_font pre_defined_text_font => draughting_pre_defined_text_font) (font_select = externally_defined_text_font externally_defined_text_font)) (text_literal) (text_literal => text_literal_with_extent) (text_literal => text_literal_with_delineation => draughting_text_literal_with_delineation) (text_literal => text_literal_with_blanking_box) (text_literal => text_literal_with_associated_curves)) #2: (geometric_representation_item => (composite_text {composite_text.collected_text[i] ->) text_or_character (text_or_character = annotation_text annotation_text) (text_or_character = annotation_text_character annotation_text_character {annotation_text_character <= mapped_item

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation => symbol_representation => character_glyph_symbol}) {text_or_character = defined_character_glyph defined_character_glyph {defined_character_glyph.definition -> defined_glyph_select defined_glyph_select = externally_defined_character_glyph externally_defined_character_glyph}) {text_or_character = text_literal text_literal})} (composite_text => composite_text_with_extent) (composite_text => composite_text_with_blanking_box) (composite_text => composite_text_with_associated_curves)) #3: (mapped_item => {mapped_item.mapping_source -> representation_map representation_map.mapped_representation -> representation => text_string_representation} annotation_text)}
TEXT_APPEARANCE #1: If text mirroring is not required. #2: If text mirroring is required.	#1: (text_style_with_box_characteristics) #2: ([text_style_with_mirror] [text_style_with_box_characteristics])	504 504 504	45,46	

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
TILING #1: If the tiling is pre-defined. #2: If the tiling is user-defined.	#1: (fill_area_style_-tiles) #2: (externally_-defined_tile_style)	504 504	27	
VIEW_AREA_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string. #3: The general case for a view_area. #4: If the view_area is in a single window and in 3D context.	representation_-relationship	43		
description	representation_-relationship.description	43		
relation_type	representation_-relationship.name	43		{(representation_relationship.name) (representation_relationship.name = 'copy') (representation_relationship.name = 'derivation') (representation_relationship.name = 'hierarchy') (representation_relationship.name = 'substitution')}
view_area_-relationship to multi_language_-string (as description)	PATH		159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <-

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
view_area_- relationship to view_area (as related)	PATH			representation_relationship representation_relationship.rep_2 ->> representation => presentation_representation => #3: (presentation_area) #4: (presentation_area => mechanical_design_geometric_presentation_area)
view_area_- relationship to view_area (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->> representation => presentation_representation => #3: (presentation_area) #4: (presentation_area => mechanical_design_geometric_presentation_area)
VIEW_PLACED_- ANNOTATION #1: If the object referenced as 'element' is an annotation_element. #2: If the object referenced as 'element' is a draughting_callout.	#1: (draughting_- annotation_occurrence) #2: (draughting_- elements)	504 506		#1: (draughting_annotation_occurrence <= annotation_occurrence) #2: (draughting_elements <= draughting_callout)
view_placed_- annotation to annotation_- element (as element)	IDENTICAL MAPPING			

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Table 20 – Mapping table annotated_presentation UoF (P2) (continued)

Application element	AIM element	Source	Rules	Reference path
view_placed_- annotation to draughting_- callout (as element)	IDENTICAL MAPPING			
view_placed_- annotation to view (as reference_- view)	PATH			#1: (draughting_annotation_occurrence <= annotation_occurrence <= styled_item <=) #2: (draughting_elements <= draughting_callout <= geometric_representation_item <=) representation_item <- representation.items[i] representation => presentation_representation => presentation_view
VIEW_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation_- relationship	43		
description	representation_- relationship. description	43		
relation_type	representation_- relationship.name	43		{(representation_relationship.name) (representation_relationship.name = 'dependency')}
view_- relationship to multi_language_- string (as description)	#1: ([representation_- relationship. description] [PATH]) #2: (PATH)	43	159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 20 – Mapping table annotated_presentation UoF (P2) (concluded)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'description'})
				#2: (multi_language_attribute_item = representation_relationship
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'description'})
view_- relationship to view (as related)	PATH			representation_relationship representation_relationship.rep_2 ->) representation => presentation_representation => presentation_view
view_- relationship to view (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->) representation => presentation_representation => presentation_view

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Table 21 – Mapping table shaded_presentation UoF (P3)

Application element	AIM element	Source	Rules	Reference path
HIDDEN_ELEMENT_-HANDLING #1: If hidden_element_-appearance is not required. #2: If hidden_element_-appearance is required. #3: If the geometry for display is two-dimensional. #4: If the geometry for display is three-dimensional.	#1: (camera_model_d3_-with_hlhsr) #2: ([camera_model_d3_-with_hlhsr] [hidden_element_over_-riding_styled_item])	46 46 214	255	#1: (camera_model_d3_with_hlhsr) #2: ([camera_model_d3_with_hlhsr] [hidden_element_over_riding_styled_item <= context_dependent_over_riding_styled_item])
switch	camera_model_d3_with_-hlhsr.hidden_line_-surface_removal	46		
hidden_element_-handling to appearance_-assignment (as hidden_-element_-appearance)	PATH			hidden_element_over_riding_styled_item <= context_dependent_over_riding_styled_item <= over_riding_styled_item <= styled_item styled_item.styles[i] -> presentation_style_assignment
hidden_element_-handling to model_image (as is_defined_-for)	PATH			camera_model_d3_with_hlhsr <= camera_model_d3 <= camera_model <= geometric_representation_item <= representation_item <- representation_map.mapping_origin representation_map <- {representation_map => camera_usage} mapped_item.mapping_source mapped_item => camera_image =>

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Table 21 – Mapping table shaded_presentation UoF (P3) (continued)

Application element	AIM element	Source	Rules	Reference path
				#3: (camera_image_2d_with_scale) #4: (camera_image_3d_with_scale)
LIGHT_SOURCE #1: If the colour is user-defined. #2: If the colour is pre-defined. #3: If the geometry for display is two-dimensional. #4: If the geometry for display is three-dimensional.	light source	46		
colour	light_source.light_-colour	46	14,36,264	light_source.light_colour -> colour {colour => #1: (colour_specification => colour_rgb) #2: (pre_defined_colour => draughting_pre_defined_colour)}
light_type	(light_source_ambient) (light_source_-directional) (light_source_spot) (light_source_-positional)	46 46 46 46		light_source => (light_source_ambient) (light_source_directional) (light_source_spot) (light_source_positional)
light_source to model_image (as is_defined_-for)	PATH			light_source <= geometric_representation_item <= representation_item <- representation.items[i] representation {representation => presentation_representation => presentation_view} representation.items[i] ->

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Table 21 – Mapping table shaded_presentation UoF (P3) (concluded)

Application element	AIM element	Source	Rules	Reference path
				representation_item => mapped_item => camera_image => #3: (camera_image_2d_with_scale) #4: (camera_image_3d_with_scale)

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Table 22 – Mapping table item_property UoF (PR1)

Application element	AIM element	Source	Rules	Reference path
CENTRE_OF_MASS	representation	43	85	representation {representation.name = 'centre of mass'}
centre_point	point	42	85	representation {representation.name = 'centre of mass'} representation.items[1] ->) representation_item => {representation_item.name = 'centre point'} geometric_representation_item => point
centre_of_mass to cartesian_-coordinate_space (as is_defined_-in)	PATH			representation representation.context_of_items ->) representation_context => geometric_representation_context

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
CHANGE #1: If the described_- change is a design_- constraint_relationship, a replaced_definition_- relationship, or a replaced_usage_- relationship. #2: If the described_- change is a complex_- product_relationship, or an item_version_- relationship. #3: If the described_- change is a process_plan_- relationship or process_- operation_occurrence_- relationship. #4: If the described_- change is a shape_element_- relationship. #5: If replaced_usage_- relationship.usage_context is a process_operation_- input_or_output. #6: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship or a product_structure_- relationship. #7: For the primary_- language_dependent_string. #8: For any additional_- language_dependent_string.	#1: (product_- definition_- relationship) #2: (product_- definition_formation_- relationship) #3: (action_- relationship) #4: (shape_aspect_- relationship)	41 41 41 41		{#1: (product_definition_relationship product_definition_relationship.name = 'change') #2: (product_definition_formation_relationship product_definition_formation_relationship.name = 'change') #3: (action_relationship action_relationship.name = 'change') #4: (shape_aspect_relationship shape_aspect_relationship.name = 'change')}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
description	#1: (product_-definition_-relationship.description) #2: (product_-definition_formation_-relationship.description) #3: (action_-relationship.description) #4: (shape_aspect_-relationship.description)	41 41 41 41		
change to complex_product_-relationship (as described_-change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation] product_definition_formation_relationship
change to design_-constraint_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
change to item_-version_-relationship (as described_-change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation] product_definition_formation_relationship
change to process_-operation_-occurrence_-relationship (as described_-change)	PATH			action_relationship {action_relationship.name = 'change'} [action_relationship.relating_action -> action <- action_relationship.relating_action] [action_relationship.related_action -> action <- action_relationship.related_action] action_relationship
change to process_plan_-relationship (as described_-change)	PATH			action_relationship {action_relationship.name = 'change'} [action_relationship.relating_action -> action <- action_relationship.relating_action] [action_relationship.related_action -> action <- action_relationship.related_action] action_relationship
change to replaced_-definition_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition_relationship.name = 'definition replacement'}
change to replaced_usage_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} #5: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship {product_definition_relationship.name = 'usage replacement'}) #6: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.related_product_definition product_definition_relationship <- product_definition_substitute.context_relationship] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_substitute.substitute_definition] product_definition_substitute)
change to multi_-language_string (as description)	#1: (#7: ([product_-definition_-relationship.description] [PATH]) #8: (PATH))	41	108,152, 153,165	#7: (#1: (product_definition_relationship attribute_language_item = product_definition_relationship) #2: (product_definition_formation_relationship attribute_language_item = product_definition_formation_relationship) #3: (action_relationship attribute_language_item = action_relationship)
	#2: (#7: ([product_-definition_formation_-relationship.description] [PATH]) #8: (PATH))	41		#4: (shape_aspect_relationship attribute_language_item = shape_aspect_relationship) attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment
	#3: (#7: ([action_-relationship.description] [PATH]) #8: (PATH))	41		{attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #8: (#1: (product_definition_relationship multi_language_attribute_item = product_definition_relationship)
	#4: (#7: ([shape_-	41		#2: (product_definition_formation_relationship

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
	aspect_relationship. description] [PATH]) #8: (PATH))			multi_language_attribute_item = product_definition_formation_relationship) #3: (action_relationship multi_language_attribute_item = action_relationship) #4: (shape_aspect_relationship multi_language_attribute_item = shape_aspect_relationship) multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
COST_PROPERTY	general_property	41		{general_property.name = 'cost property'}
DATA_ENVIRONMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	data_environment	45		
description	data_environment. description	45		
environment_name	data_environment.name	45		
data_environment to multi_- language_string (as description)	#1: ([data_- environment. description] [PATH]) #2: (PATH)	45	117	data_environment #1: (attribute_language_item = data_environment attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = data_environment multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
DURATION_- PROPERTY	general_property	41		{general_property.name = 'duration property'}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
GENERAL_PROPERTY	general_property	41		
property_type	general_property.name	41		{(general_property.name) (general_property.name = 'overall axle distance') (general_property.name = 'positioning') (general_property.name = 'theoretical axle distance') (general_property.name = 'track') (general_property.name = 'theoretical wheelbase') (general_property.name = 'wheel space')}
GENERAL_SHAPE_- DEPENDENT_- PROPERTY	representation	43		
property_type	representation.name	43		{(representation.name) (representation.name = 'surface area') (representation.name = 'volume') (representation.name = 'centroid')}
property_value	representation_item	43		representation representation.items[i] -> representation_item {(representation_item.name) ([representation_item.name = 'surface area'] [representation_item => measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = area_measure area_measure]) ([representation_item.name = 'volume'] [representation_item => measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = volume_measure volume_measure]) ([representation_item.name = 'centroid'] [representation_item => geometric_representation_item => point => cartesian_point])}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_PROPERTY_-ASSOCIATION #1: If item_property_-association.definitional is TRUE. #2: If item_property_-association.definitional is FALSE. #3: If item_property_-association.definitional is not instantiated. #4: If the document_-representation is not a physical_model. #5: If the document_-representation is a physical_model. #6: If product_class is used with UoF S4. #7: If product_class is used with UoF S7. #8: If product_-identification is used with UoF S4. #9: If product_-identification is used with UoF S7. #10: If item_instance is used in the context of UoF S7. #11: If item_instance is not used in the context of UoF S7. #12: If item_instance_-relationship is a general_-item_instance_-	property_definition	41	180	

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #13: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as usage_context.				
definitional	general_property_-association.name	41	101,180	property_definition derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.name {#1: (general_property_association.name = 'definitional') #2: (general_property_association.name = 'non-definitional') #3: (general_property_association.name = '')}
item_property_-association to catalogue_thread (as described_-element)	PATH			property_definition property_definition.definition ->characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => {feature_definition <= characterized_object characterized_object.description = 'thread'} externally_defined_feature_definition

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_property_- association to complex_product (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->> product_definition_formation
item_property_- association to design_- constraint (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->> product_definition_formation
item_property_- association to design_- discipline_item_- definition (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
item_property_- association to document_file (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => document_file

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_property_- association to document_- representation (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition #4: (characterized_product_definition = product_definition product_definition) #5: (characterized_product_definition = physically_modelled_product_definition physically_modelled_product_definition)
item_property_- association to feature_- definition (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition
item_property_- association to general_feature (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => general_feature
item_property_- association to item_definition_- instance_- relationship (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
item_property_- association to item_definition_- relationship (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_property_- association to item_instance (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition #10: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #11: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
item_property_- association to item_instance_- relationship (as described_- element)	PATH(see NOTE 1)			#12: (property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship) #13: (see NOTE 1)[1)]
item_property_- association to item_shape (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = shape_definition shape_definition = product_definition_shape product_definition_shape
item_property_- association to product_class (as described_- element)	PATH(see NOTE 2)			#6: (see NOTE 2)[2)] #7: (property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => product_class)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_property_- association to product_- identification (as described_- element)	PATH(see NOTE 3)			#8: (see NOTE 3)[3)] #9: (property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => product_identification)
item_property_- association to product_- structure_- relationship (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage
item_property_- association to shape_element (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect
item_property_- association to shape_element_- relationship (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship
item_property_- association to thread_feature (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => applied_area
item_property_- association to transition_- feature (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => transition_feature

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
MASS_PROPERTY	general_property	41		{general_property.name = 'mass'}
MATERIAL #1: If the document_-representation is not a physical_model. #2: If the document_-representation is a physical_model. #3: If product_class is used with UoF S4. #4: If product_class is used with UoF S7. #5: If product_-identification is used with UoF S4. #6: If product_-identification is used with UoF S7. #7: If item_instance is used in the context of UoF S7. #8: If item_instance is not used in the context of UoF S7. #9: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #10: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-	material_designation	45		

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
relationship or a product_-structure_relationship as usage_context.				
material_name	material_designation.-name	45		
material to catalogue_thread (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_object characterized_object => {characterized_object.description = 'thread'} feature_definition => externally_defined_feature_definition
material to complex_product (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->product_definition_formation
material to design_-constraint (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->product_definition_formation

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
material to design_-discipline_item_-definition (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
material to document_file (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_object characterized_object => document_file
material to document_-representation (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition #1: (characterized_product_definition = product_definition product_definition) #2: (characterized_product_definition = physically_modelled_product_definition physically_modelled_product_definition)
material to feature_-definition (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition =characterized_object characterized_object => feature_definition
material to general_feature (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_object characterized_object =>

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				feature_definition => general_feature
material to item_-definition_-instance_-relationship (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
material to item_-definition_-relationship (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
material to item_-instance (as described_-element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition #7: (characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #8: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
material to item_-instance_-relationship (as described_-element)	PATH			#9: (material_designation material_designation.definitions[i] -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship) #10: (see NOTE 4)[4)]
material to item_-shape (as described_-element)	PATH			material_designation material_designation.definitions[i] -> characterized_definition characterized_definition = shape_definition shape_definition = product_definition_shape product_definition_shape
material to product_class (as described_-element)	PATH			#3: (see NOTE 5)[5)] #4: (material_designation material_designation.definitions[i] -> characterized_definition characterized_definition = characterized_object characterized_object => product_class)
material to product_-identification (as described_-element)	PATH(see NOTE 6)			#5: (see NOTE 6)[6)] #6: (material_designation material_designation.definitions[i] -> characterized_definition characterized_definition = characterized_object characterized_object => product_identification)
material to product_-structure_-relationship (as described_-element)	PATH			material_designation material_designation.definitions[i] -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
material to shape_element (as described_element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect
material to shape_element_relationship (as described_element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship
material to thread_feature (as described_element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => applied_area
material to transition_feature (as described_element)	PATH			material_designation material_designation.definitions[i] ->characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => transition_feature
MATERIAL_PROPERTY	general_material_property	214		general_material_property <= general_property
property_name	general_property.name	41		general_material_property <= general_property general_property.name

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
MATERIAL_- PROPERTY_- ASSOCIATION #1: If material_property_- association.definitional is instantiatedand TRUE. #2: If material_property_- association.definitional is instantiated and FALSE. #3: If material_property_- association.definitional is not instantiated.	material_designation_- characterization	45		
definitional	material_designation_- characterization.name	45		{#1: (material_designation_characterization.name = 'definitional') #2: (material_designation_characterization.name = 'non-definitional') #3: (material_designation_characterization.name = '')}
material_- property_- association to material_- property_value_- representation (as associated_- property_value)	PATH			material_designation_characterization material_designation_characterization.property ->) characterized_material_property characterized_material_property = material_property_representation material_property_representation <= property_definition_representation property_definition_representation.used_representation ->) representation
material_- property_- association to material (as described_- material)	PATH			material_designation_characterization material_designation_characterization.designation ->) material_designation

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
MATERIAL_- PROPERTY_VALUE_- REPRESENTATION #1: If material_property_- value is referenced by a property_value_association as describing_property_- value. #2: If material_property_- value is not referenced by a property_value_- association as describing_- property_value.	representation	43		
material_- property_value_- representation to material_- property (as definition)	PATH			representation <- property_definition_representation.used_representation property_definition_representation {property_definition_representation => material_property_representation} property_definition_representation.definition -> represented_definition #1: (represented_definition = property_definition property_definition {property_definition => material_property} derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition ->) #2: (represented_definition = general_property) general_property => general_material_property
material_- property_value_- representation to data_- environment (as environment_- condition)	PATH			representation <- property_definition_representation.used_representation property_definition_representation => material_property_representation material_property_representation.dependent_environment -> data_environment

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
MODEL_PROPERTY_- ASSOCIATION #1: If model_property_- association references as described_element an element in the item_- property_select. #2: If model_property_- association references as described_element an element in the process_- property_select which is not process_operation_- resource_assignment. #3: If model_property_- association references as described_element process_- operation_resource_- assignment in the process_- property_select. #4: If the document_- representation is not a physical_model. #5: If the document_- representation is a physical_model. #6: If no item_version is associated. #7: If an item_version is associated. #8: If product_class is used with UoF S4. #9: If product_class is used with UoF S7. #10: If product_- identification is used	#1: (property_- definition) #2: (action_property) #3: (resource_- property)	41 49 49		

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
with UoF S4. #11: If product_-identification is used with UoF S7. #12: If item_instance is used in the context of UoF S7. #13: If item_instance is not used in the context of UoF S7. #14: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #15: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as usage_context.				
model_property_-association to model_property_-value (as associated_-property_value)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_property_representation.representation ->) #3: (resource_property <- resource_property_representation.property resource_property_representation resource_property_representation.representation ->) representation {representation.name = 'model property value'}
model_property_- association to activity (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = action action => executed_action
model_property_- association to activity_method_- assignment (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = action_method action_method <- action_request_solution.method action_request_solution
model_property_- association to catalogue_thread (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => {characterized_object.description = 'thread'} feature_definition => externally_defined_feature_definition
model_property_- association to complex_product (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->) product_definition_formation

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
model_property_- association to design_- constraint (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation ->) product_definition_formation
model_property_- association to design_- discipline_item_- definition (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->) product_definition_context <=) application_context_element application_context_element.name = 'part definition'}
model_property_- association to document_file (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => document_file
model_property_- association to document_- representation (as described_- element)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition #4: (characterized_product_definition = product_definition product_definition) #5: (characterized_product_definition = physically_modelled_product_definition physically_modelled_product_definition)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
model_property_-association to feature_-definition (as described_-element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition
model_property_-association to general_feature (as described_-element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => general_feature
model_property_-association to item_definition_-instance_-relationship (as described_-element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
model_property_-association to item_definition_-relationship (as described_-element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship
model_property_-association to item_instance (as described_-element)	PATH			property_definition property_definition.definition -> characterized_definition #12: (characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context >= application_context_element

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element.name = 'part occurrence'})
				#13: (characterized_definition = characterized_product_definition
				characterized_product_definition
				characterized_product_definition = product_definition_relationship
				product_definition_relationship =>
				product_definition_usage =>
				assembly_component_usage)
model_property_- association to item_instance_- relationship (as described_- element)	PATH			#14: (property_definition
				property_definition.definition ->
				characterized_definition
				characterized_definition = characterized_product_definition
				characterized_product_definition
				characterized_product_definition = product_definition_relationship
				product_definition_relationship)
				#15: (see NOTE 7)[7)]
model_property_- association to item_shape (as described_- element)	PATH			property_definition
				property_definition.definition ->
				characterized_definition
				characterized_definition = shape_definition
				shape_definition = product_definition_shape
				product_definition_shape
model_property_- association to process_- operation_- definition (as described_- element)	PATH			action_property
				action_property.definition ->
				characterized_action_definition
				characterized_action_definition = action_method
				action_method =>
				process_operation
model_property_- association to process_- operation_- occurrence (as described_- element)	PATH			action_property
				action_property.definition ->
				characterized_action_definition
				characterized_action_definition = action_relationship
				action_relationship

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
model_property_- association to process_- operation_- resource_- assignment (as described_- element)	PATH			resource_property resource_property.resource ->> characterized_resource_definition characterized_resource_definition = action_resource_requirement action_resource_requirement => requirement_for_action_resource
model_property_- association to process_plan (as described_- element)	PATH			action_property action_property.definition ->> characterized_action_definition #6: (characterized_action_definition = process_plan process_plan) #7: (characterized_action_definition = product_process_plan product_process_plan)
model_property_- association to product_class (as described_- element)	PATH			#8: (see NOTE 8)[8)] #9: (property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => product_class)
model_property_- association to product_- identification (as described_- element)	PATH(see NOTE 9)			#10: (see NOTE 9)[9)] #11: (property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_object characterized_object => product_identification)
model_property_- association to product_- structure_- relationship (as described_- element)	PATH			property_definition property_definition.definition ->> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
model_property_- association to shape_element (as described_- element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect
model_property_- association to shape_element_- relationship (as described_- element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship
model_property_- association to thread_feature (as described_- element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => applied_area
model_property_- association to transition_- feature (as described_- element)	PATH			property_definition property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect => transition_feature
model_property_- association to organization (as validity_- context)	PATH			#1: (property_definition organization_item = property_definition) #2: (action_property organization_item = action_property) #3: (resource_property organization_item = resource_property) organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role -> organization_role organization_role.name = 'validity context'} organization_assignment.assigned_organization -> organization

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
MODEL_PROPERTY_- VALUE #1: If model_property_- value is referenced by a model_property_association that references as described_element an item in the item_property_- select. #2: If model_property_- value is referenced by a model_property_association which references as described_element an item in the process_property_- select which is not of type process_operation_- resource_assignment. #3: If model_property_- value is referenced by a model_property_association which references as described_element process_- operation_resource_- assignment in the process_- property_select. #4: If model_property_- value is not referenced by a model_property_- association. #5: If used without UoF P2. #6: If used with UoF P2.	representation	43		{representation representation.name = 'model property value'}

Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
model_property_- value to general_- property (as definition)	PATH			representation <- {representation.name = 'model property value'} #1: (property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition ->) general_property) #2: (action_property_representation.representation action_property_representation action_property_representation.property ->) action_property derived_property_select = action_property derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition ->) general_property) #3: (resource_property_representation.representation resource_property_representation resource_property_representation.property ->) resource_property derived_property_select = resource_property derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition ->) general_property) #4: (property_definition_representation.used_representation property_definition_representation)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition -> represented_definition represented_definition = general_property general_property)
model_property_- value to external_model (as describing_- model)	IDENTICAL MAPPING			{representation.context_of_items -> representation_context representation_context.context_type = 'external'}
model_property_- value to geometric_model (as describing_- model)	IDENTICAL MAPPING			{representation => shape_representation}
model_property_- value to styled_- model (as describing_- model)	IDENTICAL MAPPING			{representation => #5: (draughting_model) #6: (mechanical_design_geometric_presentation_representation)}
MOMENTS_OF_- INERTIA	moments_of_inertia_- representation	214		moments_of_inertia_representation <= representation
moments_of_- inertia to numerical_value (as inertia_- value)	PATH(see NOTES 10, 11, 12, 13)			moments_of_inertia_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'moments of inertia matrix'} compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = list_representation_item list_representation_item [10)] [list_representation_item[1] -> representation_item representation_item => compound_representation_item compound_representation_item.item_element ->

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				compound_item_definition compound_item_definition = list_representation_item list_representation_item [11] [list_representation_item[1] ->] representation_item =>] [list_representation_item[2] ->] representation_item =>] [list_representation_item[3] ->] representation_item =>] measure_representation_item] [list_representation_item[2] ->] representation_item => compound_representation_item compound_representation_item.item_element ->] compound_item_definition compound_item_definition = list_representation_item list_representation_item [12] [list_representation_item[1] ->] representation_item =>] [list_representation_item[2] ->] representation_item =>] [list_representation_item[3] ->] representation_item =>] measure_representation_item] [list_representation_item[3] ->] representation_item => compound_representation_item compound_representation_item.item_element ->] compound_item_definition compound_item_definition = list_representation_item list_representation_item [13] [list_representation_item[1] ->] representation_item =>] [list_representation_item[2] ->] representation_item =>]

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				[list_representation_item[3] -> representation_item =>] measure_representation_item]
moments_of_- inertia to cartesian_- coordinate_space (as is_defined_- in)	PATH			moments_of_inertia_representation <= representation representation.context_of_items -> representation_context => geometric_representation_context
moments_of_- inertia to axis_- placement (as reference_- axis_placement)	PATH			moments_of_inertia_representation <= representation representation.items[i] -> representation_item => {representation_item.name = 'reference axis placement'} geometric_representation_item => placement
PROCESS_PROPERTY_- ASSOCIATION #1: If process_property_- association references an element in the process_- property_select which is not process_operation_- resource_assignment. #2: If process_property_- association references process_operation_resource_- assignment in the process_- property_select. #3: If no item_version is associated. #4: If an item_version is associated.	#1: (action_property) #2: (resource_- property)	49 49		

Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
process_property_- association to activity (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = executed_action executed_action
process_property_- association to activity_method_- assignment (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = action_method action_method <- action_request_solution.method action_request_solution
process_property_- association to process_- operation_- definition (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = action_method action_method => process_operation
process_property_- association to process_- operation_- occurrence (as described_- element)	PATH			action_property action_property.definition ->) characterized_action_definition characterized_action_definition = action_relationship action_relationship
process_property_- association to process_- operation_- resource_- assignment (as described_- element)	PATH			resource_property resource_property.resource ->) characterized_resource_definition characterized_resource_definition = action_resource_requirement action_resource_requirement => requirement_for_action_resource

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
process_property_- association to process_plan (as described_- element)	PATH			action_property action_property.definition ->> characterized_action_definition characterized_action_definition = action action => #3: (process_plan) #4: (product_definition_process => product_process_plan)
PROPERTY #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the unit has a commonly used descriptor. #4: If the unit descriptor is constructed of more than one unit name.	general_property	41		
description	general_property. description	41		
id	general_property.id	41		
version_id	identification_- assignment.assigned_id	41		general_property identification_item = general_property identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
property to unit (as allowed_- unit)	PATH			general_property represented_definition = general_property represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'allowed units'} representation.context_of_items -> representation_context => global_unit_assigned_context global_unit_assigned_context.units[i] -> unit #3: (unit = named_unit named_unit) #4: (unit = derived_unit derived_unit)
property to multi_language_- string (as description)	#1: ([general_- property.description] [PATH]) #2: (PATH)	41	127	general_property #1: (attribute_language_item = general_property attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = general_property multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
property to external_library_- reference (as property_- source)	IDENTICAL MAPPING			{general_property => externally_defined_general_property}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
property to plib_-property_-reference (as property_-source)	IDENTICAL MAPPING			{general_property => externally_defined_general_property}
PROPERTY_CHANGE #1: If the associated change (property_change.is_-describing) describes an item_version_relationship, a design_constraint_-relationship, a complex_-product_relationship, or a replaced_definition_-relationship. #2: If the associated change (property_change.is_-describing) describes a shape_element_relationship. #3: If the associated change (property_change.is_-describing) describes a process_plan_relationship, or a process_operation_-relationship. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string.	#1: (property_-definition_-relationship) #2: (shape_aspect_-relationship) #3: (action_property)	45 41 49		#1: ({property_definition_relationship property_definition_relationship.name = 'property change'}) #2: ({shape_aspect_relationship shape_aspect_relationship.name = 'property change'}) #3: ({action_property action_property.name = 'property change'})
description	#1: (property_-definition_-relationship.description) #2: (shape_aspect_-relationship.description) #3: (action_property.description)	45 41 49		

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
id	identification_- assignment.assigned_id	41	29	#1: (property_definition_relationship identification_item = property_definition_relationship) #2: (shape_aspect_relationship identification_item = shape_aspect_relationship) #3: (action_property identification_item = action_property) identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'property change id context'} identification_assignment.assigned_id
property_change to property_- value_- representation (as added_- property)	PATH			#1: (property_definition_relationship {property_definition_relationship.name = 'property change'} represented_definition = property_definition_relationship represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'added property'} property_definition_representation.used_representation -> representation) #2: (shape_aspect_relationship {shape_aspect_relationship.name = 'property change'} represented_definition = shape_aspect_relationship represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'added property'} property_definition_representation.used_representation -> representation) #3: (action_property <- {action_property.name = 'property change'} action_property_representation.property action_property_representation)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{action_property_representation.name = 'added property'} action_property_representation.representation ->representation)
property_change to property_-value_-representation (as deleted_-property)	PATH			#1: (property_definition_relationship {property_definition_relationship.name = 'property change'} represented_definition = property_definition_relationship represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'deleted property'} property_definition_representation.used_representation ->representation) #2: (shape_aspect_relationship {shape_aspect_relationship.name = 'property change'} represented_definition = shape_aspect_relationship represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'deleted property'} property_definition_representation.used_representation ->representation) #3: (action_property <- {action_property.name = 'property change'} action_property_representation.property action_property_representation {action_property_representation.name = 'deleted property'} action_property_representation.representation ->representation)
property_change to multi_-language_string (as description)	#4: (#1: ([property_-definition_-relationship.description][PATH]) #2: ([shape_aspect_-relationship.description]	45 41	157,107,165	#4: (#1: (property_definition_relationship attribute_language_item = property_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'})

Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
	[PATH]) #3: ([action_property. description] [PATH]) #5: (PATH)	49		#2: (shape_aspect_relationship attribute_language_item = shape_aspect_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #3: (action_property attribute_language_item = action_property attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'})) #5: (#1: (property_definition_relationship multi_language_attribute_item = property_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}) #2: (shape_aspect_relationship multi_language_attribute_item = shape_aspect_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}) #3: (action_property multi_language_attribute_item = action_property multi_language_attribute_item <- multi_language_attribute_assignment.items[i]

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
property_change to change (as is_- describing)	#1,3: (PATH) #2: (IDENTICAL MAPPING)			#1: (property_definition_relationship [property_definition_relationship.relating_property_definition ->property_definition property_definition.definition ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition <- product_definition_relationship.relating_product_definition] [property_definition_relationship.related_property_definition ->property_definition property_definition.definition ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship) #3: (action_property {action_property.name = 'property change'} action_property.definition ->characterized_action_definition characterized_action_definition = action_relationship action_relationship)
PROPERTY_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	general_property_- relationship	41		

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Table22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIMelement	Source	Rules	Reference path
description	general_property_- relationship. description	41		
relation_type	general_property_- relationship.name	41		{(general_property_relationship.name) (general_property_relationship.name = 'dependency') (general_property_relationship.name = 'hierarchy')}
property_- relationship to multi_language_- string (as description)	#1: ([general_- property_relationship. description] [PATH]) #2: (PATH)	41	128	general_property_relationship #1: (attribute_language_item = general_property_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = general_property_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
property_- relationship to property (as related)	PATH			general_property_relationship general_property_relationship.related_property ->) general_property
property_- relationship to property (as relating)	PATH			general_property_relationship general_property_relationship.relating_property ->) general_property

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
PROPERTY_VALUE_-ASSOCIATION #1: If property_value_-association is of type item_property_association. #2: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #3: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string. #6: If product_class is used without UoF S7. #7: If product_class is used with UoF S7. #8: If product_-identification is used with UoF S4. #9: If product_-identification is used with UoF S7.	#1: (property_-definition) #2: (action_property) #3: (resource_-property)	41 49 49		

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
description	#1: (property_-definition.description) #2: (action_property.description) #3: (resource_-property.description)	41 49 49		
property_value_-association to property_value_-representation (as describing_-property_value)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation action_property_representation.representation ->) #3: (resource_property <- resource_property_representation.property resource_property_representation resource_property_representation.representation ->) representation
property_value_-association to multi_language_-string (as description)	#1: (#4: ([property_-definition.description] [PATH]) #5: (PATH)) #2: (#4: ([action_-property.description] [PATH]) #5: (PATH)) #3: (#4: ([resource_-property.description] [PATH]) #5: (PATH))	41 49 49	107,156, 161	#1: (property_definition #4: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #5: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'}))
				#2: (action_property
				#4: (attribute_language_item = action_property
				attribute_language_item <-
				attribute_language_assignment.items[i]
				attribute_language_assignment
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'description'})
				#5: (multi_language_attribute_item = action_property
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'description'}))
				#3: (resource_property
				#4: (attribute_language_item = resource_property
				attribute_language_item <-
				attribute_language_assignment.items[i]
				attribute_language_assignment
				{attribute_language_assignment <=
				attribute_classification_assignment
				attribute_classification_assignment.attribute_name = 'description'})
				#5: (multi_language_attribute_item = resource_property
				multi_language_attribute_item <-
				multi_language_attribute_assignment.items[i]
				multi_language_attribute_assignment
				{multi_language_attribute_assignment <=
				attribute_value_assignment
				attribute_value_assignment.attribute_name = 'description'}))

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
property_value_- association to organization (as validity_- context)	PATH			#1: (property_definition organization_item = property_definition) #2: (action_property organization_item = action_property) #3: (resource_property organization_item = resource_property) organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'validity context'} organization_assignment.assigned_organization ->> organization
property_value_- association to product_class (as validity_- context)	PATH			#6: (see NOTE 14)[14)] #7: (property_definition <- property_definition_relationship.related_property_definition property_definition_relationship {property_definition_relationship.name = 'validity context'} property_definition_relationship.relating_property_definition ->> property_definition property_definition.definition characterized_definition characterized_definition = characterized_object characterized_object <= product_class)
property_value_- association to product_- identification (as validity_- context)	PATH			#8: (see NOTE 15)[15)] #9: (property_definition <- property_definition_relationship.related_property_definition property_definition_relationship {property_definition_relationship.name = 'validity context'} property_definition_relationship.relating_property_definition ->> property_definition property_definition.definition

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
PROPERTY_VALUE_- REPRESENTATION #1: If property_value_- representation is referenced by a property_- value_association of type item_property_association or by a classification_- attribute. #2: If property_value_- representation is referenced by a property_- value_association which is of type process_property_- association and which does not contain process_- operation_resource_- assignment in the referenced process_- property_select. #3: If property_value_- representation is referenced by a property_- value_association which is of type process_property_- association and which contains process_operation_- resource_assignment in the referenced process_- property_select. #4: If property_value_- representation is not referenced by a property_- value_association as describing_property_value. #5: If the unit has a	representation	43		

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
commonly used descriptor. #6: If the unit descriptor is constructed of more than one unit name. #7: For the primary_-language_dependent_string. #8: For any additional_-language_dependent_string. #9: If the specified_-value is a numerical_value or a value_limit and the unit is not assigned globally. #10: If the specified_-value is a value_range. #11: If the specified_-value is a string_value. #12: If no significant_-digits are given for specified_value. #13: If significant_-digits are given for specified_value. #14: If the specified_-value is a numerical_value or a value_limit and the unit is specified globally. #15: If the specified_-value is a value_list.				
qualifier	type_qualifier.name	45	49	representation representation.items[i]->representation_item => {representation_item.name = 'qualifier'}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name = 'nominal') (type_qualifier.name = 'specified') (type_qualifier.name = 'typical')}
value_- determination	type_qualifier.name	45	49	representation representation.items[i] ->representation_item => {representation_item.name = 'value interpretation'} qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name = 'calculated') (type_qualifier.name = 'designed') (type_qualifier.name = 'estimated') (type_qualifier.name = 'measured') (type_qualifier.name = 'required') (type_qualifier.name = 'set point')}
property_value_- representation to property (as definition)	PATH			representation <- #1: (property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->represented_definition represented_definition = property_definition property_definition derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				general_property_association general_property_association.base_definition -> general_property) #2: (action_property_representation.representation action_property_representation action_property_representation.property -> action_property derived_property_select = action_property derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition -> general_property) #3: (resource_property_representation.representation resource_property_representation resource_property_representation.property -> resource_property derived_property_select = resource_property derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition -> general_property) #4: (property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = general_property general_property)
property_value_- representation to unit (as global_unit)	PATH			representation representation.context_of_items -> representation_context => global_unit_assigned_context global_unit_assigned_context.units[i] -> unit #5: (unit = named_unit

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				named_unit) #6: (unit = derived_unit derived_unit)
property_value_- representation to property_- value (as specified_- value)	PATH			representation representation.items[i] ->> representation_item => #11: (descriptive_representation_item {descriptive_representation_item <= representation_item => qualified_representation_item qualified_representation_item.qualifiers[1] ->> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name type_qualifier.name = 'string'}) #9: (#12: (measure_representation_item) #13: ([measure_representation_item] [qualified_representation_item])) #10: (#12: (compound_representation_item => value_range) #13: ([compound_representation_item => value_range] [qualified_representation_item])) #14: (#12: (value_representation_item) #13: ([value_representation_item] [qualified_representation_item])) #15: (compound_representation_item)

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
PROPERTY_VALUE_- REPRESENTATION_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	representation_- relationship	43		
description	representation_- relationship. description	43		
relation_type	representation_- relationship.name	43		
property_value_- representation_- relationship to multi_language_- string (as description)	#1: ([representation_- relationship. description] [PATH]) #2: (PATH)	43	159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
property_value_- representation_- relationship to property_value_- representation (as related)	PATH			representation_relationship representation_relationship.rep_2 -> representation

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
property_value_-representation_-relationship to property_value_-representation (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->representation
QUALITY_PROPERTY	general_property	41		{general_property.name = 'quality property'}
RECYCLABILITY_-PROPERTY	general_property	41		{general_property.name = 'recyclability property'}
SHAPE_DEPENDENT_-PROPERTY #1: If used as a shape dependent property of product data. #2: For any other usages. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	representation	43		
description	representation.description	43		
value_-determination	type_qualifier.name	45	49	representation representation.items[i] ->representation_item =>qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name) (type_qualifier.name = 'required') (type_qualifier.name = 'designed') (type_qualifier.name = 'calculated') (type_qualifier.name = 'measured')}

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Table 22 – Mapping table item_property UoF (PR1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(type_qualifier.name = 'estimated')}
shape_dependent_- property to item_- shape (as described_- element)	PATH			representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition {#1: (property_definition.name = 'shape dependent property') #2: (property_definition.name)} property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = product_definition_shape product_definition_shape
shape_dependent_- property to shape_element (as described_- element)	PATH			representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition {#1: (property_definition.name = 'shape dependent property') #2: (property_definition.name)} property_definition.definition -> characterized_definition characterized_definition = shape_definition shape_definition = shape_aspect shape_aspect
shape_dependent_- property to multi_language_- string (as description)	#3: ([representation. description] [PATH]) #4: (PATH)	43	158	representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 22 – Mapping table item_property UoF (PR1) (concluded)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
shape_dependent_- property to cartesian_- coordinate_space (as is_defined_- in)	PATH			representation representation.context_of_items ->> representation_context => geometric_representation_context

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The use of this alternative is not applicable.

2 The use of this alternative is not applicable.

3 The use of this alternative is not applicable.

4 The use of this alternative is not applicable.

5 The use of this alternative is not applicable.

6 The use of this alternative is not applicable.

7 The use of this alternative is not applicable.

8 The use of this alternative is not applicable.

9 The use of this alternative is not applicable.

10 The list_representation_item specifies the three rows of the moments_of_inertia_matrix.

11 The list_representation_item specifies the moments of inertia values for the first row of the moments_of_inertia_matrix.

12 The list_representation_item specifies the moments of inertia values for the second row of the moments_of_inertia_matrix.

13 The list_representation_item specifies the moments of inertia values for the third row of the moments_of_inertia_matrix.

14 The use of this mapping alternative is not applicable.

15 The use of this alternative is not applicable.

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Table 23 – Mapping table product_management_data UoF (S1)

Application element	AIM element	Source	Rules	Reference path
ALIAS_- IDENTIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If item_instance is used in the context of UoF S7. #4: If item_instance is not used in the context of UoF S7. #5: If the styled_model is used with UoF P2. #6: If the styled_model is used without UoF P2. #7: If the design_- discipline_item_definition is not specifed as a resource_definition by a process_operation_resource_- assignment. #8: If the design_- discipline_item_definition is specifed as a resource_- definition by a process_- operation_resource_- assignment. #9: If the document_- representation is not a physical_model. #10: If the document_- representation is a physical_model. #11: If specification_- category.implicit_-	applied_identification_- assignment	214		applied_identification_assignment <= identification_assignment {identification_assignment identification_assignment.role -> identification_role identification_role.name = 'alias'}

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
exclusive_condition is FALSE. #12: If specification_-category.implicit_-exclusive_condition is TRUE. #13: If product_class is used with UoF S4. #14: If product_class is used with UoF S7.				
alias_id	identification_-assignment.assigned_id	41		applied_identification_assignment <= identification_assignment identification_assignment.assigned_id
alias_version_id	identification_-assignment.assigned_id	41	29,197	applied_identification_assignment identification_item = applied_identification_assignment identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
description	identification_role. description	41	29	applied_identification_assignment <= identification_assignment identification_assignment.role -> identification_role identification_role.description
alias_- identification to organization (as alias_scope)	PATH			applied_identification_assignment organization_item = applied_identification_assignment organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				organization_role organization_role.name = 'alias scope'} organization_assignment.assigned_organization -> organization
alias_- identification to multi_- language_string (as description)	#1: ([identification_- role.description] [PATH]) #2: (PATH)	41	133	identification_role #1: (attribute_language_item = identification_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = identification_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
alias_- identification to approval_- status (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] -> identification_item identification_item = approval_status approval_status
alias_- identification to classification_- attribute (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] -> identification_item identification_item = property_definition property_definition

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
alias_identification to classification_system (as is_applied_to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = class_system class_system
alias_identification to complex_product (as is_applied_to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product_definition_formation product_definition_formation
alias_identification to design_discipline_item_definition (as is_applied_to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product_definition #7: (product_definition) #8: (product_definition => product_definition_resource)
alias_identification to document (as is_applied_to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
alias_- identification to document_- representation (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item #9: (identification_item = product_definition product_definition) #10: (identification_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
alias_- identification to document_type_- property (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = document_type document_type
alias_- identification to document_- version (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product_definition_formation product_definition_formation {product_definition_formation product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <=product_category product_category.name = 'document'}
alias_- identification to general_- classification (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = class class

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
alias_- identification to geometric_- model (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = shape_representation shape_representation
alias_- identification to item (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product product
alias_- identification to item_instance (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item #3: (identification_item = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #4: (identification_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
alias_- identification to item_version (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product_definition_formation product_definition_formation
alias_- identification to organization (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = organization organization

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
alias_- identification to physical_- instance (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->> identification_item identification_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
alias_- identification to product_class (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->> identification_item identification_item = product_concept #13: (product_concept) #14: (product_concept => product_class)
alias_- identification to property (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->> identification_item identification_item = general_property general_property
alias_- identification to security_- level (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->> identification_item identification_item = security_classification_level security_classification_level
alias_- identification to specification (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->> identification_item identification_item = product_concept_feature product_concept_feature

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
alias_- identification to specification_- category (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item identification_item = product_concept_feature_category #11: (product_concept_feature_category) #12: (product_concept_feature_category => exclusive_product_concept_feature_category)
alias_- identification to styled_model (as is_applied_- to)	PATH			applied_identification_assignment applied_identification_assignment.items[i] ->identification_item #5: (identification_item = draughting_model draughting_model) #6: (identification_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
APPLICATION_- CONTEXT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- context	41		
application_- domain	application_context. application	41		product_definition_context <= application_context_element application_context_element.frame_of_reference ->application_context application_context.application {(application_context.application) (application_context.application = 'assembly study') (application_context.application = 'digital mock-up') (application_context.application = 'electrical design') (application_context.application = 'mechanical design') (application_context.application = 'preliminary design') (application_context.application = 'process planning')}
description	application_context. description	41		product_definition_context <= application_context_element

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element.frame_of_reference -> application_context application_context.description
life_cycle_stage	product_definition_- context.life_cycle_- stage	41		{(product_definition_context.life_cycle_stage) (product_definition_context.life_cycle_stage = 'design') (product_definition_context.life_cycle_stage = 'manufacturing') (product_definition_context.life_cycle_stage = 'recycling')}
application_- context to multi_- language_string (as description)	#1: ([application_- context.description] [PATH]) #2: (PATH)	41		product_definition_context <= application_context_element application_context_element.frame_of_reference -> application_context #1: (attribute_language_item = application_context attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = application_context multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
APPROVAL #1: If only a certain day is known. #2: If a certain day and the time of day is known. #3: If item_instance is used in the context of UoF S7. #4: If item_instance is not used in the context of UoF S7. #5: If property_value_-association is of type item_property_association. #6: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #7: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #8: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a	approval	41	11	{approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
process_operation_input_or_-output as usage_context. #9: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as usage_context. #10: If the styled_model is used with UoF P2. #11: If the styled_model is used without UoF P2. #12: If no item_version is associated. #13: If an item_version is associated. #14: If used for a person as member of an organization. #15: If used for an organization. #16: If product_class is used with UoF S4. #17: If product_class is used with UoF S7. #18: If specification_-category.implicit_-exclusive_condition is FALSE. #19: If specification_-category.implicit_-exclusive_condition is TRUE. #20: If the document_-representation is not a				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_model. #21: If the document_- representation is a physical_model.				
level	approval.level	41		{(approval.level) (approval.level = 'disposition') (approval.level = 'equipment order') (approval.level = 'planning')}
approval to date_- time (as actual_date)	PATH			approval <- approval_date_time.dated_approval approval_date_time {approval_date_time.role -> object_role object_role.name = 'actual'} approval_date_time.date_time -> date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time)
approval to activity (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = executed_action executed_action
approval to activity_element (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				approval_item = applied_action_assignment applied_action_assignment {applied_action_assignment <= action_assignment action_assignment.role ->> object_role object_role.name = 'activity element'}
approval to activity_method_-assignment (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = action_request_solution action_request_solution
approval to alternate_item_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = alternate_product_relationship alternate_product_relationship
approval to assembly_-substitute_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = assembly_component_usage_substitute assembly_component_usage_substitute
approval to certification (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				approval_item approval_item = certification certification
approval to class_category_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_concept_feature_category_usage product_concept_feature_category_usage
approval to class_condition_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_concept_feature_association product_concept_feature_association
approval to class_inclusion_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_concept_feature_association product_concept_feature_association
approval to class_-specification_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_concept_feature_association product_concept_feature_association

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to class_structure_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = configuration_design configuration_design
approval to classification_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = applied_classification_assignment applied_classification_assignment <= classification_assignment
approval to classification_-system (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = class_system class_system
approval to complex_product (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_definition_formation product_definition_formation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to configuration (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = configured_effectivity_assignment configured_effectivity_assignment
approval to contract (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = contract contract
approval to design_-constraint (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition_formation product_definition_formation
approval to design_-discipline_item_-definition (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition product_definition {product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element.name = 'part definition'}
approval to document (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
approval to document_file (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = document_file document_file
approval to document_- representation (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item #20: (approval_item = product_definition product_definition) #21: (approval_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to document_version (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition_formation product_definition_formation {product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
approval to drawing (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = drawing_revision drawing_revision
approval to drawing_sheet (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = presentation_area presentation_area => drawing_sheet_revision

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Table 23–Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to general_-classification (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = class class
approval to geometric_model (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = shape_representation shape_representation
approval to item_-definition_-instance_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_definition_relationship product_definition_relationship
approval to item_-definition_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->> approval_item approval_item = product_definition_relationship product_definition_relationship

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to item_-instance (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item #3: (approval_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #4: (approval_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
approval to item_-instance_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item #8: (approval_item = product_definition_relationship product_definition_relationship) #9: (approval_item = product_definition_substitute product_definition_substitute)
approval to item_-version (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition_formation product_definition_formation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to kinematic_-simulation_-information (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = property_definition property_definition => kinematic_property_definition
approval to manufacturing_-configuration (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = configuration_effectivity configuration_effectivity
approval to material (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = material_designation material_designation
approval to physical_-assembly_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition_relationship product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to physical_-instance (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
approval to physical_-instance_test_-result (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = property_definition property_definition
approval to process_plan (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = action action => #12: (process_plan) #13: (product_definition_process => product_process_plan)
approval to product_class (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				approval_item approval_item = product_concept #16: (product_concept) #17: (product_concept => product_class)
approval to product_-structure_-relationship (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_definition_relationship product_definition_relationship => product_definition_usage
approval to project (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = organizational_project organizational_project
approval to property (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = general_property general_property
approval to property_value_-association (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#5: (approval_item = property_definition property_definition) #6: (approval_item = action_property action_property) #7: (approval_item = resource_property resource_property)
approval to specification (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_concept_feature product_concept_feature
approval to specification_- category (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_concept_feature_category #18: (product_concept_feature_category) #19: (product_concept_feature_category => exclusive_product_concept_feature_category)
approval to specification_- expression (as is_applied_- to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_concept_feature product_concept_feature => conditional_concept_feature

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to specification_-inclusion (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
approval to styled_model (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item #10: (approval_item = draughting_model draughting_model) #11: (approval_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
approval to view_-area (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = presentation_area presentation_area
approval to work_-order (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = action_directive

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_directive
approval to work_-request (as is_applied_-to)	PATH			approval <- approval_assignment.assigned_approval approval_assignment => applied_approval_assignment applied_approval_assignment.items[i] -> approval_item approval_item = versioned_action_request versioned_action_request
approval to date_-and_person_-organization (as is_approved_-by)	PATH			approval <- approval_person_organization.authorized_approval approval_person_organization {#2: (date_and_time_item = approval_person_organization date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment date_and_time_assignment.role -> date_time_role date_time_role.name = 'sign off') #1: (date_item = approval_person_organization date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment date_assignment.role -> date_role date_role.name = 'sign off')} approval_person_organization.person_organization -> person_organization_select #14: (person_organization_select = person_and_organization person_and_organization) #15: (person_organization_select= organization organization)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval to date_-time (as planned_-date)	PATH			approval <- approval_date_time.dated_approval approval_date_time {approval_date_time.role -> object_role object_role.name = 'planned'} approval_date_time.date_time -> date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time)
approval to organization (as scope)	PATH			approval organization_item = approval organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role -> organization_role organization_role.name = 'scope'} organization_assignment.assigned_organization -> organization
approval to approval_status (as status)	PATH			approval approval.status -> approval_status
APPROVAL_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	approval_relationship	41		
description	approval_relationship. description	41		

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
relation_type	approval_relationship. name	41		
approval_- relationship to multi_language_- string (as description)	#1: ([approval_- relationship. description] [PATH]) #2: (PATH)	41	111	approval_relationship #1: (attribute_language_item = approval_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = approval_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
approval_- relationship to approval (as related)	PATH			approval_relationship approval_relationship.related_approval -> approval
approval_- relationship to approval (as relating)	PATH			approval_relationship approval_relationship.relating_approval -> approval
APPROVAL_STATUS	approval_status	41		
status_name	approval_status.name	41		{(approval_status.name) (approval_status.name = 'approved') (approval_status.name = 'disapproved') (approval_status.name = 'withdrawn')}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
approval_status to classification_-system (as used_-classification_-system)	PATH		13	approval_status classification_item = approval_status classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {classification_assignment.role ->> classification_role classification_role.name = 'class system membership'} classification_assignment.assigned_class ->> group => class_system
CERTIFICATION #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string. #3: If item_instance is used in the context of UoF S7. #4: If item_instance is not used in the context of UoF S7.	certification	41		
certification_-type	certification_type.description	41		certification certification.kind -> certification_type certification_type.description
name	certification.name	41		
purpose	certification.purpose	41		
certification to item_instance (as is_applied_-to)	PATH			certification <- certification_assignment.assigned_certification certification_assignment => applied_certification_assignment applied_certification_assignment.items[i] -> certification_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#3: (certification_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #4: (certification_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
certification to item_version (as is_applied_-to)	PATH			certification <- certification_assignment.assigned_certification certification_assignment => applied_certification_assignment applied_certification_assignment.items[i] ->> certification_item certification_item = product_definition_formation product_definition_formation
certification to item_version_-relationship (as is_applied_-to)	PATH			certification <- certification_assignment.assigned_certification certification_assignment => applied_certification_assignment applied_certification_assignment.items[i] ->> certification_item certification_item = product_definition_formation_relationship product_definition_formation_relationship
certification to supplier_-solution (as is_applied_-to)	PATH			certification <- certification_assignment.assigned_certification certification_assignment => applied_certification_assignment applied_certification_assignment.items[i] ->> certification_item certification_item = product_definition_formation product_definition_formation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
certification to multi_language_-string (as name)	#1: ([certification.name] [PATH]) #2: (PATH)	41	113	certification #1: (attribute_language_item = certification attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = certification multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
certification to multi_language_-string (as purpose)	#1: ([certification.purpose] [PATH]) #2: (PATH)	41	113	certification #1: (attribute_language_item = certification attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'purpose'}) #2: (multi_language_attribute_item = certification multi_language_attribute_item <- multi_language_attribute_assignment.items[i] {multi_language_attribute_assignment multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'purpose'})
CONTRACT #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	contract	41		
description	contract.purpose	41		
id	contract.name	41		

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
contract to activity (as contracted_element)	PATH			contract <- contract_assignment.assigned_contract contract_assignment => applied_contract_assignment applied_contract_assignment.items[i] -> contract_item contract_item = executed_action executed_action
contract to drawing (as contracted_element)	PATH			contract <- contract_assignment.assigned_contract contract_assignment => applied_contract_assignment applied_contract_assignment.items[i] -> contract_item contract_item = drawing_revision drawing_revision
contract to item_version (as contracted_element)	PATH			contract <- contract_assignment.assigned_contract contract_assignment => applied_contract_assignment applied_contract_assignment.items[i] -> contract_item contract_item = product_definition_formation product_definition_formation
contract to multi_language_string (as description)	#1: ([contract.purpose] [PATH]) #2: (PATH)	41		contract #1: (attribute_language_item = contract attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'purpose'}) #2: (multi_language_attribute_item = contract multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'purpose'})

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
DATE_AND_PERSON_- ASSIGNMENT #1: If used for a person as member of an organization. #2: If used for an organization. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string. #5: If item_instance is used in the context of UoF S7. #6: If item_instance is not used in the context of UoF S7. #7: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #8: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #9: If no item_version is associated. #10: If an item_version	#1: (applied_person_- and_organization_- assignment) #2: (applied_- organization_- assignment)	214 214		#1: (applied_person_and_organization_assignment <= person_and_organization_assignment) #2: (applied_organization_assignment <= organization_assignment)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
is associated. #11: If property_value_-association is of type item_property_association. #12: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #13: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #14: If specification_-category.implicit_-exclusive_condition is FALSE. #15: If specification_-category.implicit_-exclusive_condition is TRUE. #16: If the styled_model is used with UoF P2. #17: If the styled_model is used without UoF P2. #18: The general case for a view_area. #19: If the view_area is in a single window and in 3D context.				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
#20: If the document_-representation is not a physical_model. #21: If the document_-representation is a physical_model. #22: If event_reference.offset is not instantiated. #23: If event_reference.offset is instantiated. #24: If product_-identification is not used in the context of UoF S7. #25: If product_-identification is used in the context of UoF S7. #26: If product_class is used with UoF S4. #27: If product_class is used with UoF S7.				
description	#1: (person_and_-organization_role.description) #2: (organization_-role.description)	41 41	33,35	#2: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role -> person_and_organization_role person_and_organization_role.description) #3: (applied_organization_assignment <= organization_assignment organization_assignment.role -> organization_role organization_role.description)
role	#1: (person_and_-organization_role.name)	41	33,35	#2: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
	#2: (organization_-role.name)	41		person_and_organization_role person_and_organization_role.name {(person_and_organization_role.name) (person_and_organization_role.name = 'creation') (person_and_organization_role.name = 'update')}) #3: (applied_organization_assignment <= organization_assignment organization_assignment.role ->>br>organization_role organization_role.name {(organization_role.name) (organization_role.name = 'creation') (organization_role.name = 'update')})
date_and_person_-assignment to date_and_person_-organization (as assigned_-date_and_person)	PATH			#1: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization ->>br>person_and_organization) #2: (applied_organization_assignment <= organization_assignment organization_assignment.assigned_organization ->>br>organization)
date_and_person_-assignment to multi_language_-string (as description)	#1: (#3: ([person_-and_organization_role.description] [PATH]) #4: (PATH)) #2: (#3: ([organization_role.description] [PATH]) #4: (PATH))	41 41	138,142	#1: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->>br>person_and_organization_role #3: (attribute_language_item = person_and_organization_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = person_and_organization_role multi_language_attribute_item <-

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #2: (applied_organization_assignment <= organization_assignment organization_assignment.role ->>> organization_role #3: (attribute_language_item = organization_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = organization_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
date_and_person_- assignment to activity (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->>> person_and_organization_item person_and_organization_item = executed_action) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->>> organization_item organization_item = executed_action) executed_action

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to activity_element (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = applied_action_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = applied_action_assignment) applied_action_assignment {applied_action_assignment <=action_assignment action_assignment.role ->object_role object_role.name = 'activity element'}
date_and_person_- assignment to activity_method_- assignment (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = action_request_solution) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = action_request_solution) action_request_solution
date_and_person_- assignment to alternate_item_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = alternate_product_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = alternate_product_relationship) alternate_product_relationship

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to approval_status (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = approval_status) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = approval_status) approval_status
date_and_person_- assignment to assembly_- substitute_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = \ assembly_component_usage_substitute) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = assembly_component_usage_substitute) assembly_component_usage_substitute
date_and_person_- assignment to certification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = certification) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = certification) certification
date_and_person_- assignment to class_category_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature_category_usage) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				organization_item = product_concept_feature_category_usage) product_concept_feature_category_usage
date_and_person_- assignment to class_condition_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_concept_feature_association) product_concept_feature_association
date_and_person_- assignment to class_inclusion_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_concept_feature_association) product_concept_feature_association {product_concept_feature_association product_concept_feature_association.name = 'inclusion association'}
date_and_person_- assignment to class_- specification_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_concept_feature_association) product_concept_feature_association

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to class_structure_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = configuration_design) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = configuration_design) configuration_design
date_and_person_- assignment to classification_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = applied_classification_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = applied_classification_assignment) applied_classification_assignment <=classification_assignment
date_and_person_- assignment to classification_- system (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = class_system) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = class_system) class_system
date_and_person_- assignment to complex_product (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition_formation)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation
date_and_person_- assignment to complex_product_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = product_definition_formation_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = product_definition_formation_relationship) product_definition_formation_relationship
date_and_person_- assignment to configuration (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = configured_effectivity_assignment configured_effectivity_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = configured_effectivity_assignment) configured_effectivity_assignment
date_and_person_- assignment to contract (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = contract) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = contract) contract
date_and_person_- assignment to design_- constraint (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				organization_item = product_definition_formation) product_definition_formation
date_and_person_- assignment to design_- discipline_item_- definition (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part definition'}
date_and_person_- assignment to document (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product) product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
date_and_person_- assignment to document_file (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = document_file) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				organization_item organization_item = document_file) document_file
date_and_person_- assignment to document_- representation (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item #20: (person_and_organization_item = product_definition product_definition) #21: (person_and_organization_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item #20: (organization_item = product_definition product_definition) #21: (organization_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition))
date_and_person_- assignment to document_version (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition_formation) product_definition_formation {product_definition_formation product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_category.name = 'document'}
date_and_person_- assignment to drawing (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = drawing_revision) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = drawing_revision) drawing_revision
date_and_person_- assignment to drawing_sheet (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = presentation_area) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = presentation_area) presentation_area => drawing_sheet_revision
date_and_person_- assignment to event_reference (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = event_occurrence #22: (|event_occurrence|) #23: (event_occurrence => relative_event_occurrence)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = event_occurrence #22: (|event_occurrence|) #23: (event_occurrence => relative_event_occurrence))

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to general_- classification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = class) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = class) class
date_and_person_- assignment to geometric_model (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = shape_representation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = shape_representation) shape_representation
date_and_person_- assignment to item (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product) product
date_and_person_- assignment to item_definition_- instance_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_relationship) product_definition_relationship

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to item_definition_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_relationship) product_definition_relationship
date_and_person_- assignment to item_instance (as is_applied_- to)	PATH			#5: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #6: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_relationship) product_definition_relationship => product_definition_usage => assembly_component_usage)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to item_instance_- relationship (as is_applied_- to)	PATH			#7: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_relationship) product_definition_relationship) #8: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_substitute) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_substitute) product_definition_substitute)
date_and_person_- assignment to item_version (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_formation) product_definition_formation
date_and_person_- assignment to item_version_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_formation_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_formation_relationship)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation_relationship
date_and_person_- assignment to kinematic_- simulation_- information (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = property_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = property_definition) property_definition =>
kinematic_property_definition
date_and_person_- assignment to manufacturing_- configuration (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = configuration_effectivity) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = configuration_effectivity) configuration_effectivity
date_and_person_- assignment to material (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = material_designation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = material_designation) material_designation
date_and_person_- assignment to organization_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = organization_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				organization_item = organization_relationship) organization_relationship
date_and_person_- assignment to person_in_- organization (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = person_and_organization) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = person_and_organization) person_and_organization
date_and_person_- assignment to person_in_- organization_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = \ applied_person_and_organization_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = applied_person_and_organization_assignment) applied_person_and_organization_assignment
date_and_person_- assignment to physical_- assembly_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_relationship) product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage

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Table 23–Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to physical_- instance (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference ->) product_definition_context <=) application_context_element application_context_element.name = 'physical occurrence'}
date_and_person_- assignment to physical_- instance_test_- result (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = property_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = property_definition) property_definition
date_and_person_- assignment to process_- operation_- definition (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = action_method) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = action_method) action_method => process_operation)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to process_- operation_- occurrence (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = action_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = action_relationship) action_relationship
date_and_person_- assignment to process_- operation_- resource_- assignment (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = requirement_for_action_resource) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = requirement_for_action_resource) requirement_for_action_resource
date_and_person_- assignment to process_plan (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = action action => #9: (process_plan) #10: (product_definition_process => product_process_plan)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = action action => #9: (process_plan) #10: (product_definition_process => product_process_plan))

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to product_class (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept) #26: (product_concept) #27: (product_concept => product_class)
date_and_person_- assignment to product_- identification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item #24: (person_and_organization_item = configuration_item configuration_item) #25: (person_and_organization_item = configuration_item configuration_item => product_identification)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item #24: (organization_item = configuration_item configuration_item) #25: (organization_item = configuration_item configuration_item => product_identification))
date_and_person_- assignment to product_- structure_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_relationship) product_definition_relationship =>

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_usage
date_and_person_- assignment to project (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = organizational_project) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = organizational_project) organizational_project
date_and_person_- assignment to property (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = general_property) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = general_property) general_property
date_and_person_- assignment to property_value_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item #11: (person_and_organization_item = property_definition property_definition) #12: (person_and_organization_item = action_property action_property) #13: (person_and_organization_item = resource_property resource_property)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item #11: (organization_item = property_definition property_definition) #12: (organization_item = action_property action_property)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#13: (organization_item = resource_property resource_property))
date_and_person_-assignment to security_-classification (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = security_classification) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = security_classification) security_classification
date_and_person_-assignment to security_level (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = security_classification_level) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = security_classification_level) security_classification_level
date_and_person_-assignment to specification (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = product_concept_feature) product_concept_feature
date_and_person_-assignment to specification_-category (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = product_concept_feature_category #14: (product_concept_feature_category) #15: (product_concept_feature_category => exclusive_product_concept_feature_category))

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item #14: (product_concept_feature_category) #15: (product_concept_feature_category => exclusive_product_concept_feature_category))
date_and_person_- assignment to specification_- expression (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature) product_concept_feature => conditional_concept_feature
date_and_person_- assignment to specification_- inclusion (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature) product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
date_and_person_- assignment to styled_model (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item #16: (person_and_organization_item = draughting_model draughting_model) #17: (person_and_organization_item = \ mechanical_design_geometric_presentation_representation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				mechanical_design_geometric_presentation_representation)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item #16: (organization_item = draughting_model draughting_model) #17: (organization_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation))
date_and_person_- assignment to view_area (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = presentation_area #18: (presentation_area) #19: (presentation_area => mechanical_design_geometric_presentation_area)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = presentation_area #18: (presentation_area) #19: (presentation_area => mechanical_design_geometric_presentation_area))
date_and_person_- assignment to work_order (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = action_directive) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = action_directive) action_directive

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_and_person_- assignment to work_request (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = versioned_action_request) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = versioned_action_request) versioned_action_request
DATE_AND_PERSON_- ORGANIZATION #1: If used for a person as member of an organization. #2: If used for an organization. #3: If date_and_person_- organization is not referenced by an approval. #4: If date_and_person_- organization is referenced by an approval. #5: If a certain day and the time of day is known. #6: If only a certain day is known.	#1: (person_and_- organization) #2: (organization)	41 41		
date_and_person_- organization to date_time (as actual_date)	PATH		17,18	#1: (#3: (person_and_organization <- person_and_organization_assignment.assigned_person_and_organization person_and_organization_assignment => applied_person_and_organization_assignment #5: (date_and_time_item = applied_person_and_organization_assignment date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{date_and_time_assignment.role -> date_time_role date_time_role.name = 'actual'} date_and_time_assignment.assigned_date_and_time ->) date_and_time) #6: (date_item = applied_person_and_organization_assignment date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role ->) date_role date_role.name = 'actual'} date_assignment.assigned_date ->) date => calendar_date)) #4: (person_and_organization person_organization_select = person_and_organization person_organization_select <- approval_person_organization.person_organization approval_person_organization #5: (date_and_time_item = applied_person_and_organization_assignment date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->) date_time_role date_time_role.name = 'sign off'} date_and_time_assignment.assigned_date_and_time ->) date_and_time) #6: (date_item = applied_person_and_organization_assignment date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{date_assignment.role -> date_role date_role.name = 'sign off'} date_assignment.assigned_date -> date => calendar_date))) #2: (#3: (organization <- organization_assignment.assigned_organization organization_assignment => applied_organization_assignment #5: (date_and_time_item = applied_organization_assignment date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role -> date_time_role date_time_role.name = 'actual'} date_and_time_assignment.assigned_date_and_time -> date_and_time) #6: (date_item = applied_organization_assignment date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'actual'} date_assignment.assigned_date -> date => calendar_date)) #4: (organization person_organization_select = organization person_organization_select <- approval_person_organization.person_organization approval_person_organization #5: (date_and_time_item = applied_organization_assignment date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{date_and_time_assignment.role -> date_time_role date_time_role.name = 'sign off'} date_and_time_assignment.assigned_date_and_time -> date_and_time) #6: (date_item = applied_organization_assignment date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'sign off'} date_assignment.assigned_date -> date => calendar_date)))
date_and_person_- organization to organization (as person_or_- organization)	#1: (PATH) #2: (IDENTICAL MAPPING)			#1: (person_and_organization person_and_organization.the_organization -> organization)
date_and_person_- organization to person_in_- organization (as person_or_- organization)	#1: (IDENTICAL MAPPING) #2: (PATH)			#2: (organization <- person_and_organization.the_organization person_and_organization)
DATE_TIME #1: If only a certain day is known. #2: If a certain day and the time of day is known.	#1: (calendar_date) #2: (date_and_time)	41 41	17,18	
date	#1: (IDENTICAL MAPPING) #2: (calendar_date)	41		#2: (date_and_time date_and_time.date_component -> date => calendar_date)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
time	local_time	41		date_and_time date_and_time.time_component -> local_time
DATE_TIME_- ASSIGNMENT #1: If only a certain day is known. #2: If a certain day and the time of day is known. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string. #5: If item_instance is used in the context of UoF S7. #6: If item_instance is not used in the context of UoF S7. #7: If property_value_-association is of type item_property_association. #8: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #9: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #10: If item_instance_-relationship is a general_-	#1: (applied_date_-assignment) #2: (applied_date_and_-time_assignment)	214 214		#1: (applied_date_assignment <= date_assignment) #2: (applied_date_and_time_assignment <= date_and_time_assignment)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #11: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #12: If the styled_model is used with UoF P2. #13: If the styled_model is used without UoF P2. #14: If no item_version is associated. #15: If an item_version is associated. #16: If property_value_- association is of type item_property_association. #17: If property_value_- association is of type process_property_- association and references an element in the process_- property_select which is not process_operation_- resource_assignment. #18: If property_value_- association is of type process_property_-				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
association and references process_operation_resource_-assignment in the process_-property_select. #19: If specification_-category.implicit_-exclusive_condition is FALSE. #20: If specification_-category.implicit_-exclusive_condition is TRUE. #21: If the styled_model is used with UoF P2. #22: If the styled_model is used without UoF P2. #23: The general case for a view_area. #24: If the view_area is in a single window and in 3D context. #25: If the document_-representation is not a physical_model. #26: If the document_-representation is a physical_model. #27: If event_reference.offset is not instantiated. #28: If event_reference.offset is instantiated. #29: If product_-identification is not used in the context of UoF S7. #30: If product_-				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
identification is used in the context of UoF S7. #31: If product_class is used with UoF S4. #32: If product_class is used with UoF S7.				
description	#1: (date_role.description) #2: (date_time_role.description)	41 41	19,20	#1: (applied_date_assignment <= date_assignment date_assignment.role ->date_role date_role.description) #2: (applied_date_and_time_assignment <= date_and_time_assignment date_and_time_assignment.role ->date_time_role date_time_role.description)
role	#1: (date_role.name) #2: (date_time_role.name)	41 41	19,20	#1: (applied_date_assignment <= date_assignment date_assignment.role ->date_role date_role.name {(date_role.name) (date_role.name = 'classification date') (date_role.name = 'creation') (date_role.name = 'installation') (date_role.name = 'production') (date_role.name = 'registration') (date_role.name = 'update')}) #2: (applied_date_and_time_assignment <= date_and_time_assignment date_and_time_assignment.role ->date_time_role date_time_role.name {(date_time_role.name) (date_time_role.name = 'classification date')

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(date_time_role.name = 'creation') (date_time_role.name = 'installation') (date_time_role.name = 'production') (date_time_role.name = 'registration') (date_time_role.name = 'update')))
date_time_- assignment to date_time (as assigned_- date_time)	PATH			#1: (applied_date_assignment <= date_assignment date_assignment.assigned_date ->) date => calendar_date) #2: (applied_date_and_time_assignment <= date_and_time_assignment date_and_time_assignment.assigned_date_and_time ->) date_and_time)
date_time_- assignment to multi_language_- string (as description)	#1: (#3: ([date_role. description] [PATH]) #4: (PATH)) #2: (#3: ([date_time_- role.description] [PATH]) #4: (PATH))	41 41	118,149	#1: (applied_date_assignment <= date_assignment date_assignment.role ->) date_role #3: (attribute_language_item = date_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = date_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #2: (applied_date_and_time_assignment <= date_and_time_assignment date_and_time_assignment.role ->) date_time_role

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#3: (attribute_language_item = date_time_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = date_time_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
date_time_- assignment to activity (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = executed_action) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = executed_action) executed_action
date_time_- assignment to activity_element (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = applied_action_assignment) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = applied_action_assignment) applied_action_assignment {applied_action_assignment <= action_assignment action_assignment.role ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				object_role object_role.name = 'activity element'}
date_time_- assignment to activity_method_- assignment (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = action_request_solution) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = action_request_solution) action_request_solution
date_time_- assignment to alternate_item_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = alternate_product_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = alternate_product_relationship) alternate_product_relationship
date_time_- assignment to approval_status (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = approval_status) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = approval_status) approval_status

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_-assignment to assembly_-substitute_-relationship (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = assembly_component_usage_substitute) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = assembly_component_usage_substitute) assembly_component_usage_substitute
date_time_-assignment to certification (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = certification) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = certification) certification
date_time_-assignment to class_category_-association (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = product_concept_feature_category_usage) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = product_concept_feature_category_usage) product_concept_feature_category_usage
date_time_-assignment to class_condition_-association (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = product_concept_feature_association) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = product_concept_feature_association) product_concept_feature_association

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to class_inclusion_- association (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_concept_feature_association) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_concept_feature_association) product_concept_feature_association
date_time_- assignment to class_- specification_- association (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_concept_feature_association) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_concept_feature_association) product_concept_feature_association
date_time_- assignment to class_structure_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = configuration_design) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = configuration_design) configuration_design
date_time_- assignment to classification_- association (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = applied_classification_assignment) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = applied_classification_assignment) applied_classification_assignment <=

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				classification_assignment
date_time_- assignment to classification_- system (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = class_system) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = class_system) class_system
date_time_- assignment to complex_product (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_formation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_formation) product_definition_formation
date_time_- assignment to complex_product_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_formation_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_formation_relationship) product_definition_formation_relationship
date_time_- assignment to configuration (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = configured_effectivity_assignment) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = configured_effectivity_assignment)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				configured_effectivity_assignment
date_time_- assignment to contract (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = contract) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = contract) contract
date_time_- assignment to design_- constraint (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_formation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_formation) product_definition_formation
date_time_- assignment to design_- discipline_item_- definition (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition) product_definition {product_definition product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part definition'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to document (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product) product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
date_time_- assignment to document_file (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = document_file) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = document_file) document_file
date_time_- assignment to document_- representation (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item #25: (date_item = product_definition product_definition) #26: (date_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item #25: (date_and_time_item = product_definition

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition) #26: (date_and_time_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition))
date_time_- assignment to document_version (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_definition_formation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_definition_formation) product_definition_formation {product_definition_formation product_definition_formation.of_product ->> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
date_time_- assignment to drawing (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = drawing_revision) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = drawing_revision) drawing_revision
date_time_- assignment to drawing_sheet (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = presentation_area) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				date_and_time_item date_and_time_item = presentation_area) presentation_area => drawing_sheet_revision
date_time_- assignment to event_reference (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = event_occurrence #27: (event_occurrence) #28: (event_occurrence=> relative_event_occurrence)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item #27: (date_and_time_item = event_occurrence event_occurrence) #28: (date_and_time_item = event_occurrence event_occurrence => relative_event_occurrence))
date_time_- assignment to general_- classification (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = class) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = class) class
date_time_- assignment to geometric_model (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = shape_representation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				date_and_time_item = shape_representation) shape_representation
date_time_- assignment to item (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product) product
date_time_- assignment to item_definition_- instance_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship
date_time_- assignment to item_definition_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship
date_time_- assignment to item_instance (as is_applied_- to)	PATH			#5: (#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				date_and_time_item = product_definition) product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #6: (#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship => product_definition_usage => assembly_component_usage)
date_time_- assignment to item_instance_- relationship (as is_applied_- to)	PATH			#10: (#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship) #11: (#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_substitute) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_substitute) product_definition_substitute)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to item_version (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_definition_formation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_definition_formation) product_definition_formation
date_time_- assignment to item_version_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_definition_formation_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_definition_formation_relationship) product_definition_formation_relationship
date_time_- assignment to kinematic_- simulation_- information (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item =property_definition) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = property_definition) property_definition => kinematic_property_definition
date_time_- assignment to manufacturing_- configuration (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = effectivity) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = effectivity)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				effectivity => product_definition_effectivity => configuration_effectivity
date_time_- assignment to material (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = material_designation) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = material_designation) material_designation
date_time_- assignment to organization_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = organization_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = organization_relationship) organization_relationship
date_time_- assignment to person_in_- organization (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = person_and_organization) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = person_and_organization) person_and_organization

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to person_in_- organization_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = applied_person_and_organization_assignment) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = applied_person_and_organization_assignment) applied_person_and_organization_assignment
date_time_- assignment to physical_- assembly_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage
date_time_- assignment to physical_- instance (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_definition) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_definition) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to physical_- instance_test_- result (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = property_definition) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = property_definition) property_definition
date_time_- assignment to process_- operation_- definition (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = action_method) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = action_method) action_method => process_operation
date_time_- assignment to process_- operation_- occurrence (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = action_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = action_relationship) action_relationship {action_relationship.name = 'process plan operation assignment'}

Table 23–Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to process_- operation_- resource_- assignment (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = requirement_for_action_resource) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = requirement_for_action_resource) requirement_for_action_resource
date_time_- assignment to process_plan (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = action) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = action) action => #14: (process_plan) #15: (product_definition_process => product_process_plan)
date_time_- assignment to product_class (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_concept) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_concept) #31: (product_concept) #32: (product_concept => product_class)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to product_- identification (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item #29: (date_item = configuration_item configuration_item) #30: (date_item = configuration_item configuration_item => product_identification)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item #29: (date_and_time_item = configuration_item configuration_item) #30: (date_and_time_item = configuration_item configuration_item => product_identification))
date_time_- assignment to product_- structure_- relationship (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = product_definition_relationship) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = product_definition_relationship) product_definition_relationship => product_definition_usage
date_time_- assignment to project (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = organizational_project) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = organizational_project) organizational_project

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to property (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = general_property) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = general_property) general_property
date_time_- assignment to property_value_- association (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item #16: (date_item = property_definition property_definition) #17: (date_item = action_property action_property) #18: (date_item = resource_property resource_property)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item #16: (date_and_time_item = property_definition property_definition) #17: (date_and_time_item = action_property action_property) #18: (date_and_time_item = resource_property resource_property))
date_time_- assignment to security_- classification (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->) date_item date_item = security_classification) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->) date_and_time_item date_and_time_item = security_classification)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				security_classification
date_time_-assignment to security_level (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->date_item date_item = security_classification_level) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->date_and_time_item date_and_time_item = security_classification_level) security_classification_level
date_time_-assignment to specification (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->date_item date_item = product_concept_feature) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->date_and_time_item date_and_time_item = product_concept_feature) product_concept_feature
date_time_-assignment to specification_-category (as is_applied_-to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->date_item date_item = product_concept_feature_category #19: (product_concept_feature_category) #20: (product_concept_feature_category => exclusive_product_concept_feature_category)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->date_and_time_item date_and_time_item = product_concept_feature_category #19: (product_concept_feature_category) #20: (product_concept_feature_category => exclusive_product_concept_feature_category))

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- assignment to specification_- expression (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_concept_feature) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_concept_feature) product_concept_feature => conditional_concept_feature
date_time_- assignment to specification_- inclusion (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item date_item = product_concept_feature) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item date_and_time_item = product_concept_feature) product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
date_time_- assignment to styled_model (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] ->> date_item #21: (date_item = draughting_model draughting_model) #22: (date_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] ->> date_and_time_item #21: (date_and_time_item = draughting_model draughting_model)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#22: (date_and_time_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation))
date_time_- assignment to view_area (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item #23: (date_item = presentation_area presentation_area) #24: (date_item = presentation_area presentation_area => mechanical_design_geometric_presentation_area)) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item #23: (date_and_time_item = presentation_area presentation_area) #24: (date_and_time_item = presentation_area presentation_area => mechanical_design_geometric_presentation_area))
date_time_- assignment to work_order (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = action_directive) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = action_directive) action_directive
date_time_- assignment to work_request (as is_applied_- to)	PATH			#1: (applied_date_assignment applied_date_assignment.items[i] -> date_item date_item = versioned_action_request) #2: (applied_date_and_time_assignment applied_date_and_time_assignment.items[i] -> date_and_time_item date_and_time_item = versioned_action_request) versioned_action_request

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
DATE_TIME_- INTERVAL_- ASSIGNMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If item_instance is used in the context of UoF S7. #4: If item_instance is not used in the context of UoF S7. #5: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #6: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #7: If no item_version is associated. #8: If an item_version is associated. #9: If property_value_- association is of type item_property_association.	applied_time_interval_- assignment	214		applied_time_interval_assignment <= time_interval_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
#10: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #11: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #12: If specification_-category.implicit_-exclusive_condition is FALSE. #13: If specification_-category.implicit_-exclusive_condition is TRUE. #14: If the styled_model is used with UoF P2. #15: If the styled_model is used without UoF P2. #16: The general case for a view_area. #17: If the view_area is in a single window and in 3D context. #18: If the document_-representation is not a physical_model. #19: If the document_-				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
representation is a physical_model. #20: If product_-identification is not used in the context of UoF S7. #21: If product_-identification is used in the context of UoF S7. #22: If product_class is used with UoF S4. #23: If product_class is used with UoF S7.				
description	time_interval_role.description	41		applied_time_interval_assignment <= time_interval_assignment time_interval_assignment.role ->time_interval_role time_interval_role.description
role	time_interval_role.name	41		applied_time_interval_assignment <= time_interval_assignment time_interval_assignment.role ->time_interval_role time_interval_role.name
date_time_-interval_-assignment to interval_of_time (as assigned_-time_interval)	PATH			applied_time_interval_assignment <= time_interval_assignment time_interval_assignment.assigned_time_interval time_interval => time_interval_with_bounds
date_time_-interval_-assignment to multi_language_-string (as description)	#1: ([time_interval_-role.description][PATH]) #2: (PATH)	41		applied_time_interval_assignment <= time_interval_assignment time_interval_assignment.role ->time_interval_role #1: (attribute_language_item = time_interval_role attribute_language_item <-attribute_language_assignment.items[i]

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = time_interval_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
date_time_- interval_- assignment to activity (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = executed_action executed_action
date_time_- interval_- assignment to activity_element (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = applied_action_assignment applied_action_assignment {applied_action_assignment <= action_assignment action_assignment.role ->> object_role object_role.name = 'activity element'}
date_time_- interval_- assignment to activity_method_- assignment (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = action_request_solution action_request_solution

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to alternate_item_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = alternate_product_relationship alternate_product_relationship
date_time_- interval_- assignment to approval_status (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = approval_status approval_status
date_time_- interval_- assignment to assembly_- substitute_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = assembly_component_usage_substitute assembly_component_usage_substitute
date_time_- interval_- assignment to certification (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = certification certification
date_time_- interval_- assignment to class_category_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature_category_usage product_concept_feature_category_usage

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to class_condition_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature_association product_concept_feature_association
date_time_- interval_- assignment to class_inclusion_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature_association product_concept_feature_association {product_concept_feature_association product_concept_feature_association.name = 'inclusion association'}
date_time_- interval_- assignment to class_- specification_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature_association product_concept_feature_association
date_time_- interval_- assignment to class_structure_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = configuration_design configuration_design

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to classification_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = applied_classification_assignment applied_classification_assignment <= classification_assignment
date_time_- interval_- assignment to classification_- system (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = class_system class_system
date_time_- interval_- assignment to complex_product (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation product_definition_formation
date_time_- interval_- assignment to complex_product_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation_relationship product_definition_formation_relationship
date_time_- interval_- assignment to configuration (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = configured_effectivity_assignment configured_effectivity_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to contract (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = contract contract
date_time_- interval_- assignment to design_- constraint (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation product_definition_formation
date_time_- interval_- assignment to design_- discipline_item_- definition (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition product_definition {product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
date_time_- interval_- assignment to document (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to document_file (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = document_file document_file
date_time_- interval_- assignment to document_- representation (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item #18: (time_interval_item = product_definition product_definition) #19: (time_interval_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
date_time_- interval_- assignment to document_version (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation product_definition_formation {product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
date_time_- interval_- assignment to drawing (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = drawing_revision drawing_revision

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to drawing_sheet (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = presentation_area presentation_area => drawing_sheet_revision
date_time_- interval_- assignment to general_- classification (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = class class
date_time_- interval_- assignment to geometric_model (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = shape_representation shape_representation
date_time_- interval_- assignment to item (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product product
date_time_- interval_- assignment to item_definition_- instance_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_relationship product_definition_relationship

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to item_definition_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_relationship product_definition_relationship
date_time_- interval_- assignment to item_instance (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item #3: (time_interval_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #4: (time_interval_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
date_time_- interval_- assignment to item_instance_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item #5: (time_interval_item = product_definition_relationship product_definition_relationship) #6: (time_interval_item = product_definition_substitute product_definition_substitute)
date_time_- interval_- assignment to item_version (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation product_definition_formation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to item_version_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_formation_relationship product_definition_formation_relationship
date_time_- interval_- assignment to kinematic_- simulation_- information (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = property_definition property_definition => kinematic_property_definition
date_time_- interval_- assignment to manufacturing_- configuration (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = configuration_effectivity configuration_effectivity
date_time_- interval_- assignment to material (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = material_designation material_designation
date_time_- interval_- assignment to organization_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = organization_relationship organization_relationship

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Table 23–Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to person_in_- organization (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = person_and_organization person_and_organization
date_time_- interval_- assignment to person_in_- organization_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = applied_person_and_organization_assignment applied_person_and_organization_assignment
date_time_- interval_- assignment to physical_- assembly_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition_relationship product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage
date_time_- interval_- assignment to physical_- instance (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <=> application_context_element application_context_element.name = 'physical occurrence'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to physical_- instance_test_- result (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = property_definition property_definition
date_time_- interval_- assignment to process_- operation_- definition (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = action_method action_method => process_operation
date_time_- interval_- assignment to process_- operation_- occurrence (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = action_relationship action_relationship {action_relationship.name = 'process plan operation assignment'}
date_time_- interval_- assignment to process_- operation_- resource_- assignment (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = requirement_for_action_resource requirement_for_action_resource

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to process_plan (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = action action => #7: (process_plan) #8: (product_definition_process => product_process_plan)
date_time_- interval_- assignment to product_class (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept #22: (product_concept) #23: (product_concept => product_class)
date_time_- interval_- assignment to product_- identification (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item #20: (time_interval_item = configuration_item configuration_item) #21: (time_interval_item = configuration_item configuration_item => product_identification)
date_time_- interval_- assignment to product_- structure_- relationship (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = (product_definition_relationship product_definition_relationship => product_definition_usage

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to project (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->time_interval_item time_interval_item = organizational_project organizational_project
date_time_- interval_- assignment to property (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->time_interval_item time_interval_item = general_property general_property
date_time_- interval_- assignment to property_value_- association (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->time_interval_item #9: (time_interval_item =property_definition property_definition) #10: (time_interval_item =action_property action_property) #11: (time_interval_item =resource_property resource_property)
date_time_- interval_- assignment to security_- classification (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->time_interval_item time_interval_item = security_classification security_classification
date_time_- interval_- assignment to security_level (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->time_interval_item time_interval_item = security_classification_level security_classification_level

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to specification (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature product_concept_feature
date_time_- interval_- assignment to specification_- category (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature_category #12: (product_concept_feature_category) #13: (product_concept_feature_category => exclusive_product_concept_feature_category)
date_time_- interval_- assignment to specification_- expression (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature product_concept_feature => conditional_concept_feature
date_time_- interval_- assignment to specification_- inclusion (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
date_time_- interval_- assignment to styled_model (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item #14: (time_interval_item= draughting_model draughting_model) #15: (time_interval_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
date_time_- interval_- assignment to view_area (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = presentation_area #16: (presentation_area) #17: (presentation_area => mechanical_design_geometric_presentation_area)
date_time_- interval_- assignment to work_order (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = action_directive action_directive
date_time_- interval_- assignment to work_request (as is_applied_- to)	PATH			applied_time_interval_assignment applied_time_interval_assignment.items[i] ->> time_interval_item time_interval_item = versioned_action_request versioned_action_request

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
DESIGN_- DISCIPLINE_ITEM_- DEFINITION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the design_- discipline_item_definition is not specifed as a resource_definition by a process_operation_resource_- assignment. #4: If the design_- discipline_item_definition is specifed as a resource_- definition by a process_- operation_resource_- assignment.	#3: (product_- definition) #4: (product_- definition_resource)	41 214	181	#3: (product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part definition'}) #4: (product_definition_resource <= [action_resource] [product_definition] {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part definition'})
id	product_definition.id	41		
name	product_definition. description	41		
design_- discipline_item_- definition to application_- context (as additional_- context)	PATH			product_definition <- product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role product_definition_context_role.name = 'additional context'} product_definition_context_association.frame_of_reference ->product_definition_context

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
design_- discipline_item_- definition to item_version (as associated_- item_version)	PATH			product_definition product_definition.formation ->> product_definition_formation
design_- discipline_item_- definition to application_- context (as initial_- context)	PATH			product_definition product_definition.frame_of_reference ->> product_definition_context
design_- discipline_item_- definition to multi_language_- string (as name)	#1: ([product_- definition. description] [PATH]) #2: (PATH)	41	150	product_definition #1: (attribute_language_item = product_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
FEATURE_- PARAMETER	measure_representation_- item	45		
parameter_name	identification_- assignment.assigned_id	41	32,162	measure_representation_item identification_item = measure_representation_item identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{identification_assignment.role -> identification_role identification_role.name = 'parameter identification'} identification_assignment.assigned_id
feature_- parameter to value_with_unit (as parameter_- value)	IDENTICAL MAPPING			
GENERAL_- PARAMETER #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	measure_representation_- item	45		
parameter_role	representation_item. name	43		measure_representation_item <= representation_item representation_item.name
general_- parameter to feature_- parameter (as parameter_- value)	IDENTICAL MAPPING			

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
INTERVAL_OF_TIME #1: If only a certain day is known. #2: If a certain day and the time of day is known. #3: If event_reference. offset is not instantiated. #4: If event_reference. offset is instantiated.	time_interval_with_-bounds	41		
interval_of_time to date_time (as end_-definition)	PATH			time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time)
interval_of_time to duration (as end_-definition)	PATH			time_interval_with_bounds time_interval_with_bounds.duration -> time_measure_with_unit
interval_of_time to event_-reference (as end_-definition)	PATH			time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #3: (event_occurrence) #4: (event_occurrence => relative_event_occurrence)
interval_of_time to date_time (as start_-definition)	PATH			time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (date_time_select = date_and_time date_and_time)
interval_of_time to event_- reference (as start_- definition)	PATH			time_interval_with_bounds time_interval_with_bounds.primary_bound ->
date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #3: (event_occurrence) #4: (event_occurrence relative_event_occurrence)
ITEM #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product	41	75,74, 179	{product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name (product_category.name = 'part') (product_category.name = 'raw material') (product_category.name = 'tool')}
description	product.description	41		
id	product.id	41		
name	product.name	41		
item to multi_- language_string (as description)	#1: ([product. description] [PATH]) #2: (PATH)	41	145	product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
item to multi_- language_string (as name)	#1: ([product.name] [PATH]) #2: (PATH)	41	145	product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
ITEM_VERSION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- formation	41		{product_definition_formation => product_definition_formation_with_specified_source[1)]}
description	product_definition_- formation.description	41		
id	product_definition_- formation.id	41		
item_version to item (as associated_- item)	PATH			product_definition_formation product_definition_formation.of_product -> product
item_version to multi_language_- string (as description)	#1: ([product_- definition_formation. description] [PATH]) #2: (PATH)	41	151	product_definition_formation #1: (attribute_language_item = product_definition_formation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
ITEM_VERSION_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- formation_relationship	41		
description	product_definition_- formation_relationship. description	41		
relation_type	product_definition_- formation_relationship. name	41		{product_definition_formation_relationship (product_definition_formation_relationship.name) (product_definition_formation_relationship.name = 'derivation') (product_definition_formation_relationship.name = 'hierarchy') (product_definition_formation_relationship.name = 'sequence') (product_definition_formation_relationship.name = 'supplied item')}
item_version_- relationship to multi_language_- string (as description)	#1: ([product_- definition_formation_- relationship. description][PATH]) #2: (PATH)		152	product_definition_formation_relationship #1: (attribute_language_item = product_definition_formation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
item_version_- relationship to item_version (as related)	PATH			product_definition_formation_relationship product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation
item_version_- relationship to item_version (as relating)	PATH			product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation
LANGUAGE	language	214		language <= group
country_code	group.description	41		language <= group group.description
language_code	group.name	41		language <= group group.name
MULTI_LANGUAGE_- STRING #1: If additional_- language_dependent_string is not populated. #2: If additional_- language_dependent_string is populated.	#1: (attribute_- language_assignment) #2: ([attribute_- language_assignment] [multi_language_- attribute_assignment])	214 214 214	12	#1: (attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.role -> classification_role classification_role.name = 'primary'}) #2: ([attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.role -> classification_role classification_role.name = 'primary'}] [multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.role -> attribute_value_role attribute_value_role.name = 'alternate language'} attribute_language_item = attribute_value_assignment attribute_language_item <-

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {[attribute_classification_assignment.role ->> classification_role classification_role.name = 'translated'] [attribute_classification_assignment.attribute_name = 'attribute_value']}])
multi_language_- string to string_- with_language (as additional_- language_- dependent_- string)	IDENTICAL MAPPING			
multi_language_- string to string_- with_language (as primary_- language_- dependent_- string)	IDENTICAL MAPPING			
NUMERICAL_VALUE #1: If significant digits are given for the value_- with_unit. #2: If no significant digits are given for the value_with_unit. #3: If the unit is not assigned globally. #4: If the unit is assigned globally.	#3: (#1: ([measure_- representation_item] [qualified_- representation_item]) #2: (measure_- representation_item)) #4: (#1: ([value_- representation_item] [qualified_- representation_item]) #2: (value_- representation_item))	45 45 45 43 45 43	30	
value_component	#3: (measure_with_- unit.value_component) #4: (value_-	41 43		#3: ({measure_representation_item <= measure_with_unit {([measure_with_unit])

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
	representation_item. value_component)			(measure_with_unit => (amount_of_substance_measure_with_unit) (area_measure_with_unit) (celsius_temperature_measure_with_unit) (electric_current_measure_with_unit) (length_measure_with_unit) (luminous_intensity_measure_with_unit) (mass_measure_with_unit) (plane_angle_measure_with_unit) (ratio_measure_with_unit) (solid_angle_measure_with_unit) (thermodynamic_temperature_measure_with_unit) (time_measure_with_unit) (volume_measure_with_unit))} measure_with_unit.value_component {measure_with_unit.value_component -> measure_value (measure_value = area_measure area_measure) (measure_value = amount_of_substance_measure amount_of_substance_measure) (measure_value = celsius_temperature_measure celsius_temperature_measure) (measure_value = length_measure length_measure) (measure_value = electric_current_measure electric_current_measure) (measure_value = plane_angle_measure plane_angle_measure) (measure_value = ratio_measure ratio_measure) (measure_value = parameter_value parameter_value) (measure_value = descriptive_measure descriptive_measure) (measure_value = positive_plane_angle_measure

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				positive_plane_angle_measure) (measure_value = count_measure count_measure) (measure_value = mass_measure mass_measure) (measure_value = time_measure time_measure) (measure_value = thermodynamic_temperature_measure thermodynamic_temperature_measure) (measure_value = luminous_intensity_measure luminous_intensity_measure) (measure_value = solid_angle_measure solid_angle_measure) (measure_value = volume_measure volume_measure) (measure_value = numeric_measure numeric_measure) (measure_value = context_dependent_measure context_dependent_measure) (measure_value = positive_length_measure positive_length_measure) (measure_value = positive_ratio_measure positive_ratio_measure)}}) #4: (value_representation_item value_representation_item.value_component)
ORGANIZATION	organization	41		
delivery_address	organizational_address	41		organization <- organizational_address.organizations[i] organizational_address {organizational_address.description = 'delivery address'}
id	organization.id	41		
organization_- name	organization.name	41		
organization_- type	organization. description	41		

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
postal_address	organizational_address	41		organization <- organizational_address.organizations[i] organizational_address {organizational_address.description = 'postal address'}
visitor_address	organizational_address	41		organization <- organizational_address.organizations[i] organizational_address {organizational_address.description = 'visitor address'}
ORGANIZATION_IN_- CONTRACT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If used for a person as member of an organization. #4: If used for an organization.	applied_organization_- assignment	214		applied_organization_assignment <= {applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = contract} organization_assignment {organization_assignment.role ->> organization_role organization_role.name= 'organization in contract'}
role_of_- organization	organization_role. description	41	33	applied_organization_assignment <= organization_assignment organization_assignment.role ->> organization_role organization_role.description {(organization_role.description) (organization_role.description = 'contractee') (organization_role.description = 'contractor')}
organization_in_- contract to organization (as contracted_- organization)	PATH			applied_organization_assignment <= organization_assignment organization_assignment.assigned_organization ->> organization

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
organization_in_- contract to date_- and_person_- organization (as signature)	PATH			applied_organization_assignment #3: (person_and_organization_item = applied_organization_assignment person_and_organization_item <- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment {applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->>br>person_and_organization_role person_and_organization_role.name = 'signing for contract'}) #4: (organization_item = applied_organization_assignment organization_item <- applied_organization_assignment.items[i] applied_organization_assignment {applied_organization_assignment <= organization_assignment organization_assignment.role ->>br>organization_role organization_role.name = 'signing for contract'})
organization_in_- contract to contract (as signed_- contract)	PATH			applied_organization_assignment applied_organization_assignment.items[i] ->>br>organization_item organization_item = contract contract
PERSON	person	41		{person <- person_and_organization.the_person person_and_organization}
person_name	<person.last_name> <person.first_name> <person.middle_names>	41 41 41		
preferred_- business_address	personal_address	41		person <- personal_address.people[i] personal_address
PERSON_IN_- ORGANIZATION	person_and_- organization	41		

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
id	identification_- assignment.assigned_id	41		person_and_organization identification_item = person_and_organization identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'id'} identification_assignment.assigned_id
location	person_and_- organization_address	214		person_and_organization [person_and_organization.the_person ->> person <- personal_address.people[1] personal_address =>] [person_and_organization.the_organization ->> organization <- organizational_address.organizations[1] organizational_address =>] person_and_organization_address {person_and_organization_address <= [organizational_address] [personal_address]}
role	person_and_- organization.name	41		
person_in_- organization to organization (as associated_- organization)	PATH			person_and_organization person_and_organization.the_organization ->> organization
person_in_- organization to person (as associated_- person)	PATH			person_and_organization person_and_organization.the_person ->> person

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
PERSON_IN_- ORGANIZATION_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	applied_person_and_- organization_- assignment	214		applied_person_and_organization_assignment <= person_and_organization_assignment
description	person_and_- organization_role. description	41		applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.description
relation_type	person_and_- organization_role.name	41		applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.name {(person_and_organization_role.name) (person_and_organization_role.name = 'successor')}
person_in_- organization_- relationship to multi_language_- string (as description)	#1: ([person_and_- organization_role. description] [PATH]) #2: (PATH)	41		applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role #1: (attribute_language_item = person_and_organization_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = person_and_organization_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
person_in_- organization_- relationship to person_in_- organization (as related)	PATH			applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization ->) person_and_organization
person_in_- organization_- relationship to person_in_- organization (as relating)	PATH			applied_person_and_organization_assignment applied_person_and_organization_assignment.items[1] ->) person_and_organization_item person_and_organization_item = person_and_organization person_and_organization

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
PERSON_-ORGANIZATION_-ASSIGNMENT #1: If used for a person as member of an organization. #2: If used for an organization. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string. #5: If property_value_-association is of type item_property_association. #6: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #7: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #8: If item_instance is used in the context of UoF S7. #9: If item_instance is not used in the context of UoF S7.	#1: (applied_person_and_-organization_-assignment) #2: (applied_organization_-assignment)	214 214		#1: (applied_person_and_organization_assignment <= person_and_organization_assignment) #2: (applied_organization_assignment <= organization_assignment)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
#10: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #11: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as usage_context. #12: If the styled_model is used with UoF P2. #13: If the styled_model is used without UoF P2. #14: If no item_version is associated. #15: If an item_version is associated. #16: If property_value_-association is of type item_property_association. #17: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #18: If property_value_-				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #19: If specification_-category.implicit_-exclusive_condition is FALSE. #20: If specification_-category.implicit_-exclusive_condition is TRUE. #21: If the styled_model is used with UoF P2. #22: If the styled_model is used without UoF P2. #23: The general case for a view_area. #24: If the view_area is in a single window and in 3D context. #25: If the document_-representation is not a physical_model. #26: If the document_-representation is a physical_model. #27: If event_reference.offset is not instantiated. #28: If event_reference.offset is instantiated. #29: If product_-identification is not used				

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
in the context of UoF S7. #30: If product_- identification is used in the context of UoF S7. #31: If product_class is used with UoF S4. #32: If product_class is used with UoF S7.				
description	#1: (person_and_- organization_role. description) #2: (organization_- role.description)	41 41	33,35	#2: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.description) #3: (applied_organization_assignment <= organization_assignment organization_assignment.role ->> organization_role organization_role.description)
role	#1: (person_and_- organization_role. name) #2: (organization_- role.name)	41 41	33,35	#2: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.name {(person_and_organization_role.name) (person_and_organization_role.name = 'author') (person_and_organization_role.name = 'classification officer') (person_and_organization_role.name = 'creator') (person_and_organization_role.name = 'custodian') (person_and_organization_role.name = 'customer') (person_and_organization_role.name = 'design supplier') (person_and_organization_role.name = 'editor') (person_and_organization_role.name = 'id owner') (person_and_organization_role.name = 'location') (person_and_organization_role.name = 'manufacturer') (person_and_organization_role.name = 'owner')

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(person_and_organization_role.name = 'supplier') (person_and_organization_role.name = 'wholesaler'))} #3: (applied_organization_assignment <= organization_assignment organization_assignment.role ->) organization_role organization_role.name {(organization_role.name = 'author') (organization_role.name = 'classification officer') (organization_role.name = 'creator') (organization_role.name = 'custodian') (organization_role.name = 'customer') (organization_role.name = 'design supplier') (organization_role.name = 'editor') (organization_role.name = 'id owner') (organization_role.name = 'location') (organization_role.name = 'manufacturer') (organization_role.name = 'owner') (organization_role.name = 'supplier') (organization_role.name = 'wholesaler')})
person_- organization_- assignment to organization (as assigned_- person_- organization)	PATH			applied_organization_assignment <= organization_assignment organization_assignment.assigned_organization ->) organization

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to person_in_- organization (as assigned_- person_- organization)	PATH			applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.assigned_person_and_organization ->> person_and_organization
person_- organization_- assignment to multi_language_- string (as description)	#1: (#3: ([person_- and_organization_role. description] [PATH]) #4: (PATH)) #2: (#3: ([organization_role. description] [PATH]) #4: (PATH))	41 41	138,142	#1: (applied_person_and_organization_assignment <= person_and_organization_assignment person_and_organization_assignment.role ->> person_and_organization_role #3: (attribute_language_item = person_and_organization_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = person_and_organization_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #2: (applied_organization_assignment <= organization_assignment organization_assignment.role ->> organization_role #3: (attribute_language_item = organization_role attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 23–Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = organization_role multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
person_-organization_-assignment to activity (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = executed_action) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = executed_action) executed_action
person_-organization_-assignment to activity_element (as is_applied_-to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = applied_action_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = applied_action_assignment) applied_action_assignment {applied_action_assignment <= action_assignment action_assignment.role -> object_role object_role.name = 'activity_element'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to activity_method_- assignment (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = action_request_solution) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = action_request_solution) action_request_solution
person_- organization_- assignment to alternate_item_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = alternate_product_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = alternate_product_relationship) alternate_product_relationship
person_- organization_- assignment to approval_status (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = approval_status) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = approval_status) approval_status
person_- organization_- assignment to assembly_- substitute_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = assembly_component_usage_substitute) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = assembly_component_usage_substitute) assembly_component_usage_substitute

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to certification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = certification) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = certification) certification
person_- organization_- assignment to class_category_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature_category_usage) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature_category_usage) product_concept_feature_category_usage
person_- organization_- assignment to class_condition_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature_association) product_concept_feature_association
person_- organization_- assignment to class_inclusion_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature_association)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_concept_feature_association
person_- organization_- assignment to class_- specification_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_concept_feature_association) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_concept_feature_association) product_concept_feature_association
person_- organization_- assignment to class_structure_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = configuration_design) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = configuration_design) configuration_design
person_- organization_- assignment to classification_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = applied_classification_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = applied_classification_assignment) applied_classification_assignment <=classification_assignment

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to classification_- system (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = class_system) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = class_system) class_system
person_- organization_- assignment to complex_product (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_formation) product_definition_formation
person_- organization_- assignment to complex_product_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_formation_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_formation_relationship) product_definition_formation_relationship
person_- organization_- assignment to configuration (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = configured_effectivity_assignment configured_effectivity_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = configured_effectivity_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				configured_effectivity_assignment)
person_- organization_- assignment to contract (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = contract) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = contract) contract
person_- organization_- assignment to design_- constraint (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition_formation) product_definition_formation
person_- organization_- assignment to design_- discipline_item_- definition (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part definition'}

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to document (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product) product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
person_- organization_- assignment to document_file (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = document_file) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = document_file) document_file
person_- organization_- assignment to document_- representation (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item #25: (person_and_organization_item = product_definition product_definition) #26: (person_and_organization_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#25: (organization_item = product_definition product_definition) #26: (organization_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition))
person_- organization_- assignment to document_version (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_formation) product_definition_formation {product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
person_- organization_- assignment to drawing (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = drawing_revision) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = drawing_revision) drawing_revision

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to drawing_sheet (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = presentation_area) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = presentation_area) presentation_area => drawing_sheet_revision
person_- organization_- assignment to event_reference (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = event_occurrence #27: (event_occurrence) #28: (event_occurrence => relative_event_occurrence)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = event_occurrence #27: (event_occurrence) #28: (event_occurrence relative_event_occurrence))
person_- organization_- assignment to general_- classification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = class) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = class) class

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to geometric_model (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = shape_representation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = shape_representation) shape_representation
person_- organization_- assignment to item (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product) product
person_- organization_- assignment to item_definition_- instance_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition_relationship) product_definition_relationship
person_- organization_- assignment to item_definition_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->organization_item organization_item = product_definition_relationship) product_definition_relationship

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to item_instance (as is_applied_- to)	PATH			#8: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #9: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_relationship) product_definition_relationship => product_definition_usage => assembly_component_usage)
person_- organization_- assignment to item_instance_- relationship (as is_applied_- to)	PATH			#10: (#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_relationship) product_definition_relationship) #11: (#1: (applied_person_and_organization_assignment

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = product_definition_substitute) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = product_definition_substitute) product_definition_substitute)
person_- organization_- assignment to item_version (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = product_definition_formation) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = product_definition_formation) product_definition_formation
person_- organization_- assignment to item_version_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = product_definition_formation_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = product_definition_formation_relationship) product_definition_formation_relationship
person_- organization_- assignment to kinematic_- simulation_- information (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] -> person_and_organization_item person_and_organization_item = property_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] -> organization_item organization_item = property_definition) property_definition => kinematic_property_definition

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to manufacturing_- configuration (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = configuration_effectivity) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = configuration_effectivity) configuration_effectivity
person_- organization_- assignment to material (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = material_designation) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = material_designation) material_designation
person_- organization_- assignment to organization_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = organization_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = organization_relationship) organization_relationship
person_- organization_- assignment to person_in_- organization (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = person_and_organization) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = person_and_organization) person_and_organization

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to person_in_- organization_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = \ applied_person_and_organization_assignment) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = applied_person_and_organization_assignment) applied_person_and_organization_assignment
person_- organization_- assignment to physical_- assembly_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition_relationship) product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage
person_- organization_- assignment to physical_- instance (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_definition) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to physical_- instance_test_- result (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = property_definition) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = property_definition) property_definition
person_- organization_- assignment to process_- operation_- definition (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = action_method) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = action_method) action_method => process_operation
person_- organization_- assignment to process_- operation_- occurrence (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = action_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = action_relationship) action_relationship {action_relationship.name = 'process plan operation assignment'}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to process_- operation_- resource_- assignment (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = requirement_for_action_resource) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = requirement_for_action_resource) requirement_for_action_resource
person_- organization_- assignment to process_plan (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = action action => #14: (process_plan) #15: (product_definition_process => product_process_plan)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = action action => #14: (process_plan) #15: (product_definition_process => product_process_plan))
person_- organization_- assignment to product_class (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept) #31: (product_concept) #32: (product_concept => product_class)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to product_- identification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = configuration_item #29: (configuration_item) #30: (configuration_item => product_identification)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = configuration_item #29: (configuration_item) #30: (configuration_item => product_identification))
person_- organization_- assignment to product_- structure_- relationship (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = product_definition_relationship) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = product_definition_relationship) product_definition_relationship => product_definition_usage
person_- organization_- assignment to project (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = organizational_project) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = organizational_project) organizational_project

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to property (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = general_property) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = general_property) general_property
person_- organization_- assignment to property_value_- association (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item #16: (person_and_organization_item = property_definition property_definition) #17: (person_and_organization_item = action_property action_property) #18: (person_and_organization_item = resource_property resource_property)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item #16: (organization_item = property_definition property_definition) #17: (organization_item = action_property action_property) #18: (organization_item = resource_property resource_property))
person_- organization_- assignment to security_- classification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = security_classification) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = security_classification)

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				security_classification
person_- organization_- assignment to security_level (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = security_classification_level) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = security_classification_level) security_classification_level
person_- organization_- assignment to specification (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = product_concept_feature) product_concept_feature
person_- organization_- assignment to specification_- category (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->
person_and_organization_item person_and_organization_item = product_concept_feature_category #19: (product_concept_feature_category) #20: (product_concept_feature_category =>
exclusive_product_concept_feature_category)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->
organization_item organization_item = product_concept_feature_category #19: (product_concept_feature_category) #20: (product_concept_feature_category =>
exclusive_product_concept_feature_category))

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
person_- organization_- assignment to specification_- expression (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature) product_concept_feature => conditional_concept_feature
person_- organization_- assignment to specification_- inclusion (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item person_and_organization_item = product_concept_feature) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item organization_item = product_concept_feature) product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
person_- organization_- assignment to styled_model (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->> person_and_organization_item #21: (person_and_organization_item = draughting_model draughting_model) #22: (person_and_organization_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->> organization_item #21: (organization_item = draughting_model

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				draughting_model) #22: (organization_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation))
person_- organization_- assignment to view_area (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = presentation_area #23: (presentation_area) #24: (presentation_area => mechanical_design_geometric_presentation_area)) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = presentation_area #23: (presentation_area) #24: (presentation_area => mechanical_design_geometric_presentation_area))
person_- organization_- assignment to work_order (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = action_directive) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = action_directive) action_directive
person_- organization_- assignment to work_request (as is_applied_- to)	PATH			#1: (applied_person_and_organization_assignment applied_person_and_organization_assignment.items[i] ->) person_and_organization_item person_and_organization_item = versioned_action_request) #2: (applied_organization_assignment applied_organization_assignment.items[i] ->) organization_item organization_item = versioned_action_request) versioned_action_request

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
PROPERTY_VALUE #1: If property_value is a value_list. #2: If property_value is a string_value. #3: If property_value is a numerical_value or a value_limit and the unit is not assigned globally. #4: If property_value is a value_range. #5: If no significant_digits are given for the value_with_unit. #6: If significant_digits are given for the value_with_unit. #7: If the property_value is a numerical_value or a value_limit and the unit is specified globally.	#1: (compound_representation_item) #2: (descriptive_representation_item) #3: (#5: (measure_representation_item) #6: ([measure_representation_item] [qualified_representation_item])) #4: (#5: (value_range) #6: ([value_range] [qualified_representation_item])) #7: (#5: (value_representation_item) #6: ([value_representation_item] [qualified_representation_item]))	43 45 45 45 45 214 214 45 43 43 45		#2: (descriptive_representation_item {descriptive_representation_item <= representation_item => qualified_representation_item qualified_representation_item.qualifiers[1] -> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name type_qualifier.name = 'string'}) #4: (#5: (value_range <= compound_representation_item) #6: ([value_range <= compound_representation_item] [qualified_representation_item]))
value_name	representation_item.name	43		#1: (compound_representation_item <=) #2: (descriptive_representation_item <=) #3: (measure_representation_item <=) #4: (value_range <= compound_representation_item <=) #7: (value_representation_item <=) representation_item representation_item.name

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
SECURITY_- CLASSIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If property_value_- association is of type item_property_association. #4: If property_value_- association is of type process_property_- association and references an element in the process_- property_select which is not process_operation_- resource_assignment. #5: If property_value_- association is of type process_property_- association and references process_operation_resource_- assignment in the process_- property_select. #6: If the styled_model is used with UoF P2. #7: If the styled_model is used without UoF P2. #8: If no item_version is associated. #9: If an item_version is associated. #10: If product_class is used with UoF S4. #11: If product_class is used with UoF S7.	security_- classification	41		

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
#12: If specification_-category.implicit_-exclusive_condition is FALSE. #13: If specification_-category.implicit_-exclusive_condition is TRUE. #14: If the document_-representation is not a physical_model. #15: If the document_-representation is a physical_model.				
name	security_-classification.name	41		
purpose	security_-classification.purpose	41		
security_-classification to activity (as is_applied_-to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = executed_action executed_action
security_-classification to activity_-element (as is_applied_-to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = applied_action_assignment applied_action_assignment {applied_action_assignment <=

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_assignment action_assignment.role ->object_role object_role.name = 'activity element'}
security_-classification to assembly_-substitute_-relationship (as is_applied_-to)	PATH			security_classification <-security_classification_assignment.assigned_security_classification security_classification_assignment =>applied_security_classification_assignment applied_security_classification_assignment.items[i] ->security_classification_item security_classification_item = assembly_component_usage_substituteassembly_component_usage_substitute
security_-classification to class_-structure_-relationship (as is_applied_-to)	PATH			security_classification <-security_classification_assignment.assigned_security_classification security_classification_assignment =>applied_security_classification_assignment applied_security_classification_assignment.items[i] ->security_classification_item security_classification_item = configuration_designconfiguration_design
security_-classification to classification_-system (as is_applied_-to)	PATH			security_classification <-security_classification_assignment.assigned_security_classification security_classification_assignment =>applied_security_classification_assignment applied_security_classification_assignment.items[i] ->security_classification_item security_classification_item = class_systemclass_system
security_-classification to complex_-product (as is_applied_-to)	PATH			security_classification <-security_classification_assignment.assigned_security_classification security_classification_assignment =>applied_security_classification_assignment applied_security_classification_assignment.items[i] ->security_classification_item security_classification_item = product_definition_formationproduct_definition_formation

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to configuration (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = configured_effectivity_assignment configured_effectivity_assignment
security_- classification to design_- constraint (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_definition_formation product_definition_formation
security_- classification to document (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
security_- classification to document_file (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = document_file

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				document_file
security_- classification to document_- representation (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_definition #14: (product_definition) #15: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
security_- classification to document_- version (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_definition_formation product_definition_formation {product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
security_- classification to drawing (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = drawing_revision drawing_revision:

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to drawing_sheet (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = presentation_area presentation_area => drawing_sheet_revision
security_- classification to geometric_- model (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = shape_representation shape_representation
security_- classification to item (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product product
security_- classification to item_version (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_definition_formation product_definition_formation

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to kinematic_- simulation_- information (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = property_definition property_definition => kinematic_property_definition
security_- classification to manufacturing_- configuration (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = configuration_effectivity configuration_effectivity
security_- classification to material (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = material_designation material_designation
security_- classification to physical_- assembly_- relationship (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = product_definition_relationship product_definition_relationship => {product_definition_relationship.name = 'physical occurrence usage'} product_definition_usage => assembly_component_usage

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to physical_- instance (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
security_- classification to physical_- instance_test_- result (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = property_definition property_definition
security_- classification to process_plan (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = action action => #8: (process_plan) #9: (product_definition_process => product_process_plan)

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to product_class (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = product_concept #10: (product_concept) #11: (product_concept => product_class)
security_- classification to product_- structure_- relationship (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = product_definition_relationship product_definition_relationship => product_definition_usage
security_- classification to project (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = organizational_project organizational_project
security_- classification to property (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->> security_classification_item security_classification_item = general_property general_property

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to property_- value_- association (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item #3: (security_classification_item = property_definition property_definition) #4: (security_classification_item = action_property action_property) #5: (security_classification_item = resource_property resource_property)
security_- classification to specification (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_concept_feature product_concept_feature
security_- classification to specification_- category (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item security_classification_item = product_concept_feature_category #12: (product_concept_feature_category) #13: (product_concept_feature_category => exclusive_product_concept_feature_category)
security_- classification to styled_model (as is_applied_- to)	PATH			#6: (security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] -> security_classification_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				security_classification_item = draughting_model draughting_model) #7: (security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->) security_classification_item security_classification_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
security_- classification to view_area (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->) security_classification_item security_classification_item = presentation_area presentation_area
security_- classification to work_order (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->) security_classification_item security_classification_item = action_directive action_directive
security_- classification to work_request (as is_applied_- to)	PATH			security_classification <- security_classification_assignment.assigned_security_classification security_classification_assignment => applied_security_classification_assignment applied_security_classification_assignment.items[i] ->) security_classification_item security_classification_item = versioned_action_request versioned_action_request

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
security_- classification to security_- level (as level)	PATH			security_classification security_classification.security_level -> security_classification_level
security_- classification to multi_- language_string (as name)	#1: ([security_- classification.name] [PATH]) #2: (PATH)	41	163	security_classification #1: (attribute_language_item = security_classification attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = security_classification multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
security_- classification to multi_- language_string (as purpose)	#1: ([security_- classification. purpose] [PATH]) #2: (PATH)	41	163	security_classification #1: (attribute_language_item = security_classification attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'purpose'}) #2: (multi_language_attribute_item = security_classification multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'purpose'})

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
SECURITY_LEVEL	security_- classification_level	41		
level_name	security_- classification_level. name	41		
security_level to classification_- system (as used_- classification_- system)	PATH		13	security_classification_level classification_item = security_classification_level classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {classification_assignment.role ->> classification_role classification_role.name = 'class system membership'} classification_assignment.assigned_class ->> group => class_system
SPECIFIC_ITEM_- CLASSIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_related_- product_category	41		
classification_- name	product_category.name	41		product_related_product_category <= product_category product_category.name {(product_category.name) (product_category.name = 'application control') (product_category.name = 'assembly') (product_category.name = 'collection') (product_category.name = 'completely knocked down') (product_category.name = 'detail') (product_category.name = 'in process') (product_category.name = 'part') (product_category.name = 'prototype')

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				(product_category.name = 'raw material') (product_category.name = 'regulated') (product_category.name = 'safety') (product_category.name = 'service') (product_category.name = 'tool')}
description	product_category. description	41		product_related_product_category <= product_category product_category.description
specific_item_- classification to item (as associated_- item)	PATH			product_related_product_category product_related_product_category.products[i] ->product
specific_item_- classification to multi_- language_string (as description)	#1: ([product_- category.description] [PATH]) #2: (PATH)	41	155	product_related_product_category #1: (attribute_language_item = product_related_product_category attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_related_product_category multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
SPECIFIC_ITEM_- CLASSIFICATION_- HIERARCHY	product_category_- relationship	41		{product_category_relationship product_category_relationship.name = 'hierarchy'}

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
specific_item_- classification_- hierarchy to specific_item_- classification (as sub_- classification)	PATH			product_category_relationship product_category_relationship.sub_category ->> product_category => product_related_product_category
specific_item_- classification_- hierarchy to specific_item_- classification (as super_- classification)	PATH			product_category_relationship product_category_relationship.category ->> product_category => product_related_product_category
STRING_VALUE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	descriptive_- representation_item	45		{descriptive_representation_item <= representation_item => qualified_representation_item qualified_representation_item.qualifiers[1] ->> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name type_qualifier.name = 'string'}
value_- specification	descriptive_- representation_item. description	45		
string_value to multi_language_- string (as value_- specification)	#1: ([descriptive_- representation_item. description] [PATH]) #2: (PATH)	41		descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <-

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
STRING_WITH_- LANGUAGE #1: If the string_with_- language does not play the role of a additional_- language_dependent_string. #2: if the string_with_- language play the role of an additional_language_- dependent_string.	#1: (attribute_- language_assignment) #2: ([attribute_- language_assignment] [multi_language_- attribute_assignment])	214 214 214		#1: (attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.role ->> classification_role classification_role.name = 'primary'}) #2: ([attribute_language_assignment <= attribute_classification_assignment {attribute_classification_assignment.role ->> classification_role classification_role.name = 'primary'}] [multi_language_attribute_assignment <= attribute_value_assignment {attribute_value_assignment.role ->> attribute_value_role attribute_value_role.name = 'alternate language'} attribute_language_item = attribute_value_assignment attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment <= attribute_classification_assignment {[attribute_classification_assignment.role ->> classification_role classification_role.name = 'translated'] [attribute_classification_assignment.attribute_name = 'attribute_value']}])
contents	#1: (IDENTICAL MAPPING) #2: (attribute_value_- assignment.attribute_- value)	41		#2: (multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_value)
string_with_- language to language (as language_- specification)	PATH			attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.assigned_class -> group => language

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
UNIT #1: If the unit has a commonly used descriptor. #2: If the unit descriptor is constructed of more than one unit name. #3: If the unit is defined with respect to the system of units defined in ISO 10403-41. #4: If the unit is defined with respect to another named_unit by means of a conversion factor. #5: If the unit is dependent on the context of its usage. #6: In order to express a distance. #7: In order to express an amount of matter. #8: In order to express the duration of periods. #9: In order to express the movement of electrically charged particles. #10: In order to express the degree of heat of a body. #11: In order to express a quantity of substance in numbers of atoms. #12: In order to express	#1: (named_unit) #2: (derived_unit)	41 41	21,31	{#1: (named_unit) #18: (named_unit => named_unit_variable <= variable_semantics) #19: (named_unit => context_dependent_unit => expression_conversion_based_unit <= variable_semantics) {named_unit => <#3: (si_unit) #4: (conversion_based_unit) #5: (context_dependent_unit)> <#6: (length_unit) #7: (mass_unit) #8: (time_unit) #9: (electric_current_unit) #10: (thermodynamic_temperature_unit) #11: (amount_of_substance_unit) #12: (luminous_intensity_unit) #13: (plane_angle_unit) #14: (solid_angle_unit) #15: (area_unit) #16: (volume_unit) #17: (ratio_unit)>} #2: (derived_unit) #20: (derived_unit => derived_unit_variable <= variable_semantics)}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
the brightness of a body. #13: In order to express angles in planes. #14: In order to express solid angles. #15: In order to express the extent of a surface. #16: In order to express the solid content of a body. #17: In order to express the ratio between two quantities of the same kind. #18: If the named unit is represented by an explicit expression. #19: If the context dependent unit is represented by an explicit expression. #20: If the derived unit is represented by an explicit expression.				
unit_name	#1: (#3: (si_unit.name) #4: (conversion_based_-unit.name) #5: (context_-dependent_unit.name)) #2: (derived_unit.name)	41 41 41 41		#1: (named_unit => #3: (si_unit si_unit.name) #4: (conversion_based_unit conversion_based_unit.name) #6: (context_dependent_unit context_dependent_unit.name)) #2: (derived_unit derived_unit.name)

Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
VALUE_LIMIT #1: If no significant digits are given for the value_with_unit. #2: If significant digits are given for the value_-with_unit. #3: If the limit is an upper bound. #4: If the limit is a lower bound. #5: If the unit is assigned globally. #6: If the unit is not assigned globally.	#6: (#1: (measure_-representation_item) #2: ([qualified_-representation_item] [measure_-representation_item])) #5: (#1: (value_-representation_item) #2: ([value_-representation_item] [qualified_-representation_item]))	45 45 45 43 43 45	30	
limit	#5: (value_-representation_item. value_component) #6: (measure_with_-unit.value_component)	43 41		#5: (value_representation_item value_representation_item.value_component) #6: ({measure_representation_item <= measure_with_unit {(|measure_with_unit|) (measure_with_unit => (amount_of_substance_measure_with_unit) (area_measure_with_unit) (electric_current_measure_with_unit) (length_measure_with_unit) (luminous_intensity_measure_with_unit) (mass_measure_with_unit) (plane_angle_measure_with_unit) (ratio_measure_with_unit) (solid_angle_measure_with_unit) (thermodynamic_temperature_measure_with_unit) (time_measure_with_unit) (volume_measure_with_unit))} measure_with_unit.value_component {measure_with_unit.value_component ->

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_value (measure_value = area_measure area_measure) (measure_value = amount_of_substance_measure amount_of_substance_measure) (measure_value = length_measure length_measure) (measure_value = electric_current_measure electric_current_measure) (measure_value = plane_angle_measure plane_angle_measure) (measure_value = ratio_measure ratio_measure) (measure_value = parameter_value parameter_value) (measure_value = descriptive_measure descriptive_measure) (measure_value = positive_plane_angle_measure positive_plane_angle_measure) (measure_value = count_measure count_measure) (measure_value = mass_measure mass_measure) (measure_value = time_measure time_measure) (measure_value = thermodynamic_temperature_measure thermodynamic_temperature_measure) (measure_value = luminous_intensity_measure luminous_intensity_measure) (measure_value = solid_angle_measure solid_angle_measure) (measure_value = volume_measure volume_measure) (measure_value = numeric_measure numeric_measure) (measure_value = context_dependent_measure

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				context_dependent_measure) (measure_value = positive_length_measure positive_length_measure) (measure_value = positive_ratio_measure positive_ratio_measure)}})
limit_qualifier	type_qualifier.name	45	49	qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier = type_qualifier type_qualifier {#3: (type_qualifier.name = 'maximum') #4: (type_qualifier.name = 'minimum')}
VALUE_LIST #1: If values[i] is a value_list. #2: If values[i] is a string_value. #3: If values[i] is a numerical_value or a value_-limit and the unit is not assigned globally. #4: If values[i] is a value_range. #5: If no significant_-digits are given for values[i]. #6: If significant_digits are given for values[i]. #7: If values[i] is a numerical_value or a value_-limit and the unit is specified globally.	compound_-representation_item	43		
value_list to property_value (as values)	PATH			compound_representation_item compound_representation_item.item_element ->compound_item_definition compound_item_definition = list_representation_item

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				list_representation_item[i] -> representation_item => #1: (compound_representation_item) #2: (descriptive_representation_item {descriptive_representation_item <= representation_item => qualified_representation_item qualified_representation_item.qualifiers[1] -> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name type_qualifier.name = 'string'}) #3: (#5: (measure_representation_item) #6: ([measure_representation_item] [qualified_representation_item])) #4: (#5: (compound_representation_item => value_range) #6: ([compound_representation_item => value_range] [qualified_representation_item])) #7: (#5: (value_representation_item) #6: ([value_representation_item] [qualified_representation_item]))

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
VALUE_RANGE #1: If no significant digits are given for the value_with_unit. #2: If significant digits are given for the value_-with_unit. #3: If the unit is not assigned globally. #4: If the unit is assigned globally.	#1: (value_range) #2: ([value_range] [qualified_-representation_item])	214 214 45		{value_range <= compound_representation_item}
lower_limit	#3: (measure_with_-unit.value_component) #4: (value_-representation_item.value_component)	41 43	30	value_range <= compound_representation_item compound_representation_item.item_element -> set_representation_item #3: (set_representation_item[i] -> representation_item => {representation_item.name = 'lower limit'} measure_representation_item measure_representation_item <= measure_with_unit {(measure_with_unit) (measure_with_unit => (amount_of_substance_measure_with_unit) (area_measure_with_unit) (electric_current_measure_with_unit) (length_measure_with_unit) (luminous_intensity_measure_with_unit) (mass_measure_with_unit) (plane_angle_measure_with_unit) (ratio_measure_with_unit) (solid_angle_measure_with_unit) (thermodynamic_temperature_measure_with_unit) (time_measure_with_unit) (volume_measure_with_unit))}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit.value_component {measure_with_unit.value_component ->measure_value (measure_value = area_measure area_measure) (measure_value = amount_of_substance_measure amount_of_substance_measure) (measure_value = length_measure length_measure) (measure_value = electric_current_measure electric_current_measure) (measure_value = plane_angle_measure plane_angle_measure) (measure_value = ratio_measure ratio_measure) (measure_value = parameter_value parameter_value) (measure_value = descriptive_measure descriptive_measure) (measure_value = positive_plane_angle_measure positive_plane_angle_measure) (measure_value = count_measure count_measure) (measure_value = mass_measure mass_measure) (measure_value = time_measure time_measure) (measure_value = thermodynamic_temperature_measure thermodynamic_temperature_measure) (measure_value = luminous_intensity_measure luminous_intensity_measure) (measure_value = solid_angle_measure solid_angle_measure) (measure_value = volume_measure volume_measure) (measure_value = numeric_measure

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				numeric_measure) (measure_value = context_dependent_measure context_dependent_measure) (measure_value = positive_length_measure positive_length_measure) (measure_value = positive_ratio_measure positive_ratio_measure))) #4: (set_representation_item[i] ->) representation_item => {representation_item.name = 'lower limit'} value_representation_item value_representation_item.value_component)
upper_limit	#3: (measure_with_- unit.value_component) #4: (value_- representation_item. value_component)	41 43	30	value_range <= compound_representation_item compound_representation_item.item_element -> set_representation_item #3: (set_representation_item[i] ->) representation_item => {representation_item.name = 'upper limit'} measure_representation_item measure_representation_item <= measure_with_unit {([measure_with_unit]) (measure_with_unit => (amount_of_substance_measure_with_unit) (area_measure_with_unit) (electric_current_measure_with_unit) (length_measure_with_unit) (luminous_intensity_measure_with_unit) (mass_measure_with_unit) (plane_angle_measure_with_unit) (ratio_measure_with_unit) (solid_angle_measure_with_unit) (thermodynamic_temperature_measure_with_unit) (time_measure_with_unit) (volume_measure_with_unit))}

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit.value_component {measure_with_unit.value_component -> measure_value (measure_value = area_measure area_measure) (measure_value = amount_of_substance_measure amount_of_substance_measure) (measure_value = length_measure length_measure) (measure_value = electric_current_measure electric_current_measure) (measure_value = plane_angle_measure plane_angle_measure) (measure_value = ratio_measure ratio_measure) (measure_value = parameter_value parameter_value) (measure_value = descriptive_measure descriptive_measure) (measure_value = positive_plane_angle_measure positive_plane_angle_measure) (measure_value = count_measure count_measure) (measure_value = mass_measure mass_measure) (measure_value = time_measure time_measure) (measure_value = thermodynamic_temperature_measure thermodynamic_temperature_measure) (measure_value = luminous_intensity_measure luminous_intensity_measure) (measure_value = solid_angle_measure solid_angle_measure) (measure_value = volume_measure volume_measure) (measure_value = numeric_measure

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Table 23 – Mapping table product_management_data UoF (S1) (continued)

Application element	AIM element	Source	Rules	Reference path
				numeric_measure) (measure_value = context_dependent_measure context_dependent_measure) (measure_value = positive_length_measure positive_length_measure) (measure_value = positive_ratio_measure positive_ratio_measure)}) #4: (set_representation_item[i] ->> representation_item => {representation_item.name = 'upper limit'} value_representation_item value_representation_item.value_component)
VALUE_WITH_UNIT #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range. #3: If no significant digits are given for the value_with_unit. #4: If significant digits are given for the value_- with_unit. #5: If the unit has a commonly used descriptor. #6: If the unit descriptor is constructed of more than one unit name. #7: If the value_with_- unit is a numerical_value or a value_limit and the unit is specified globally.	#1: (#3: (measure_- representation_item) #4: ([measure_- representation_item] [qualified_- representation_item])) #2: (#3: (value_- range) #4: ([value_range] [qualified_- representation_item])) #7: (#3: (value_- representation_item) #4: ([value_- representation_item] [qualified_- representation_item]))	45 45 45 214 214 45 43 43 45		#2: ({value_range <= compound_representation_item})

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Table 23 – Mapping table product_management_data UoF (S1) (concluded)

Application element	AIM element	Source	Rules	Reference path
significant_- digits	precision_qualifier. precision_value	45	38	qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier value_qualifier = precision_qualifier precision_qualifier precision_qualifier.precision_value
value_with_unit to unit (as unit_- component)	PATH			#1: (measure_representation_item <=) #2: (compound_representation_item compound_representation_item.item_element ->compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] ->representation_item => measure_representation_item <=) measure_with_unit measure_with_unit.unit_component ->unit #5: (unit = named_unit named_unit) #6: (unit = derived_unit derived_unit)

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The use of the subtype product_definition_formation_with_specified_source is not recommended in the general case. If compatibility with AP203 is required for a postprocessor, the postprocessor should at a minimum process the information from the supertype entity product_definition_formation.

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Table 24 – Mapping table element_structure UoF (S2)

Application element	AIM element	Source	Rules	Reference path
ACCURACY #1: For global assignments. #2: For partial models. #3: For single items. #4: For the primary_-language_dependent_string. #5: For any additional_-language_dependent_string. #6: If the face is used with UoF G3 or G5. #7: If the face is defined by an associated surface. #8: If the face is not defined by an associated surface. #9: If the edge is defined by another edge. #10: If the edge is fully defined.	#1: (global_-uncertainty_assigned_-context) #2: (uncertainty_-assigned_-representation) #3: (qualified_-representation_item)	43 43 45	6	
accuracy_type	#1: (uncertainty_-measure_with_unit.name) #2: (uncertainty_-measure_with_unit.name) #3: (uncertainty_-qualifier.measure_-name)	43 43 45	30,43,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit uncertainty_measure_with_unit.name {(uncertainty_measure_with_unit.name) (uncertainty_measure_with_unit.name = 'angular accuracy') (uncertainty_measure_with_unit.name = 'curvature accuracy') (uncertainty_measure_with_unit.name = 'distance accuracy')}) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] ->value_qualifier

Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				value_qualifier = uncertainty_qualifier uncertainty_qualifier uncertainty_qualifier.measure_name {[(uncertainty_qualifier.measure_name = 'angular accuracy') (uncertainty_qualifier.measure_name = 'curvature accuracy') (uncertainty_qualifier.measure_name = 'distance accuracy')] [uncertainty_qualifier => standard_uncertainty]})
accuracy_value	#1: (measure_with_- unit.value_component) #2: (measure_with_- unit.value_component) #3: (standard_- uncertainty. uncertainty_value)	41 45	30,43,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit <= measure_with_unit measure_with_unit.value_component) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] ->) value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier => standard_uncertainty standard_uncertainty.uncertainty_value)
description	#1: (uncertainty_- measure_with_unit. description) #2: (uncertainty_- measure_with_unit. description) #3: (uncertainty_- qualifier.description)	43 43 45	30,50	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->) uncertainty_measure_with_unit uncertainty_measure_with_unit.description) #3: (qualified_representation_item qualified_representation_item.qualifiers[i] ->) value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier.description)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				uncertainty_qualifier.description)
accuracy to multi_language_- string (as description)	#1: (#4: ([uncertainty_measure_- with_unit.description] [PATH]) #5: (PATH))	43	169,170	(#1: (global_uncertainty_assigned_context global_uncertainty_assigned_context.uncertainty[i] ->) #2: (uncertainty_assigned_representation uncertainty_assigned_representation.uncertainty[i] ->)
	#2: (#4: ([uncertainty_measure_- with_unit.description] [PATH]) #5: (PATH))	43		uncertainty_measure_with_unit #4: (attribute_language_item = uncertainty_measure_with_unit attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #5: (multi_language_attribute_item = uncertainty_measure_with_unit multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
	#3: (#4: ([uncertainty_- qualifier.description] [PATH]) #5: (PATH))	45		#3: (qualified_representation_item qualified_representation_item.qualifiers[i] -> value_qualifier value_qualifier = uncertainty_qualifier uncertainty_qualifier #4: (attribute_language_item = uncertainty_qualifier attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #5: (multi_language_attribute_item = uncertainty_qualifier multi_language_attribute_item <- multi_language_attribute_assignment.items[i]

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
accuracy to face (as is_defined_- for)	PATH			qualified_representation_item <= representation_item => topological_representation_item => face => #6: (face_surface => advanced_face) #7: (face_surface) #8: (oriented_face)
accuracy to geometric_model (as is_defined_- for)	PATH			#1: (global_uncertainty_assigned_context <= representation_context <- representation.context_of_items representation => shape_representation) #2: (uncertainty_assigned_representation <= representation => shape_representation)
accuracy to oriented_edge_- curve (as is_defined_- for)	PATH			qualified_representation_item <= representation_item => topological_representation_item => edge => #9: (oriented_edge) #10: (edge_curve)
accuracy to vertex_point (as is_defined_- for)	PATH			qualified_representation_item <= representation_item => geometric_representation_item => vertex_point

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
AXIS_PLACEMENT #1: For orientation and location of a single axis. #2: For orientation and location of two mutually perpendicular axes in two-dimensional space. #3: For orientation and location of two mutually perpendicular axes in three-dimensional space.	placement	42		{placement => #1: (axis1_placement) #2: (axis2_placement_2d) #3: (axis2_placement_3d)}
CARTESIAN_- COORDINATE_SPACE #1: If the unit has a commonly used descriptor. #2: If the unit descriptor is constructed of more than one unit name.	geometric_- representation_context	42	52	
cartesian_- coordinate_space to unit (as unit_of_- values)	#1: (named_unit) #2: (derived_unit)	41 41	63	geometric_representation_context <= representation_context => global_unit_assigned_context global_unit_assigned_context.units[i] ->> unit #1: (unit = named_unit named_unit) #2: (unit = derived_unit derived_unit)
CARTESIAN_- COORDINATE_SPACE_- 2D	geometric_- representation_context	42	52	{geometric_representation_context geometric_representation_context.coordinate_space_dimension = 2}
CARTESIAN_- COORDINATE_SPACE_- 3D	geometric_- representation_context	42	52	{geometric_representation_context geometric_representation_context.coordinate_space_dimension = 3}

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
CHANGE #1: If the described_- change is a design_- constraint_relationship, a replaced_definition_- relationship, or a replaced_usage_- relationship. #2: If the described_- change is a complex_- product_relationship, or an item_version_- relationship. #3: If the described_- change is a process_plan_- relationship or process_- operation_occurrence_- relationship. #4: If the described_- change is a shape_element_- relationship. #5: If replaced_usage_- relationship.usage_context is a process_operation_- input_or_output. #6: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship or a product_structure_- relationship. #7: For the primary_- language_dependent_string. #8: For any additional_- language_dependent_string.	#1: (product_- definition_- relationship) #2: (product_- definition_formation_- relationship) #3: (action_- relationship) #4: (shape_aspect_- relationship)	41 41 41 41		{#1: (product_definition_relationship product_definition_relationship.name = 'change') #2: (product_definition_formation_relationship product_definition_formation_relationship.name = 'change') #3: (action_relationship action_relationship.name = 'change') #4: (shape_aspect_relationship shape_aspect_relationship.name = 'change')}

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
description	#1: (product_-definition_-relationship.description) #2: (product_-definition_formation_-relationship.description) #3: (action_-relationship.description) #4: (shape_aspect_-relationship.description)	41 41 41 41		
change to complex_product_-relationship (as described_-change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation] product_definition_formation_relationship
change to design_-constraint_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
change to item_-version_-relationship (as described_-change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation] product_definition_formation_relationship
change to process_-operation_-occurrence_-relationship (as described_-change)	PATH			action_relationship {action_relationship.name = 'change'} [action_relationship.relating_action -> action <- action_relationship.relating_action] [action_relationship.related_action -> action <- action_relationship.related_action] action_relationship
change to process_plan_-relationship (as described_-change)	PATH			action_relationship {action_relationship.name = 'change'} [action_relationship.relating_action -> action <- action_relationship.relating_action] [action_relationship.related_action -> action <- action_relationship.related_action] action_relationship
change to replaced_-definition_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition_relationship.name = 'definition replacement'}
change to replaced_usage_- relationship (as described_- change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} #5: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship {product_definition_relationship.name = 'usage replacement'}) #6: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.related_product_definition product_definition_relationship <- product_definition_substitute.context_relationship] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_substitute.substitute_definition] product_definition_substitute)
change to shape_- element_- relationship (as described_- change)	PATH			shape_aspect_relationship {shape_aspect_relationship.name = 'change'} [shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- shape_aspect_relationship.relating_shape_aspect] [shape_aspect_relationship.related_shape_aspect -> shape_aspect <- shape_aspect_relationship.related_shape_aspect] shape_aspect_relationship
change to multi_- language_string (as description)	#1: (#7: ([product_- definition_- relationship. description] [PATH]) #8: (PATH)) #2: (#7: ([product_-	41 41	108,152, 153,165	#7: (#1: (product_definition_relationship attribute_language_item = product_definition_relationship) #2: (product_definition_formation_relationship attribute_language_item = product_definition_formation_relationship) #3: (action_relationship attribute_language_item = action_relationship) #4: (shape_aspect_relationship

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
	definition_formation_- relationship. description] [PATH]) #8: (PATH)) #3: (#7: ([action_- relationship. description] [PATH]) #8: (PATH)) #4: (#7: ([shape_- aspect_relationship. description] [PATH]) #8: (PATH))	41 41		attribute_language_item = shape_aspect_relationship) attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #8: (#1: (product_definition_relationship multi_language_attribute_item = product_definition_relationship) #2: (product_definition_formation_relationship multi_language_attribute_item = product_definition_formation_relationship) #3: (action_relationship multi_language_attribute_item = action_relationship) #4: (shape_aspect_relationship multi_language_attribute_item = shape_aspect_relationship) multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
CONSTRUCTIVE_- GEOMETRIC_- ELEMENT #1: If the constructive_- geometric_element is a placement in 2d context. #2: If the constructive_- geometric_element is a placement in 3d context. #3: If the constructive_- geometric_element is a point. #4: If the constructive_- geometric_element is a curve. #5: If the constructive_- geometric_element is a face or a surface. #6: If the constructive_- geometric_element is an oriented edge or an oriented face. #7: If the constructive_- geometric_element is a face that is defined by an associated surface. #8: For the primary_- language_dependent_string. #9: For any additional_- language_dependent_string.	#1: (axis2_placement_- 2d) #2: (axis2_placement_- 3d) #3: ((cartesian_- point) (point_on_curve) (point_on_surface) (vertex_point) (point_replica) (degenerate_pcurve)) #4: (curve) #5: ((advanced_face) (face_surface) (surface)) #6: ((oriented_edge) (oriented_face)) #7: (face_surface)	42 42 42 42 42 42 42 42 511 42 42 42 42 42		
description	representation_item. name	43		(#1: (axis2_placement_2d <= placement <=) #2: (axis2_placement_3d <= placement <=) #3: (((cartesian_point <=)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(point_on_curve <=) (point_on_surface <=) (point_replica <=) (point_on_surface <=) (degenerate_pcurve <=) point <=) (vertex_point <=)) #6: (curve <=) #10: ((advanced_face <= face_surface <=) (face_surface <=) (surface <=)) geometric_representation_item <=) (#12: ((oriented_edge <= edge <=) (oriented_face <= face <=)) #14: (face_surface <= face <=) topological_representation_item <=)
				representation_item representation_item.name
constructive_- geometric_- element to multi_- language_string (as description)	#5: ([representation_- item.name] [PATH]) #4: (PATH)	43	129,168	(#1: (axis2_placement_2d <= placement <=) #2: (axis2_placement_3d <= placement <=) #3: (((cartesian_point <=) (point_on_curve <=) (point_on_surface <=) (point_replica <=) (point_on_surface <=) (degenerate_pcurve <=))

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				point <=) (vertex_point <=)) #4: (curve <=) #5: ((advanced_face <= face_surface <=) (face_surface <=) (surface <=))
				geometric_representation_item #8: (attribute_language_item = geometric_representation_item) #9: (multi_language_attribute_item = geometric_representation_item))
				(#6: ((oriented_edge <= edge <=) (oriented_face <= face <=)) #7: (face_surface <= face <=)
				topological_representation_item #8: (attribute_language_item = topological_representation_item) #9: (multi_language_attribute_item = topological_representation_item))
				#8: (attribute_language_item <- attribute_language_assignment.items[i] {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name= 'description'})
				#9: (multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
constructive_- geometric_- element to axis_- placement (as element)	IDENTICAL MAPPING			{#1: (axis2_placement_2d <=) #2: (axis2_placement_3d <=) placement}
constructive_- geometric_- element to curve (as element)	IDENTICAL MAPPING			
constructive_- geometric_- element to face (as element)	IDENTICAL MAPPING			
constructive_- geometric_- element to oriented_edge_- curve (as element)	IDENTICAL MAPPING			
constructive_- geometric_- element to point (as element)	IDENTICAL MAPPING			
constructive_- geometric_- element to surface (as element)	IDENTICAL MAPPING			
constructive_- geometric_- element to vertex_point (as element)	IDENTICAL MAPPING			

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
CONSTRUCTIVE_-GEOMETRY #1: If the constructive_-geometric_element is a placement in 2d context. #2: If the constructive_-geometric_element is a placement in 3d context. #3: If the constructive_-geometric_element is a placement in 2d context. #4: If the constructive_-geometric_element is a curve. #5: If the constructive_-geometric_element is a face or a surface. #6: If the constructive_-geometric_element is an oriented edge or an oriented face. #7: If the constructive_-geometric_element is a face that is defined by an associated surface. #8: For the primary_-language_dependent_string. #9: For any additional_-language_dependent_string.	constructive_geometry_-representation	214	52	constructive_geometry_representation <= representation {representation.context_of_items -> representation_context => geometric_representation_context #1: (geometric_representation_context.coordinate_space_dimension = 2) #2: (geometric_representation_context.coordinate_space_dimension = 3)}
name	representation.name	43		constructive_geometry_representation <= representation representation.name

Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
constructive_- geometry to constructive_- geometric_- element (as element)	PATH			constructive_geometry_representation <= representation representation.items[i] ->) representation_item => (geometric_representation_item => #1: (placement => axis2_placement_2d) #2: (placement => axis2_placement_3d) #3: (point => (cartesian_point) (point_on_curve) (point_on_surface) (point_replica) (point_on_surface) (degenerate_pcurve)) #9: (vertex_point) #4: (curve) #5: ((face_surface => advanced_face) (face_surface) (surface))) (topological_representation_item => #6: ((edge => oriented_edge) (face => oriented_face)) #7: (face => face_surface))
constructive_- geometry to multi_language_- string (as name)	#1: ([representation. name] [PATH]) #2: (PATH)	43	158	constructive_geometry_representation <= representation #8: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #9: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
CONSTRUCTIVE_- GEOMETRY_- ASSOCIATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	constructive_geometry_- representation_- relationship	214		constructive_geometry_representation_relationship <= representation_relationship
description	representation_- relationship. description	43		constructive_geometry_representation_relationship <= representation_relationship representation_relationship.description
constructive_- geometry_- association to constructive_- geometry (as auxiliary_- geometry)	PATH			constructive_geometry_representation_relationship <= representation_relationship representation_relationship.rep_2 ->> constructive_geometry_representation
constructive_- geometry_- association to constructive_- geometry (as base_- geometry)	PATH			constructive_geometry_representation_relationship <= representation_relationship representation_relationship.rep_1 ->> representation_=> constructive_geometry_representation

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
constructive_- geometry_- association to geometric_model (as base_- geometry)	PATH			constructive_geometry_representation_relationship <= representation_relationship representation_relationship.rep_1 ->> representation => shape_representation
constructive_- geometry_- association to multi_language_- string (as description)	#1: ([representation_- relationship. description] [PATH]) #2: (PATH)	43	139	constructive_geometry_representation_relationship <= representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
FULL_MODEL_- CHANGE #1: The general case for full_model_change. #2: If the described_-change is a process_plan_-relationship or process_-operation_occurrence_-relationship. #3: If the added element is part of a geometric_-model. #4: If the added element is a template_instance. #5: If the added element is part of a topological model. #6: If the detailed_-element is a styled_-element. #7: If the detailed_-element is a draughting_-callout. #8: If the styled_model is used with UoF P2. #9: If the styled_model is used without UoF P2.	#1: (property_-definition) #2: (action_property)	41 49	61,62	{#1: (property_definition property_definition.name = 'full model change') #2: (action_property action_property.name = 'full model change')}
full_model_-change to detailed_element (as added_-element)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'added elements'} property_definition_representation.used_representation ->) #2: (action_property <-

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_property_representation.property action_property_representation {action_property_representation.name = 'added elements'} action_property_representation.representation ->) representation {representation.name = 'added elements'} representation.items[i] ->) representation_item => {representation_item <- representation.items[i] representation <- #1: (property_definition_representation.used_representation property_definition_representation {property_definition_representation.name ='replacement representation'} property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition) #2: (action_property_representation.representation action_property_representation {action_property_representation.name = 'replacement representation'} action_property_representation.property ->) action_property)} #3: (geometric_representation_item) #4: (mapped_item) #5: (topological_representation_item) #6: (styled_item) #7: (geometric_representation_item => draughting_callout => draughting_elements)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
full_model_- change to geometric_model_- relationship (as related_- description)	PATH			#1: (property_definition [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'original representation'} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_1] [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'replacement representation'} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_2]) #2: (action_property <- [action_property_representation.property action_property_representation {action_property_representation.name = 'original representation'} action_property_representation.representation -> representation <- {representation => shape_representation} representation_relationship.rep_1] [action_property_representation.property action_property_representation {action_property_representation.name = 'replacement representation'} representation <- {representation => shape_representation}

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_relationship.rep_2])
				representation_relationship
full_model_- change to styled_- model_- relationship (as related_- description)	PATH			#1: (property_definition [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'original representation'} property_definition_representation.used_representation -> representation <- {representation => #8: (draughting_model) #9: (mechanical_design_geometric_presentation_representation)} representation_relationship.rep_1] [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'replacement representation'} property_definition_representation.used_representation -> representation <- {representation => #8: (draughting_model) #9: (mechanical_design_geometric_presentation_representation)} representation_relationship.rep_2]) #2: (action_property <- [action_property_representation.property action_property_representation {action_property_representation.name = 'original representation'} action_property_representation.representation -> representation <- {representation => #8: (draughting_model) #9: (mechanical_design_geometric_presentation_representation)} representation_relationship.rep_1]

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				[action_property_representation.property action_property_representation {action_property_representation.name = 'replacement representation'} action_property_representation.representation ->[1] representation <- {representation => #8: (draughting_model) #9: (mechanical_design_geometric_presentation_representation)} representation_relationship.rep_2[] representation_relationship
full_model_- change to view_- area_- relationship (as related_- description)	PATH			#1: (property_definition [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'original representation'} property_definition_representation.used_representation ->[1] representation <- {representation => presentation_representation => presentation_area} representation_relationship.rep_1] [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'replacement representation'} property_definition_representation.used_representation ->[1] representation <- {representation => presentation_representation => presentation_area} representation_relationship.rep_2]) #2: (action_property <- [action_property_representation.property

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_property_representation {action_property_representation.name = 'original representation'} action_property_representation.representation -> representation <- {representation => presentation_representation => presentation_area} representation_relationship.rep_1] [action_property_representation.property action_property_representation {action_property_representation.name = 'replacement representation'} representation <- {representation => presentation_representation => presentation_area} representation_relationship.rep_2]) representation_relationship
full_model_- change to view_- relationship (as related_- description)	PATH			#1: (property_definition [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'original representation'} property_definition_representation.used_representation -> representation <- {representation => presentation_representation => presentation_view} representation_relationship.rep_1] [represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'original representation'} property_definition_representation.used_representation ->

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation <- {representation => presentation_representation => presentation_view} representation_relationship.rep_2]) #2: (action_property <- [action_property_representation.property action_property_representation {action_property_representation.name = 'original representation'} action_property_representation.representation -> representation <- {representation => presentation_representation => presentation_view} representation_relationship.rep_1] [action_property_representation.property action_property_representation {action_property_representation.name = 'original representation'} representation <- {representation => presentation_representation => presentation_view} representation_relationship.rep_2]) representation_relationship
GENERAL_SHAPE_- DEPENDENT_- PROPERTY	representation	43		
property_type	representation.name	43		{(representation.name) (representation.name = 'surface area') (representation.name = 'volume') (representation.name = 'centroid')}
property_value	representation_item	43		representation representation.items[i] -> representation_item {(representation_item.name)
				([representation_item.name = 'surface area'] [representation_item => measure_representation_item <= measure_with_unit

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit.value_component -> measure_value measure_value measure_value = area_measure area_measure]) ([representation_item.name = 'volume'] [representation_item => measure_representation_item <= measure_with_unit measure_with_unit.value_component -> measure_value measure_value = volume_measure volume_measure]) ([representation_item.name = 'centroid'] [representation_item => geometric_representation_item => point => cartesian_point])}
GEOMETRIC_MODEL #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the unit is assigned globally. #4: If the unit is not assigned globally. #5: If the geometric_- model is used in 2d context. #6: If the geometric_- model is used in 3d context.	shape_representation	41		

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
description	representation. description	43		shape_representation <= representation representation.description
model_extent	#3: (value_- representation_item) #4: (measure_- representation_item)	43 45	30	shape_representation <= representation <- representation_relationship.rep_1 representation_relationship {representation_relationship.name = 'model extent association'} representation_relationship.rep_2 ->>br>representation {representation.name = 'model extent representation'} representation.items[i] ->>br>representation_item =>>br>{representation_item.name = 'model extent value'} #3: (value_representation_item) #4: (measure_representation_item)
model_id	representation.id	43		shape_representation <= representation representation.id
geometric_model to template_- instance (as additional_- element)	PATH			shape_representation <= representation representation.items[i] ->>br>representation_item =>>br>mapped_item
geometric_model to multi_- language_string (as description)	#1: ([representation. description] [PATH]) #2: (PATH)	43	158	shape_representation <= representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
geometric_model to cartesian_-coordinate_space (as is_defined_-in)	PATH			shape_representation <= representation representation.context_of_items -> representation_context => geometric_representation_context #5: ({geometric_representation_context.coordinate_space_dimension = 2}) #6: ({geometric_representation_context.coordinate_space_dimension = 3})
GEOMETRIC_MODEL_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	representation_-relationship	43		
description	representation_-relationship. description	43		
relation_type	representation_-relationship.name	43		
geometric_model_-relationship to multi_language_-string (as description)	#1: ([representation_-relationship. description] [PATH]) #2: (PATH)	43	159	representation_relationship #1: (attribute_language_item = representation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
geometric_model_-relationship to geometric_model (as related)	PATH			representation_relationship representation_relationship:rep_2 -> representation => shape_representation

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
geometric_model_- relationship to geometric_model (as relating)	PATH			representation_relationship representation_relationship.rep_1 ->> representation
GEOMETRIC_MODEL_- RELATIONSHIP_- WITH_- TRANSFORMATION #1: If the transformation is implicitely defined by two items. #2: For a two-dimensional transformation. #3: For a three-dimensional transformation. #4: If the item is a placement. #5: If the item is a transformation operator. #6: If the transformation is explicitly defined.	representation_- relationship_with_- transformation	43		
geometric_model_- relationship_- with_- transformation to transformation (as model_- placement)	PATH			representation_relationship_with_transformation representation_relationship_with_transformation.transformation_operator ->> transformation #1: (transformation = item_defined_transformation item_defined_transformation {#2: ([item_defined_transformation.transform_item_1 ->> representation_item => geometric_representation_item => placement => axis2_placement_2d] [item_defined_transformation.transform_item_2 ->> representation_item => geometric_representation_item => #4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0}

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				cartesian_transformation_operator_2d)]) #3: ([item_defined_transformation.transform_item_1 ->) representation_item => geometric_representation_item => placement => axis2_placement_3d] [item_defined_transformation.transform_item_2 ->) representation_item => geometric_representation_item => #4: (placement => axis2_placement_3d) #5: (cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0} cartesian_transformation_operator_3d)])}) #6: (transformation = functionally_defined_transformation functionally_defined_transformation {functionally_defined_transformation => cartesian_transformation_operator => {cartesian_transformation_operator.scl = 1.0} #2: (cartesian_transformation_operator_2d) #3: (cartesian_transformation_operator_3d)})
GEOMETRIC_MODEL_- VERSION	shape_representation	41		{shape_representation identification_item = shape_representation identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment identification_assignment.role -> identification_role identification_role.name = 'version'}
version_id	identification_- assignment.assigned_id	41	29,208	shape_representation identification_item = shape_representation identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
GROUP #1: The general case for the group. #2: If the group is member of a layer. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string. #5: If the detailed_-element is part of a geometric model. #6: If the detailed_-element is a template instance. #7: If the detailed_-element is part of a topological model. #8: If the detailed_-element is a styled_-element. #9: If the detailed_-element is a draughting_-callout.	#1: (group) #2: (rep_item_group)	41 214		#2: ({rep_item_group <= [group] [representation_item] {representation_item <- representation.items[i] representation representation.name = 'group representation'}})
name	group.name	41		#1: (group) #2: (rep_item_group <= group) group.name
purpose	group.description	41		#2: (rep_item_group <= group)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(group) group.description
group to detailed_element (as element)	PATH			#1: (group <-) #2: (rep_item_group <= group <-) group_assignment.assigned_group group_assignment => {group_assignment.role -> object_role object_role.name = 'group membership'} applied_group_assignment applied_group_assignment.items[i] -> group_item #5: (group_item = geometric_representation_item geometric_representation_item) #7: (group_item = topological_representation_item topological_representation_item) #6: (group_item = mapped_item mapped_item) #8: (group_item = styled_item styled_item) #9: (group_item = geometric_representation_item geometric_representation_item => draughting_callout => draughting_elements)
group to shape_-element (as element)	PATH			#1: (group <- group_assignment.assigned_group group_assignment => {group_assignment.role -> object_role object_role.name = 'group membership'} applied_group_assignment applied_group_assignment.items[i] -> group_item

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				group_item = shape_aspect shape_aspect) #2: (see NOTE 1)[1)]
group to multi_- language_string (as name)	#3: ([group.name] [PATH]) #4: (PATH)	41	131	#1: (group) #2: (rep_item_group <= group) #3: (attribute_language_item = group attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #4: (multi_language_attribute_item = group multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
group to multi_- language_string (as purpose)	#3: ([group. description] [PATH]) #4: (PATH)	41	131	#1: (group) #2: (rep_item_group <= group) #3: (attribute_language_item = group attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = group multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
GROUP_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	group_relationship	41		
description	group_relationship. description	41		
relation_type	group_relationship. name	41		
group_- relationship to multi_language_- string (as description)	#1: ([group_- relationship. description] [PATH]) #2: (PATH)	41	132	group_relationship #1: (attribute_language_item = group_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = group_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
group_- relationship to group (as related)	PATH			group_relationship group_relationship.related_group ->group
group_- relationship to group (as relating)	PATH			group_relationship group_relationship.relating_group ->group

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
HYBRID_GEOMETRIC_- MODEL_3D	shape_representation	41	192	{shape_representation <= representation representation.name = 'hybrid 3d shape representation'}
hybrid_geometric_- model_3d to detailed_- geometric_model_- element (as element)	PATH			shape_representation <= representation representation.items[i] ->> representation_item => geometric_representation_item
INCREMENTAL_- MODEL_CHANGE #1: The general case for the incremental_model_-change. #2: If the described_-change is a process_plan_-relationship or process_-operation_occurrence_-relationship. #3: If the styled_model is used with UoF P2. #4: If the styled_model is used without UoF P2.	#1: (property_-definition) #2: (action_property)	41 49		{#1: (property_definition property_definition.name = 'incremental model change') #2: (action_property action_property.name = 'incremental model change')}
incremental_- model_change to geometric_model (as added_- element)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'added element'} property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation {action_property_representation.name = 'added element'} action_property_representation.representation ->)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation => shape_representation
incremental_- model_change to styled_model (as added_- element)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'added element'} property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation {action_property_representation.name = 'added element'} action_property_representation.representation ->) representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
incremental_- model_change to geometric_model (as basis_model)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'basis model'} property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation {action_property_representation.name = 'basis model'} action_property_representation.representation ->) representation => shape_representation

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
incremental_- model_change to incremental_- model_change (as basis_model)	PATH			#1: (property_definition <- property_definition_relationship.related_property_definition property_definition_relationship {property_definition_relationship.name = 'basis model'} property_definition_relationship.relating_property_definition ->) property_definition {property_definition.name = 'incremental model change'}) #2: (action_property <- {action_property.name = 'incremental model change'} action_property_representation.property action_property_representation {action_property_representation.name = 'added element'} action_property_representation.representation -> representation <- representation_relationship.rep_2 representation_relationship representation_relationship.rep_1 -> representation <- action_property_representation.representation {action_property_representation.name = 'basis model'} action_property_representation.property -> action_property {action_property.name = 'incremental_model change'})
incremental_- model_change to styled_model (as basis_model)	PATH			#1: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'basis model'} property_definition_representation.used_representation ->) #2: (action_property <- action_property_representation.property action_property_representation {action_property_representation.name = 'basis model'} action_property_representation.representation ->)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation => #3: (draughting_model) #4: (mechanical_design_geometric_presentation_representation)
ITEM_SHAPE #1: If item_instance is used in the context of UoF S7. #2: If item_instance is not used in the context of UoF S7. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	product_definition_-shape	41		
description	property_definition.description	41		product_definition_shape <= property_definition property_definition.description
item_shape to design_-discipline_item_-definition (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
item_shape to item_instance (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				#1: (characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #2: (characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
item_shape to physical_-instance (as described_-object)	PATH			product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
item_shape to multi_language_-string (as description)	#3: ([property_-definition.description][PATH]) #4: (PATH)	41	156	product_definition_shape <= property_definition #3: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
LAYER #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the element is part of a geometric model. #4: If the element is part of a topological model. #5: If the element is a template instance. #6: If the detailed_- element is a styled_- element. #7: If the detailed_- element is a draughting_- callout.	presentation_layer_- assignment	46		
description	presentation_layer_- assignment.description	46		
id	presentation_layer_- assignment.name	46		
layer to multi_- language_string (as description)	#1: ([presentation_- layer_assignment. description] [PATH]) #2: (PATH)	46	143	presentation_layer_assignment #1: (attribute_language_item = presentation_layer_assignment attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = presentation_layer_assignment multi_language_attribute_item <- multi_language_attribute_assignment.items[i]

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
layer to detailed_element (as element)	PATH			presentation_layer_assignment presentation_layer_assignment.assigned_items[i] ->) layered_item = representation_item representation_item => #3: (geometric_representation_item) #4: (topological_representation_item) #5: (mapped_item) #6: (styled_item) #7: (geometric_representation_item => draughting_callout => draughting_elements)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
MODEL_CHANGE #1: If the model_change is a complete replacement. #2: If the model_change is a series of incremental changes to one basis model. #3: If the element is part of a geometric model. #4: If the element is a template instance. #5: If the element is part of a topological model. #6: If the detailed_-element is a styled_-element. #7: If the detailed_-element is a draughting_-callout. #8: For the primary_-language_dependent_string. #9: For any additional_-language_dependent_string. #10: The general case for model change. #11: If the described_-change is a complex_-product_relationship, or an item_version_-relationship. #12: If the described_-change is a shape_element_-relationship. #13: If the described_-change is a process_plan_-	#10: (property_-definition) #13: (action_-property)	41 49		{#1: (#10: (property_definition property_definition.name = 'full model change') #13: (action_property action_property.name = 'full model change')) #2: (#10: (property_definition property_definition.name = 'incremental model change') #13: (action_property action_property.name = 'incremental model change'))}

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
relationship or process_-operation_occurrence_-relationship. #14: If the described_-change is a design_-constraint_relationship, a replaced_definition_-relationship, or a replaced_usage_-relationship.				
description	#10: (property_-definition.description) #13: (action_property.description)	41 49		
id	identification_-assignment.assigned_id	41	29	#10: (property_definition identification_item = property_definition) #13: (action_property identification_item = action_property) identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->identification_role identification_role.name = 'model change id'} identification_assignment.assigned_id
model_change to detailed_element (as deleted_-element)	PATH		61,62	#10: (property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation.name = 'deleted elements'} property_definition_representation.used_representation ->)

Table24 – Mapping table element_structure UoF (S2) (continued)

Application element	ARM element	Source	Rules	Reference path
				#13: (action_property <- action_property_representation.property action_property_representation {action_property_representation.name = 'deleted elements'} action_property_representation.representation ->) representation {representation.name = 'deleted elements'} representation.items[i] ->) representation_item => {representation_item <- representation.items[i] representation <- #10: (property_definition_representation.used_representation property_definition_representation {property_definition_representation.name ='original representation'} property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition) #13: (action_property_representation.representation action_property_representation {action_property_representation.name = 'original representation'} action_property_representation.property ->) action_property)} #3: (geometric_representation_item) #4: (mapped_item) #5: (topological_representation_item) #6: (styled_item) #7: (geometric_representation_item => draughting_callout => draughting_elements)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
model_change to multi_language_-string (as description)	#10: (#8: ([property_-definition. description] [PATH]) #9: (PATH))	41	107,156	#10: (property_definition #8: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #9: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
	#13: (#8: ([action_-property.description] [PATH]) #9: (PATH))	49		#13: (action_property #8: (attribute_language_item = action_property attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #9: (multi_language_attribute_item = action_property multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
model_change to change (as is_-describing)	PATH			#10: (property_definition property_definition.definition -> characterized_definition (characterized_definition = characterized_product_definition characterized_product_definition #14: (characterized_product_definition = product_definition_relationship

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_relationship {product_definition_relationship.name = 'change'}) #11: (characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition.formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'})) #12: (characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship)) #13: (action_property action_property.definition -> characterized_action_definition characterized_action_definition = action_relationship action_relationship)
SHAPE_DEPENDENT_-PROPERTY #1: if used as a shape_-dependent_property of product data. #2: For any other usages of shape_dependent_-property. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	representation	43		

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
description	representation. description	43		
value_- determination	type_qualifier.name	45	49	representation representation.items[i] ->> representation_item => qualified_representation_item qualified_representation_item.qualifiers[i] ->> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name) (type_qualifier.name = 'required') (type_qualifier.name = 'designed') (type_qualifier.name = 'calculated') (type_qualifier.name = 'measured') (type_qualifier.name = 'estimated')}
shape_dependent_- property to item_- shape (as described_- element)	PATH			representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition {#1: (property_definition.name = 'shape dependent property') #2: (property_definition.name)} property_definition.definition ->> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = product_definition_shape product_definition_shape

Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_dependent_- property to shape_element (as described_- element)	PATH			representation <- property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition {#1: (property_definition.name = 'shape_dependent_property') #2: (property_definition.name)} property_definition.definition ->) characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect
shape_dependent_- property to multi_language_- string (as description)	#3: ([representation. description][PATH]) #4: (PATH)		158	representation #3: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_dependent_- property to cartesian_- coordinate_space (as is_defined_- in)	PATH			representation representation.context_of_items ->> representation_context => geometric_representation_context
SHAPE_- DESCRIPTION_- ASSOCIATION #1: The general case for the shape_description_- association. #2: If the shape_- description_association is defining shape for a general_feature or a feature_definition.	#1: (shape_definition_- representation) #2: (property_- definition_- representation)	41 41		#1: (shape_definition_representation <=) #2: (property_definition_representation) property_definition_representation {(property_definition_representation.name) (property_definition_representation.name = 'detailed representation') (property_definition_representation.name = 'idealized representation')}
role	property_definition_- representation.name	41		#1: (shape_definition_representation <=) property_definition_representation) #2: (property_definition_representation) property_definition_representation.used_representation ->> representation => shape_representation
shape_- description_- association to geometric_model (as defining_- geometry)	PATH			

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_- description_- association to feature_- definition (as is_defining_- shape_for)	PATH			property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition {property_definition => product_definition_shape} property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => feature_definition
shape_- description_- association to general_feature (as is_defining_- shape_for)	PATH			property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => feature_definition => general_feature
shape_- description_- association to item_shape (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition => product_definition_shape

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_- description_- association to shape_element (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition ->>br>represented_definition represented_definition = property_definition property_definition property_definition.definition ->>br>characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect
shape_- description_- association to shape_element_- relationship (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition ->>br>represented_definition represented_definition = property_definition property_definition property_definition.definition ->>br>characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect_relationship shape_aspect_relationship
shape_- description_- association to thread_feature (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition ->>br>represented_definition represented_definition = property_definition property_definition property_definition.definition ->>br>characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect =>

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_area
shape_- description_- association to transition_- feature (as is_defining_- shape_for)	PATH			shape_definition_representation <= property_definition_representation property_definition_representation.definition ->> represented_definition represented_definition = property_definition property_definition property_definition.definition ->> characterized_definition characterized_definition = shape_definition shape_definition shape_definition = shape_aspect shape_aspect => transition_feature
SHAPE_ELEMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	shape_aspect	41		
description	shape_aspect. description	41		
element_name	shape_aspect.name	41		
shape_element to item_shape (as composition)	PATH			shape_aspect shape_aspect.of_shape ->> product_definition_shape
shape_element to multi_language_- string (as description)	#1: ([shape_aspect. description] [PATH]) #2: (PATH)	41	164	shape_aspect #1: (attribute_language_item = shape_aspect attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = shape_aspect multi_language_attribute_item <-

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
SHAPE_ELEMENT_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	shape_aspect_- relationship	41		
description	shape_aspect_- relationship. description	41		
relation_type	shape_aspect_- relationship.name	41		
shape_element_- relationship to multi_language_- string (as description)	#1: ([shape_aspect_- relationship. description][PATH]) #2: (PATH)		165	shape_aspect_relationship #1: (attribute_language_item = shape_aspect_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = shape_aspect_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
shape_element_- relationship to shape_element (as related)	PATH			shape_aspect_relationship shape_aspect_relationship.related_shape_aspect ->) shape_aspect
shape_element_- relationship to shape_element (as relating)	PATH			shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect ->) shape_aspect
STRUCTURING_- METHOD_HIERARCHY #1: If the relating is a group. #2: If the relating is a layer. #3: If the group is member of a layer. #4: The general case for the group.	#1: (group_- relationship) #2: (presentation_- layer_assignment)	41 46		#1: ({group_relationship.name = 'hierarchy'})
structuring_- method_hierarchy to group (as related)	PATH			#1: (group_relationship group_relationship.related_group ->) #3: (group => rep_item_group) #4: (group)) #2: (presentation_layer_assignment presentation_layer_assignment.assigned_items[i] ->) layered_item = representation_item representation_item => rep_item_group)
structuring_- method_hierarchy to group (as relating)	PATH			group_relationship group_relationship.relating_group ->) #3: (group=> rep_item_group) #4: (group)

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
structuring_- method_hierarchy to layer (as relating)	IDENTICAL MAPPING			{presentation_layer_assignment.assigned_items[i] ->` `layered_item `layered_item = representation_item `representation_item => `rep_item_group}
TEMPLATE_- INSTANCE #1: In case of a two-dimensional context for the template_instance. #2: In case of a three-dimensional context for the template_instance. #3: If the styled_model is used with UoF P2. #4: If the styled_model is used without UoF P2.	mapped_item	43		
id	representation_item. name	43		mapped_item <= representation_item representation_item.name
scale	cartesian_- transformation_- operator.scale	42		mapped_item mapped_item.mapping_target -> representation_item => geometric_representation_item => cartesian_transformation_operator {cartesian_transformation_operator => #1: (cartesian_transformation_operator_2d) #2: (cartesian_transformation_operator_3d)} cartesian_transformation_operator.scale
template_- instance to transformation (as model_- placement)	PATH	43		mapped_item [mapped_item.mapping_target] [mapped_item.mapping_source -> representation_map representation_map.mapping_origin]

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
template_-instance to geometric_model (as template_-definition)	PATH			mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->representation =>shape_representation
template_-instance to styled_model (as template_-definition)	PATH			mapped_item mapped_item.mapping_source ->representation_map representation_map.mapped_representation ->representation =>#3: (draughting_model)#4: (mechanical_design_geometric_presentation_representation)
TRANSFORMATION #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined.	#1: ([mapped_item.mapping_target][representation_map.mapping_origin]) #2: (item_defined_-transformation) #3: (functionally_-defined_-transformation)	43 43 43 43		

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Table 24 – Mapping table element_structure UoF (S2) (continued)

Application element	AIM element	Source	Rules	Reference path
TRANSFORMATION_-2D #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined. #4: If the item is a placement. #5: If the item is a transformation operator.	#1: ([mapped_item.mapping_target] [representation_map.mapping_origin]) #2: (item_defined_-transformation) #3: (functionally_-defined_-transformation)	43 43 43 43		{#1: ([mapped_item.mapping_target -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_2d)] [representation_map.mapping_origin -> representation_item => geometric_representation_item => placement => axis2_placement_2d]) #2: (item_defined_transformation [item_defined_transformation.transform_item_1 -> representation_item => geometric_representation_item => placement => axis2_placement_2d] [item_defined_transformation.transform_item_2 -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_2d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_2d)]) #3: (functionally_defined_transformation => cartesian_transformation_operator => cartesian_transformation_operator_2d)}

Table 24 - Mapping table element_structure UoF (S2) (concluded)

Application element	AIM element	Source	Rules	Reference path
TRANSFORMATION_-3D #1: If the transformation is used with a template instance. #2: If the transformation is implicitly defined by two items. #3: If the transformation is explicitly defined. #4: If the item is a placement. #5: If the item is a transformation operator.	#1: ([mapped_item.mapping_target] [representation_map.mapping_origin]) #2: (item_defined_transformation) #3: (functionally_defined_transformation)	43 43 43 43		{#1: ([mapped_item.mapping_target -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_3d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_3d)] [representation_map.mapping_origin -> representation_item => geometric_representation_item => placement => axis2_placement_3d]) #2: (item_defined_transformation [item_defined_transformation.transform_item_1 -> representation_item => geometric_representation_item => placement => axis2_placement_3d] [item_defined_transformation.transform_item_2 -> representation_item => geometric_representation_item => #4: (placement => axis2_placement_3d) #5: (cartesian_transformation_operator => cartesian_transformation_operator_3d)) #3: (functionally_defined_transformation => cartesian_transformation_operator => cartesian_transformation_operator_3d)}

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The use of this combination of mapping alternatives is not applicable.

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Table 25 – Mapping table item_definition_structure UoF (S3)

Application element	AIM element	Source	Rules	Reference path
ALTERNATE_ITEM_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	alternate_product_- relationship	44		
fulfilled_- requirements	alternate_product_- relationship.basis	44		
alternate_item_- relationship to item (as alternate)	PATH			alternate_product_relationship alternate_product_relationship.alternate ->product
alternate_item_- relationship to item (as base)	PATH			alternate_product_relationship alternate_product_relationship.base ->product
alternate_item_- relationship to multi_language_- string (as fulfilled_- requirements)	#1: ([alternate_- product_relationship. basis][PATH]) #2: (PATH)		109	alternate_product_relationship #1: (attribute_language_item = alternate_product_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'basis'}) #2: (multi_language_attribute_item = alternate_product_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'basis'})

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
ASSEMBLY_- COMPONENT_- RELATIONSHIP #1: The component (related) is used only once within the assembly (relating). #2: The component is used multiple times within the assembly.	assembly_component_- usage	44	184	
assembly_- component_- relationship to geometric_model_- relationship_- with_- transformation (as placement)	PATH			assembly_component_usage <= product_definition_usage <= product_definition_relationship [characterized_product_definition = product_definition_relationship characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition => product_definition_shape <- context_dependent_shape_representation.represented_product_relation context_dependent_shape_representation context_dependent_shape_representation.representation_relation -> shape_representation_relationship <=] [product_definition_relationship.relating_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_2] [product_definition_relationship.related_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_1] representation_relationship => representation_relationship_with_transformation

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
assembly_-component_-relationship to template_-instance (as placement)	PATH			assembly_component_usage <= product_definition_usage <= [product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item =>] product_definition_relationship product_definition_relationship.related_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <-

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_map.mapped_representation representation_map <- mapped_item.mapping_source[[#1: (product_definition_relationship) #2: (product_definition_relationship characterized_product_definition = product_definition_relationship characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item =>)] mapped_item {mapped_item.mapping_target -> representation_item => geometric_representation_item}>

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				(placement) (cartesian_transformation_operator {(cartesian_transformation_operator.scl = 1.0) (see NOTE 1)[1)]})}
assembly_- component_- relationship to assembly_- definition (as relating)	PATH			assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'assembly definition'] [product_definition_context_association.role ->product_definition_context_role product_definition_context_role.name = 'part definition type']}
ASSEMBLY_- DEFINITION	product_definition	41	40	{product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'assembly definition'] [product_definition_context_association.role ->product_definition_context_role product_definition_context_role.name = 'part definition type']}
assembly_type	product_definition. name	41		[2)]

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
ASSEMBLY_- SUBSTITUTE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	assembly_component_- usage_substitute	44		
description	assembly_component_- usage_substitute. definition	44		
assembly_- substitute_- relationship to assembly_- component_- relationship (as base)	PATH			assembly_component_usage_substitute assembly_component_usage_substitute.base -> assembly_component_usage
assembly_- substitute_- relationship to multi_language_- string (as description)	#1: ([assembly_- component_usage_- substitute.definition] [PATH]) #2: (PATH)	44	112	assembly_component_usage_substitute #1: (attribute_language_item = assembly_component_usage_substitute attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'definition'}) #2: (multi_language_attribute_item = assembly_component_usage_substitute multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'definition'})

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
assembly_- substitute_- relationship to assembly_- component_- relationship (as substitute)	PATH			assembly_component_usage_substitute assembly_component_usage_substitute.substitute ->assembly_component_usage
GENERAL_ITEM_- DEFINITION_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41		
description	product_definition_- relationship. description	41		
relation_type	product_definition_- relationship.name	41		
general_item_- definition_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
GEOMETRICAL_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41	184	{product_definition_relationship product_definition_relationship.name = 'geometrical relationship'}
description	product_definition_- relationship. description	41		
geometrical_- relationship to geometric_model_- relationship_- with_- transformation (as definition_- placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'geometrical relationship' } [product_definition_relationship.relating_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_2] [product_definition_relationship.related_product_definition -> product_definition characterized_product_definition = product_definition

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_relationship.rep_1] [characterized_product_definition = product_definition_relationship characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition => product_definition_shape <- context_dependent_shape_representation.represented_product_relation context_dependent_shape_representation context_dependent_shape_representation.representation_relation -> shape_representation_relationship <=] representation_relationship => representation_relationship_with_transformation

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
geometrical_- relationship to template_- instance (as definition_- placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'geometrical relationship' } [product_definition_relationship.relating_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item =>] [product_definition_relationship.related_product_definition -> product_definition characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				{property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_map.mapped_representation representation_map <- mapped_item.mapping_source] [characterized_product_definition = product_definition_relationship characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item =>] mapped_item
geometrical_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description][PATH]) #2: (PATH)		153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
ITEM_DEFINITION_- INSTANCE_- RELATIONSHIP #1: If item_definition_- instance_relationship is not used in the context of UoF S7. #2: If item_definition_- instance_relationship is used in the context of UoF S7. #3: If item_definition_- instance_relationship is an assembly_component_- relationship. #4: If item_definition_- instance_relationship is a general_item_definition_- instance_relationship, a collected_item_- association, or a mated_- item_association.	product_definition_- relationship	41		{#1: (#3: ({product_definition_relationship => product_definition_usage => assembly_component_usage}) #4: (see NOTE 3)[3]) #2: ([product_definition_relationship])}

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
item_definition_- instance_- relationship to item_instance (as related)	#1: (#3: (IDENTICAL MAPPING) #4: (see NOTE 2)) #2: (PATH)			#1: (#3: ({product_definition_relationship => product_definition_usage => assembly_component_usage}) #4: ((see NOTE 4)[4]) #2: (#3: ([product_definition_relationship product_definition_relationship.related_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.related_product_definition ->] [product_definition_relationship => product_definition_usage => assembly_component_usage <- product_definition_occurrence_relationship.occurrence_usage product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence ->]) #4: (product_definition_relationship product_definition_relationship.related_product_definition ->) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
item_definition_- instance_- relationship to design_- discipline_item_- definition (as relating)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_DEFINITION_- RELATIONSHIP	product_definition_- relationship	41		
item_definition_- relationship to design_- discipline_item_- definition (as related)	PATH			product_definition_relationship product_definition_relationship.related_product_definition ->product_definition{product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'part definition'}
item_definition_- relationship to design_- discipline_item_- definition (as relating)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition{product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'part definition'}

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_INSTANCE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If item_instance is not used in the context of UoF S7. #4: If item_instance is used in the context of UoF S7. #5: If item_instance is referenced by an assembly_- component_relationship as related. #6: If item_instance is not referenced by an assembly_component_- relationship as related.	#3: (assembly_- component_usage) #4: (product_- definition)	44 41	176,181	#4: ({[product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [product_definition <- #5: ([product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->] [product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.relating_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage =>] assembly_component_usage) #6: ([product_definition_relationship.related_product_definition product_definition_relationship product_definition_relationship.name = 'definition usage'] [product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage])]})
description	#3: (product_- definition_- relationship. description) #4: (#5: ([product_- definition. description] [product_definition_- relationship.	41 41 41		#3: (assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.description) #4: (#5: (product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage -> assembly_component_usage <=

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
	description]) #6: (product_- definition. description))	41		product_definition_usage <= product_definition_relationship product_definition_relationship.description))
id	#3: (product_- definition_- relationship.id) #4: (#5: ([product_- definition.id] [product_definition_- relationship.id]) #6: (product_- definition.id))	41 41 41 41		#3: (assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.id) #4: (#5: (product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->) assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.id))
item_instance to design_- discipline_item_- definition (as definition)	PATH		184	#3: (assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.related_product_definition ->) #4: (product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.relating_product_definition ->) product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part definition'}
item_instance to product_- identification (as definition)	PATH			#3: ((see NOTE 5)[5]) #4: (product_definition [configuration_design_item = product_definition configuration_design_item <- configuration_design.design configuration_design

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				{configuration_design.name = 'occurrence usage definition'} configuration_design.configuration ->] [product_definition.formation -> product_definition_formation {product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'part'} configuration_design_item = product_definition_formation configuration_design_item <- configuration_design.design configuration_design {configuration_design.name = 'product design'} configuration_design.configuration ->] configuration_item => product_identification)
item_instance to multi_language_-string (as description)	#3: (#1: ([product_-definition_-relationship.description] [PATH]) #2: (PATH)) #4: (#5: (#1: ([product_definition.description] [product_definition_-relationship.description] [PATH]) #2: (PATH)) #6: (#1: ([product_-definition.description] [PATH])	41 41 41 41	150,153	#3: (assembly_component_usage <= product_definition_usage <= product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
	#2: (PATH)))			#4: (#5: (#1: (product_definition [attribute_language_item = product_definition attribute_language_item <-] [product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->) assembly_component_usage <= product_definition_usage <= product_definition_relationship attribute_language_item = product_definition_relationship attribute_language_item <-] attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (product_definition [multi_language_attribute_item = product_definition multi_language_attribute_item <-] [product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->) assembly_component_usage <= product_definition_usage <= product_definition_relationship multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <-] multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #6: (product_definition

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				#1: (attribute_language_item = product_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})})
MAKE_FROM_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	make_from_usage_option	44		
description	product_definition_- relationship. description	41		make_from_usage_option <= product_definition_usage <= product_definition_relationship product_definition_relationship.description
make_from_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	make_from_usage_option <= product_definition_usage <= product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
NEXT_HIGHER_- ASSEMBLY	next_assembly_usage_- occurrence	44	7	
PRODUCT_- CONSTITUENT #1: If product_- constitutent is not used in the context of UoF S7. #2: If product_- constitutent is used in the context of UoF S7. #3: If product_- constituent is an item_- instance. #4: If product_- constituent is not an item_- instance.	#1: (assembly_- component_usage) #2: (#3: (product_- definition) #4: (product_- definition_formation))	44 41 41		
PROMISSORY_USAGE	promissory_usage_- occurrence	44		

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
QUANTIFIED_- INSTANCE #1: If quantified_- instance is not used in the context of UoF S7. #2: If quantified_- instance is used in the context of UoF S7. #3: If item_instance is referenced by an assembly_- component_relationship as related. #4: If item_instance is not referenced by an assembly_component_- relationship as related.	#1: (quantified_- assembly_component_- usage) #2: (product_- definition)	44 41		{product_definition [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [product_definition.name = 'quantified instance'] [#3: (product_definition <- [product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->] [product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.relating_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage =>] assembly_component_usage => quantified_assembly_component_usage) #4: (product_definition <- [product_definition_relationship.related_product_definition product_definition_relationship product_definition_relationship.name = 'definition usage'] [product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage])]}
quantified_- instance to numerical_value (as quantity)	PATH		176	#1: (quantified_assembly_component_usage quantified_assembly_component_usage.quantity -> measure_with_unit) #2: (product_definition #3: ([product_definition <-

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage assembly_component_usage => quantified_assembly_component_usage quantified_assembly_component_usage.quantity ->> measure_with_unit] [characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'occurrence quantity'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->> representation {representation.name = 'quantity'} representation.items[1] ->> representation_item => {representation_item.name = 'quantity measure'} measure_representation_item]) #4: (characterized_product_definition = product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'occurrence quantity'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation {representation.name = 'quantity'} representation.items[i] ->> representation_item => {representation_item.name = 'quantity measure'} measure_representation_item))
REPLACED_- DEFINITION_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41	72	{product_definition_relationship {product_definition_relationship.name = 'definition replacement'} [product_definition_relationship.relating_product_definition ->] [product_definition_relationship.related_product_definition ->] product_definition product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
description	product_definition_- relationship. description	41		
replaced_- definition_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
SELECTED_- INSTANCE #1: If selected_instance is not used in the context of UoF S7. #2: If selected_instance is used in the context of UoF S7. #3: If selected_instance is referenced by an assembly_component_-relationship as related. #4: If selected_instance is not referenced by an assembly_component_-relationship as related. #5: If selected_instance. selected_quantity is a value_limit. #6: If selected_instance. selected_quantity is a value_range.	#1: (assembly_-component_usage) #2: (product_-definition)	44 41	213	#1: ({assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.name = 'selected instance usage'}) #2: ({product_definition [product_definition.name = 'selected instance'] [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [product_definition <- #3: ([product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->] [product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.relating_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage =>] assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.name = 'selected instance usage') #4: ([product_definition_relationship.related_product_definition product_definition_relationship product_definition_relationship.name = 'definition usage'] [product_definition <- product_definition_relationship.related_product_definition product_definition_relationship =>

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_usage])]})
selection_- control	descriptive_- representation_item. description	45	176,213	#1: (assembly_component_usage <= product_definition_usage <= product_definition_relationship characterized_product_definition = product_definition_relationship) #2: (product_definition #3: ([characterized_product_definition = product_definition] [product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->>br>assembly_component_usage <= product_definition_usage <= product_definition_relationship {product_definition_relationship.name = 'selected instance usage'} characterized_product_definition = product_definition_relationship]) #4: (product_definition characterized_product_definition = product_definition)) characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'occurrence selection'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->>br>representation {representation.name = 'selection criteria'} representation.items[i] ->>br>representation_item => {representation_item.name = 'selection control'} descriptive_representation_item descriptive_representation_item.description

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
selected_- instance to value_with_unit (as selected_- quantity)	PATH		176,213	#1: (assembly_component_usage <= product_definition_usage <= product_definition_relationship characterized_product_definition = product_definition_relationship) #2: (product_definition #3: ([characterized_product_definition = product_definition] [product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->) assembly_component_usage <= product_definition_usage <= product_definition_relationship {product_definition_relationship.name = 'selected instance usage'} characterized_product_definition = product_definition_relationship]) #4: (product_definition characterized_product_definition = product_definition)) characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition.name = 'occurrence selection'} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->) representation {representation.name = 'selection criteria'} representation.items[i] ->) representation_item => {representation_item.name = 'selection quantity'} #5: (measure_representation_item) #6: (compound_representation_item => value_range)

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
SINGLE_INSTANCE #1: If single_instance is not used in the context of UoF S7. #2: If single_instance is used in the context of UoF S7.	#1: (assembly_-component_usage) #2: (product_-definition)	44 41		#2: ({product_definition [product_definition.name = 'single instance'] [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence']})
SPECIFIED_-INSTANCE #1: If specified_instance is not used in the context of UoF S7. #2: If specified_instance is used in the context of UoF S7.	#1: (specified_higher_-usage_occurrence) #2: (product_-definition)	44 41		#2: ({product_definition [product_definition.name = 'specified instance'] [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [product_definition <- [product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->] [product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'definition usage'} product_definition_relationship.relating_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'} product_definition_relationship.related_product_definition product_definition_relationship => product_definition_usage =>] assembly_component_usage => specified_higher_usage_occurrence]})

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Table 25 – Mapping table item_definition_structure UoF (S3) (continued)

Application element	AIM element	Source	Rules	Reference path
specified_- instance to assembly_- definition (as assembly_- context)	PATH			#1: (specified_higher_usage_occurrence <= assembly_component_usage <=) #2: (product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->) assembly_component_usage <= {assembly_component_usage => specified_higher_usage_occurrence}) product_definition_usage <= product_definition_relationship product_definition_relationship.relating_product_definition ->) product_definition {[product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part definition'] [product_definition <- product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role ->) product_definition_context_role product_definition_context_role.name = 'part definition type'} product_definition_context_association.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'assembly definition']}
specified_- instance to item_- instance (as related_- instance)	PATH		176	#1: (specified_higher_usage_occurrence specified_higher_usage_occurrence.next_usage ->) next_assembly_usage_occurrence <= assembly_component_usage) #2: (product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage ->)

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Table 25 – Mapping table item_definition_structure UoF (S3) (concluded)

Application element	AIM element	Source	Rules	Reference path
				assembly_component_usage => specified_higher_usage_occurrence specified_higher_usage_occurrence.next_usage -> next_assembly_usage_occurrence <= assembly_component_usage <- product_definition_occurrence_relationship.occurrence_usage product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
specified_- instance to item_- instance (as upper_usage)	PATH		176	#1: (specified_higher_usage_occurrence specified_higher_usage_occurrence.next_usage -> next_assembly_usage_occurrence <= assembly_component_usage) #2: (product_definition <- product_definition_occurrence_relationship.occurrence product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence_usage -> assembly_component_usage => specified_higher_usage_occurrence specified_higher_usage_occurrence.upper_usage -> assembly_component_usage <- product_definition_occurrence_relationship.occurrence_usage product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})

NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 The optional attribute cartesian_transformation_operator.scl is omitted

2 If assembly_definition is also of type collection_definition and/or mating_definition, it is assumed, that only one of the attributes collection_-definition.purpose, assembly_definition.assembly_type, or mating_definition.mating_type is instantiated.

3 The use of this combination of mapping alternatives is not applicable.

4 The use of this combination of mapping alternatives is not applicable.

5 The use of this mapping alternative is not applicable.

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Table 26 – Mapping table effectivity UoF (S4)

Application element	AIM element	Source	Rules	Reference path
DATED_- CONFIGURATION #1: If start_date or end_- date are only specified as a certain calendar day. #2: If start_date or end_- date are specified as a certain calendar day and a time.	[dated_effectivity] [configuration_- effectivity]	41 44		{dated_effectivity <= effectivity => product_definition_effectivity => configuration_effectivity}
end_date	#1: (calendar_date) #2: (date_and_time)	41 41		dated_effectivity dated_effectivity.effectivity_end_date ->> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time)
start_date	#1: (calendar_date) #2: (date_and_time)	41 41		dated_effectivity dated_effectivity.effectivity_start_date ->> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time)
DURATION	time_measure_with_unit	41	30	
time	time_measure	41		time_measure_with_unit <= measure_with_unit measure_with_unit.value_component ->> measure_value measure_value = time_measure time_measure

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
time_unit	time_unit	41	31	time_measure_with_unit <= measure_with_unit measure_with_unit.unit_component ->> unit unit = named_unit named_unit => time_unit
EFFECTIVITY #1: If at least one of the attributes start_-definition or end_-definition is specified. #2: If neither one of the attributes start_-definition and end_-definition are specified. #3: If a start_definition is given and no period is specified. #4: If no start_-definition is given or a period is specified. #5: For the primary_-language_dependent_string. #6: For any additional_-language_dependent_string. #7: If start_definition or end_definition reference a date_time with no time specified. #8: If start_definition or end_definition reference a date_time with a time specified. #9: If event_reference. offset is not instantiated. #10: If event_reference. offset is instantiated.	effectivity	41	99	{#1: (effectivity => #3: (dated_effectivity) #4: (time_interval_based_effectivity)) #2: (|effectivity| <- effectivity_relationship.related_effectivity effectivity_relationship effectivity_relationship.name = 'inheritance')}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
description	effectivity. description	41		
effectivity_- context	effectivity.name	41		
id	effectivity.id	41		
version_id	identification_- assignment.assigned_id	41	29,202	effectivity identification_item = effectivity identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
effectivity to organization (as concerned_- organization)	PATH			effectivity <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'concerned organization'} organization_assignment.assigned_organization ->> organization
effectivity to multi_language_- string (as description)	#5: ([effectivity. description][PATH]) #6: (PATH)		123	effectivity #5: (attribute_language_item = effectivity attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #6: (multi_language_attribute_item = effectivity multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to date_time (as end_-definition)	PATH			effectivity => #3: (dated_effectivity dated_effectivity.effectivity_end_date -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #7: (date_time_select = date date => calendar_date) #8: (date_time_select = date_and_time date_and_time)) #4: (time_interval_based_effectivity time_interval_based_effectivity.effectivity_period -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #7: (date_time_select = date date => calendar_date) #8: (date_time_select = date_and_time date_and_time))
effectivity to event_reference (as end_-definition)	PATH			effectivity => #3: (dated_effectivity dated_effectivity.effectivity_end_date ->) #4: (time_interval_based_effectivity time_interval_based_effectivity.effectivity_period -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound ->) date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #9: (event_occurrence) #10: (event_occurrence => relative_event_occurrence)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity to duration (as period)	PATH			effectivity => time_interval_based_effectivity time_interval_based_effectivity.effectivity_period -> time_interval => time_interval_with_bounds time_interval_with_bounds.duration -> time_measure_with_unit
effectivity to date_time (as start_- definition)	PATH			effectivity => #3: (dated_effectivity dated_effectivity.effectivity_start_date -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #7: (date_time_select = date date => calendar_date) #8: (date_time_select = date_and_time date_and_time)) #4: (time_interval_based_effectivity time_interval_based_effectivity.effectivity_period -> time_interval => time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #7: (date_time_select = date date => calendar_date) #8: (date_time_select = date_and_time date_and_time))
effectivity to event_reference (as start_- definition)	PATH			effectivity => #3: (dated_effectivity dated_effectivity.effectivity_start_date ->) #4: (time_interval_based_effectivity time_interval_based_effectivity.effectivity_period ->
				time_interval => time_interval_with_bounds time_interval_with_bounds.primary_bound ->) date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence event_occurrence

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
EFFECTIVITY_- ASSIGNMENT #1: If effectivity_- assignment.effectivity_- indication is TRUE. #2: If effectivity_- assignment.effectivity_- indication is FALSE. #3: If item_instance is not used in the context of UoF S7. #4: If item_instance is used in the context of UoF S7. #5: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #6: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #7: If no item_version is associated. #8: If an item_version is associated. #9: If effectivity_- assignment is not used in	#1: (applied_- effectivity_- assignment) #2: (applied_- ineffectivity_- assignment)	214 214		#1: (applied_effectivity_assignment <= effectivity_assignment) #2: (applied_ineffectivity_assignment <= effectivity_assignment)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
the context of UoF S7. #10: If effectivity_- assignment is used in the context of UoF S7. #11: If property_value_- association is of type item_property_association. #12: If property_value_- association is of type process_property_- association and references an element in the process_- property_select which is not process_operation_- resource_assignment. #13: If property_value_- association is of type process_property_- association and references process_operation_resource_- assignment in the process_- property_select. #14: If specification_- category.implicit_- exclusive_condition is FALSE. #15: If specification_- category.implicit_- exclusive_condition is TRUE. #16: If the styled_model is used with UoF P2. #17: If the styled_model is used without UoF P2. #18: If the document_- representation is not a				

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_model. #19: If the document_- representation is a physical_model.				
effectivity_- indication	IDENTICAL MAPPING			
role	object_role.name	41	32	#1: (applied_effectivity_assignment <=) #2: (applied_ineffectivity_assignment <=) effectivity_assignment effectivity_assignment.role ->) object_role object_role.name {(object_role.name) (object_role.name = 'actual') (object_role.name = 'planned') (object_role.name = 'required')}
effectivity_- assignment to effectivity (as assigned_- effectivity)	PATH			#1: (applied_effectivity_assignment <=) #2: (applied_ineffectivity_assignment <=) effectivity_assignment effectivity_assignment.assigned_effectivity ->) effectivity
effectivity_- assignment to assembly_- substitute_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = assembly_component_usage_substitute assembly_component_usage_substitute
effectivity_- assignment to class_category_- association (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature_category_usage product_concept_feature_category_usage

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to class_condition_- association (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature_association product_concept_feature_association
effectivity_- assignment to class_inclusion_- association (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature_association product_concept_feature_association
effectivity_- assignment to class_- specification_- association (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature_association product_concept_feature_association
effectivity_- assignment to class_structure_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = configuration_design configuration_design
effectivity_- assignment to classification_- system (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = class_system class_system

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to complex_product (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_formation product_definition_formation
effectivity_- assignment to complex_product_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_formation_relationship product_definition_formation_relationship
effectivity_- assignment to configuration (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = configured_effectivity_assignment configured_effectivity_assignment
effectivity_- assignment to design_- constraint (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_formation product_definition_formation {product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to document (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
effectivity_- assignment to document_file (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = document_file document_file
effectivity_- assignment to document_- representation (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition #18: (product_definition) #19: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
effectivity_- assignment to document_version (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_formation product_definition_formation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
effectivity_- assignment to drawing (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = drawing_revision drawing_revision
effectivity_- assignment to feature_- occurrence (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = shape_aspect shape_aspect
effectivity_- assignment to geometric_model (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = shape_representation shape_representation
effectivity_- assignment to item (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product product

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to item_definition_- instance_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_relationship product_definition_relationship
effectivity_- assignment to item_definition_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_relationship product_definition_relationship
effectivity_- assignment to item_instance (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item #3: (effectivity_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #4: (effectivity_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
effectivity_- assignment to item_instance_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item #5: (effectivity_item = product_definition_relationship product_definition_relationship)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				#6: (effectivity_item = product_definition_substitute product_definition_substitute)
effectivity_- assignment to item_version (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_formation product_definition_formation
effectivity_- assignment to kinematic_- simulation_- information (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = property_definition property_definition => kinematic_property_definition
effectivity_- assignment to material (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = material_designation material_designation
effectivity_- assignment to process_- operation_- definition (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = action_method action_method => process_operation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to process_- operation_- definition_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = action_method_relationship action_method_relationship
effectivity_- assignment to process_- operation_- occurrence (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = action_relationship action_relationship
effectivity_- assignment to process_- operation_- occurrence_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = action_relationship action_relationship
effectivity_- assignment to process_- operation_- resource_- assignment (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = requirement_for_action_resource requirement_for_action_resource

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to process_plan (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = action action => #7: (process_plan) #8: (product_definition_process => product_process_plan)
effectivity_- assignment to product_class (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept product_concept #9: ([product_concept]) #10: (product_concept => product_class)
effectivity_- assignment to product_- identification (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = configuration_item configuration_item #9: ([configuration_item]) #10: (configuration_item => product_identification)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to product_- structure_- relationship (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_definition_relationship product_definition_relationship => product_definition_usage
effectivity_- assignment to property (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = general_property general_property
effectivity_- assignment to property_value_- association (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item #11: (effectivity_item = property_definition property_definition) #12: (effectivity_item = action_property action_property) #13: (effectivity_item = resource_property resource_property)
effectivity_- assignment to security_- classification (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = security_classification security_classification

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to specification (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature product_concept_feature
effectivity_- assignment to specification_- category (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature_category product_concept_feature_category #14: (|product_concept_feature_category|) #15: (product_concept_feature_category => exclusive_product_concept_feature_category)
effectivity_- assignment to specification_- expression (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature product_concept_feature => conditional_concept_feature
effectivity_- assignment to specification_- inclusion (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
effectivity_- assignment to styled_model (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item #16: (effectivity_item = draughting_model draughting_model) #17: (effectivity_item = mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
effectivity_- assignment to view_area (as effective_- element)	PATH			#1: (applied_effectivity_assignment applied_effectivity_assignment.items[i] ->) #2: (applied_ineffectivity_assignment applied_ineffectivity_assignment.items[i] ->) effectivity_item effectivity_item = presentation_area presentation_area
EFFECTIVITY_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	effectivity_- relationship	41		
description	effectivity_- relationship. description	41		
relation_type	effectivity_- relationship.name	41		(effectivity_relationship (effectivity_relationship.name) (effectivity_relationship.name = 'constraint') (effectivity_relationship.name = 'inheritance')}
effectivity_- relationship to multi_language_- string (as description)	#1: ([effectivity_- relationship. description] [PATH]) #2: (PATH)	41	124	effectivity_relationship #1: (attribute_language_item = effectivity_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = effectivity_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
effectivity_- relationship to effectivity (as related)	PATH		98	effectivity_relationship effectivity_relationship.related_effectivity ->) effectivity
effectivity_- relationship to effectivity (as relating)	PATH		98	effectivity_relationship effectivity_relationship.relating_effectivity ->) effectivity

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
EVENT_REFERENCE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If item_instance is not used in the context of UoF S7. #4: If item_instance is used in the context of UoF S7. #5: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #6: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #7: If no item_version is associated. #8: If an item_version is associated. #9: If event_reference is not used in the context of UoF S7. #10: If event_reference is used in the context of	#20: (event_- occurrence) #21: (relative_event_- occurrence)	41 41	24,25,57, 81	

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
UoF S7. #11: If property_value_- association is of type item_property_association. #12: If property_value_- association is of type process_property_- association and references an element in the process_- property_select which is not process_operation_- resource_assignment. #13: If property_value_- association is of type process_property_- association and references process_operation_resource_- assignment in the process_- property_select. #14: If specification_- category.implicit_- exclusive_condition is FALSE. #15: If specification_- category.implicit_- exclusive_condition is TRUE. #16: If the styled_model is used with UoF P2. #17: If the styled_model is used without UoF P2. #18: The general case for a view_area. #19: If the view_area is in a single window and in 3D context.				

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
#20: If event_reference.offset is not instantiated. #21: If event_reference.offset is instantiated. #22: If the document_-representation is not a physical_model. #23: If the document_-representation is a physical_model.				
description	event_occurrence.description	41		#21: (relative_event_occurrence relative_event_occurrence.base_event ->event_occurrence event_occurrence.description)
event_type	event_occurrence.name	41		#21: (relative_event_occurrence relative_event_occurrence.base_event ->event_occurrence event_occurrence.name)
event_reference to multi_-language_string (as description)	#1: ([event_-occurrence.description][PATH]) #2: (PATH)	41	125	#20: (|event_occurrence|) #21: (relative_event_occurrence <=)event_occurrence #1: (attribute_language_item = event_occurrence attribute_language_item <-attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = event_occurrence multi_language_attribute_item <-multi_language_attribute_assignment.items[i] {multi_language_attribute_assignment multi_language_attribute_assignment <=attribute_value_assignment

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
event_reference to activity (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = executed_action executed_action
event_reference to activity_-element (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = applied_action_assignment applied_action_assignment
event_reference to activity_-method_-assignment (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = action_request_solution action_request_solution
event_reference to alternate_- item_- relationship (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = alternate_product_relationship alternate_product_relationship
event_reference to approval_- status (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = approval_status approval_status

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to assembly_-substitute_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = assembly_component_usage_substitute assembly_component_usage_substitute
event_reference to certification (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = certification certification
event_reference to class_-category_-association (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_item event_occurrence_item = product_concept_feature_category_usage product_concept_feature_category_usage
event_reference to class_-condition_-association (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_concept_feature_association product_concept_feature_association
event_reference to class_-inclusion_-association (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_concept_feature_association product_concept_feature_association
event_reference to class_-specification_-association (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = product_concept_feature_association product_concept_feature_association
event_reference to class_-structure_-relationship (as event_-context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = configuration_design configuration_design
event_reference to classification_-association (as event_-context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = applied_classification_assignment applied_classification_assignment

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to classification_-system (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = class_system class_system
event_reference to complex_-product (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = product_definition_formation product_definition_formation
event_reference to complex_-product_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_item event_occurrence_item = product_definition_formation_relationship product_definition_formation_relationship
event_reference to configuration (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = configured_effectivity_assignment configured_effectivity_assignment
event_reference to contract (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = contract contract
event_reference to design_- constraint (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = product_definition_formation product_definition_formation
event_reference to design_-discipline_item_-definition (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
event_reference to document (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = product product

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
event_reference to document_file (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->' event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = document_file document_file
event_reference to document_- representation (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->' event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_definition #22: (product_definition) #23: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to document_- version (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_definition_formation product_definition_formation {product_definition_formation.of_product ->} product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
event_reference to drawing (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = drawing_revision drawing_revision

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to drawing_sheet (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = presentation_area presentation_area => drawing_sheet_revision
event_reference to general_- classification (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = class class
event_reference to geometric_- model (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = shape_representation shape_representation
event_reference to item (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product product
event_reference to item_- definition_- instance_- relationship (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_definition_relationship product_definition_relationship

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to item_- definition_- relationship (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->event_occurrence_item event_occurrence_item = product_definition_relationship product_definition_relationship
event_reference to item_instance (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->event_occurrence_item #3: (event_occurrence_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #4: (event_occurrence_item = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to item_instance_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item #5: (event_occurrence_item = product_definition_relationship product_definition_relationship) #6: (event_occurrence_item = product_definition_substitute product_definition_substitute)
event_reference to item_version (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_definition_formation product_definition_formation
event_reference to item_version_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'event context'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = product_definition_formation_relationship product_definition_formation_relationship
event_reference to kinematic_- simulation_- information (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = property_definition property_definition => kinematic_property_definition
event_reference to manufacturing_- configuration (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = configuration_effectivity configuration_effectivity

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to material (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = material_designation material_designation
event_reference to organization_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->) event_occurrence_item event_occurrence_item = organization_relationship organization_relationship
event_reference to person_in_-organization (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_item event_occurrence_item = person_and_organization person_and_organization
event_reference to person_in_- organization_- relationship (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = applied_person_and_organization_assignment applied_person_and_organization_assignment
event_reference to physical_- assembly_- relationship (as event_- context)	PATH			#20: ([event_occurrence]) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to physical_-instance (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_definition product_definition {product_definition.frame_of_reference ->} product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
event_reference to physical_-instance_test_-result (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = property_definition property_definition

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to process_-operation_-definition (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = action_method action_method => process_operation
event_reference to process_-operation_-occurrence (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = action_relationship action_relationship
event_reference to process_-operation_-resource_-assignment (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = requirement_for_action_resource requirement_for_action_resource
event_reference to process_plan (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = action action => #7: (process_plan) #8: (product_definition_process => product_process_plan)
event_reference to product_class (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] -> event_occurrence_item event_occurrence_item = product_concept #9: (|product_concept|) #10: (product_concept => product_class)

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to product_-identification (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = configuration_item #9: (|configuration_item|) #10: (configuration_item => product_identification)
event_reference to product_-structure_-relationship (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_definition_relationship product_definition_relationship => product_definition_usage
event_reference to project (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = organizational_project organizational_project
event_reference to property (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = general_property general_property
event_reference to property_-value_-association (as event_-context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item #11: (event_occurrence_item = property_definition property_definition) #12: (event_occurrence_item = action_property action_property) #13: (event_occurrence_item = resource_property resource_property)

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to security_- classification (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = security_classification security_classification
event_reference to security_- level (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = security_classification_level security_classification_level
event_reference to specification (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_item event_occurrence_item = product_concept_feature product_concept_feature
event_reference to specification_- category (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_concept_feature_category product_concept_feature_category #14: (|product_concept_feature_category|) #15: (product_concept_feature_category => exclusive_product_concept_feature_category)
event_reference to specification_- expression (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_concept_feature product_concept_feature => conditional_concept_feature

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to specification_- inclusion (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item event_occurrence_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
event_reference to styled_model (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->} event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->} event_occurrence_item #16: (event_occurrence_item = draughting_model draughting_model) #17: (event_occurrence_item = mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
event_reference to view_area (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = presentation_area #18: (presentation_area) #19: (presentation_area => mechanical_design_geometric_presentation_area)
event_reference to work_order (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = action_directive action_directive
event_reference to work_request (as event_- context)	PATH			#20: (|event_occurrence|) #21: (relative_event_occurrence <=) event_occurrence <- event_occurrence_assignment.assigned_event_occurrence event_occurrence_assignment => {event_occurrence_assignment.role ->> event_occurrence_role event_occurrence_role.name = 'event context'} applied_event_occurrence_assignment applied_event_occurrence_assignment.items[1] ->> event_occurrence_item event_occurrence_item = versioned_action_request versioned_action_request

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
event_reference to duration (as offset)	PATH			#21: (relative_event_occurrence relative_event_occurrence.offset ->) time_measure_with_unit)
LOT_- CONFIGURATION	[lot_effectivity] [configuration_- effectivity]	41 44		{lot_effectivity <= effectivity => product_definition_effectivity => configuration_effectivity}
lot_id	lot_effectivity. effectivity_lot_id	41		
lot_size	measure_with_unit	41	30	lot_effectivity lot_effectivity.effectivity_lot_size ->) measure_with_unit
MANUFACTURING_- CONFIGURATION #1: If item_instance is not used in the context of UoF S7. #2: If item_instance is used in the context of UoF S7.	configuration_- effectivity	44	196	
manufacturing_- configuration to organization (as concerned_- organization)	PATH			configuration_effectivity <= product_definition_effectivity <= effectivity organization_item = effectivity organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->) organization_role organization_role.name = 'concerned organization'} organization_assignment.assigned_organization ->) organization

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
manufacturing_-configuration to item_instance (as configured_-element)	PATH			configuration_effectivity <= product_definition_effectivity product_definition_effectivity.usage -> #1: (product_definition_relationship => product_definition_usage => assembly_component_usage) #2: (product_definition_relationship => product_definition_usage => assembly_component_usage <- product_definition_occurrence_relationship.occurrence_usage product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
manufacturing_-configuration to product_design (as is_solution_-for)	PATH			configuration_effectivity configuration_effectivity.configuration -> configuration_design {configuration_design.name = 'product design'}
PRODUCT_CLASS #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_concept	44		
description	product_concept.description	44		
id	product_concept.id	44		
name	product_concept.name	44		
version_id	identification_-assignment.assigned_id	41	29,206	product_concept identification_item = product_concept identification_item <- applied_identification_assignment.items[i]

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_identification_assignment <= identification_assignment {identification_assignment.role ->} identification_role identification_role.name = 'version'} identification_assignment.assigned_id
product_class to multi_language_- string (as description)	#1: ([product_concept. description] [PATH]) #2: (PATH)	44	146	product_concept #1: (attribute_language_item = product_concept attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_class to multi_language_- string (as name)	#1: ([product_concept. name] [PATH]) #2: (PATH)	41	146	product_concept #1: (attribute_language_item = product_concept attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product_concept multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_DESIGN #1: If product_- identification is not used in the context of UoF S7. #2: If product_- identification is used in the context of UoF S7.	configuration_design	44		{configuration_design.name = 'product design'}
product_design to item_version (as design)	PATH			configuration_design configuration_design.design ->configuration_design_item configuration_design_item = product_definition_formation product_definition_formation
product_design to product_- identification (as product)	PATH			configuration_design configuration_design.configuration ->#1: (|configuration_item|) #2: (configuration_item => product_identification)
PRODUCT_- IDENTIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	configuration_item	44		
description	configuration_item. description	44		
id	configuration_item.id	44		
name	configuration_item. name	44	32,158	
version_id	identification_- assignment.assigned_id	41	29,199	configuration_item identification_item = configuration_item identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				{identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
product_- identification to product_class (as associated_- product_class)	PATH			configuration_item configuration_item.item_concept -> product_concept
product_- identification to multi_- language_string (as description)	#1: ([configuration_- item.description] [PATH]) #2: (PATH)	44	115	configuration_item #1: (attribute_language_item = configuration_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = configuration_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_- identification to multi_- language_string (as name)	#1: ([configuration_- item.name] [PATH]) #2: (PATH)	44	115	configuration_item #1: (attribute_language_item = configuration_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = configuration_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
RETENTION_PERIOD #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If earliest_end_- definition, latest_end_- definition, or start_- definition reference a date_time with no time specified. #4: If earliest_end_- definition, latest_end_- definition, or start_- definition reference a date_time with a time specified. #5: If item_instance is not used in the context of UoF S7. #6: If item_instance is used in the context of UoF S7. #7: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #8: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_-	retention	214	42,211	retention <= action {action <- action_assignment.assigned_action action_assignment action_assignment.role ->> object_role object_role.name = 'retention'}

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
relationship or a product_-structure_relationship as usage_context. #9: If no item_version is associated. #10: If an item_version is associated. #11: If retention_period is not used in the context of UoF S7. #12: If retention_period is used in the context of UoF S7. #13: If property_value_-association is of type item_property_association. #14: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #15: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #16: If specification_-category.implicit_-exclusive_condition is FALSE. #17: If specification_-				

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
category.implicit_- exclusive_condition is TRUE. #18: If the styled_model is used with UoF P2. #19: If the styled_model is used without UoF P2. #20: The general case for a view_area. #21: If the view_area is in a single window and in 3D context. #22: If event_reference. offset is not instantiated. #23: If event_reference. offset is instantiated. #24: If the document_- representation is not a physical_model. #25: If the document_- representation is a physical_model.				
retention_- purpose	action.description	41		retention <= action action.description
retention_period to date_time (as earliest_end_- definition)	PATH			retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				time_interval_role.name = 'minimum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #3: (date_time_select = date date => calendar_date) #4: (date_time_select = date_and_time date_and_time)
retention_period to duration (as earliest_end_- definition)	PATH		47	retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'minimum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.duration -> time_measure_with_unit
retention_period to event_- reference (as earliest_end_- definition)	PATH			retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				time_interval_role.name = 'minimum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #22: (|event_occurrence|) #23: (event_occurrence => relative_event_occurrence)
retention_period to activity (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = executed_action executed_action
retention_period to activity_-element (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = applied_action_assignment applied_action_assignment
retention_period to activity_-method_-assignment (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = action_request_solution

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_request_solution
retention_period to alternate_-item_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = alternate_product_relationship alternate_product_relationship
retention_period to approval_-status (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = approval_status approval_status
retention_period to assembly_-substitute_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = assembly_component_usage_substitute assembly_component_usage_substitute
retention_period to certification (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = certification

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				certification
retention_period to class_-category_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_category_usage product_concept_feature_category_usage
retention_period to class_-condition_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_association product_concept_feature_association
retention_period to class_-inclusion_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_association product_concept_feature_association
retention_period to class_-specification_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_association

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_concept_feature_association
retention_period to class_-structure_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = configuration_design configuration_design
retention_period to classification_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = applied_classification_assignment applied_classification_assignment
retention_period to classification_-system (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = class_system class_system
retention_period to complex_-product (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_formation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation
retention_period to complex_-product_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_formation_relationship product_definition_formation_relationship
retention_period to configuration (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = configured_effectivity_assignment configured_effectivity_assignment
retention_period to contract (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = contract contract
retention_period to design_-constraint (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_formation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation {product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'}
retention_period to design_- discipline_item_- definition (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
retention_period to document (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to document_file (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = document_file document_file
retention_period to document_-representation (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition #24: (product_definition) #25: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
retention_period to document_-version (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_formation product_definition_formation {product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to drawing (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = drawing_revision drawing_revision
retention_period to drawing_sheet (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = presentation_area presentation_area => drawing_sheet_revision
retention_period to general_- classification (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = class class
retention_period to geometric_- model (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = shape_representation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_representation
retention_period to item (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product product
retention_period to item_-definition_-instance_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_relationship product_definition_relationship
retention_period to item_-definition_-relationship (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_relationship product_definition_relationship
retention_period to item_instance (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item #5: (action_item = product_definition_relationship

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_relationship => product_definition_usage => assembly_component_usage) #6: (action_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
retention_period to item_instance_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item #7: (action_item = product_definition_relationship product_definition_relationship) #8: (action_item = product_definition_substitute product_definition_substitute)
retention_period to item_version (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_formation product_definition_formation
retention_period to item_version_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_item = product_definition_formation_relationship product_definition_formation_relationship
retention_period to kinematic_- simulation_- information (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = property_definition property_definition => kinematic_property_definition
retention_period to manufacturing_- configuration (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = configuration_effectivity configuration_effectivity
retention_period to material (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = material_designation material_designation
retention_period to organization_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_item action_item = organization_relationship organization_relationship
retention_period to person_in_- organization (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = person_and_organization person_and_organization
retention_period to person_in_- organization_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = applied_person_and_organization_assignment applied_person_and_organization_assignment
retention_period to physical_- assembly_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to physical_- instance (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
retention_period to physical_- instance_test_- result (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = property_definition property_definition {property_definition.name = 'test result'}
retention_period to process_- operation_- definition (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = action_method action_method => process_operation

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to process_- operation_- occurrence (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = action_relationship action_relationship
retention_period to process_- operation_- resource_- assignment (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = requirement_for_action_resource requirement_for_action_resource
retention_period to process_plan (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item = action action => #9: (process_plan) #10: (product_definition_process product_process_plan)
retention_period to product_class (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_item = product_concept #11: (|product_concept|) #12: (product_concept => product_class)
retention_period to product_- identification (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = configuration_item #11: (|configuration_item|) #12: (configuration_item => product_identification)
retention_period to product_- structure_- relationship (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_relationship product_definition_relationship => product_definition_usage
retention_period to project (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = organizational_project organizational_project

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to property (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = general_property general_property
retention_period to property_-value_-association (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item #13: (action_item = property_definition property_definition) #14: (action_item = action_property action_property) #15: (action_item = resource_property resource_property)
retention_period to security_-classification (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = security_classification security_classification

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
retention_period to security_-level (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = security_classification_level security_classification_level
retention_period to specification (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature product_concept_feature
retention_period to specification_-category (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_category product_concept_feature_category #16: (|product_concept_feature_category|) #17: (product_concept_feature_category => exclusive_product_concept_feature_category)
retention_period to specification_-expression (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] ->

Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_item action_item = product_concept_feature product_concept_feature => conditional_concept_feature
retention_period to specification_- inclusion (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
retention_period to styled_model (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item #18: (action_item = draughting_model draughting_model) #19: (action_item = mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
retention_period to view_area (as is_applied_- to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = presentation_area #20: (presentation_area) #21: (presentation_area =>

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				mechanical_design_geometric_presentation_area)
retention_period to work_order (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = action_directive action_directive
retention_period to work_request (as is_applied_-to)	PATH			retention <= action <- action_assignment.assigned_action action_assignment => applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = versioned_action_request versioned_action_request
retention_period to date_time (as latest_end_-definition)	PATH			retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'maximum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #3: (date_time_select = date

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				date => calendar_date) #4: (date_time_select = date_and_time date_and_time)
retention_period to duration (as latest_end_- definition)	PATH		47	retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role ->> time_interval_role time_interval_role.name = 'maximum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.duration -> time_measure_with_unit
retention_period to event_- reference (as latest_end_- definition)	PATH			retention <= action time_interval_item = action time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role ->> time_interval_role time_interval_role.name = 'maximum retention period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.secondary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #22: ([event_occurrence])

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				#23: (event_occurrence => relative_event_occurrence)
retention_period to multi_- language_string (as retention_- purpose)	#1: ([action. description] [PATH]) #2: (PATH)	41	104	retention <= action #1: (attribute_language_item = action attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
retention_period to date_time (as start_- definition)	PATH		47	retention <= action time_interval_item = action time_interval_item <- [applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'minimum retention period'} time_interval_assignment.assigned_time_interval -> time_interval =>] [applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'maximum retention period'}

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Table 26 – Mapping table effectivity UoF (S4) (continued)

Application element	AIM element	Source	Rules	Reference path
				time_interval_assignment.assigned_time_interval -> time_interval =>] time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #3: (date_time_select = date date => calendar_date) #4: (date_time_select = date_and_time date_and_time)
retention_period to event_- reference (as start_- definition)	PATH		47	retention <= action time_interval_item = action time_interval_item <- [applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'minimum retention period'} time_interval_assignment.assigned_time_interval -> time_interval =>] [applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'maximum retention period'} time_interval_assignment.assigned_time_interval -> time_interval =>] time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #22: ([event_occurrence]) #23: (event_occurrence => relative_event_occurrence)

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Table 26 – Mapping table effectivity UoF (S4) (concluded)

Application element	AIM element	Source Rules	Reference path
SERIAL_-CONFIGURATION	[serial_numbered_-effectivity] [configuration_-effectivity]	41 44	{serial_numbered_effectivity <= effectivity => product_definition_effectivity => configuration_effectivity}
serial_end_-number	serial_numbered_-effectivity. effectivity_end_id	41	
serial_start_-number	serial_numbered_-effectivity. effectivity_start_id	41	

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Table 27 – Mapping table work_management UoF (S5)

Application element	AIM element	Source	Rules	Reference path
ACTIVITY #1: If activity.internal is not specified. #2: If activity.internal is TRUE. #3: If activity.internal is FALSE. #4: If only a certain day is known. #5: If a certain day and the time of day is known. #6: For the primary_-language_dependent_string. #7: For any additional_-language_dependent_string. #8: If used for a person as member of an organization. #9: If used for an organization. #10: If event_reference.offset is not instantiated. #11: If event_reference.offset is instantiated. #12: If the activity is controlled by a work_order which resolves the work_-request. #13: If the activity is not controlled by a work_-order which resolves the work_request.	executed_action	41		

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_type	action.name	41		executed_action <= action action.name {(action.name) (action.name = 'amendment') (action.name = 'analysis') (action.name = 'cancellation') (action.name = 'delivery change') (action.name = 'design change') (action.name = 'design') (action.name = 'mock-up creation') (action.name = 'prototype building') (action.name = 'rectification') (action.name = 'restructuring') (action.name = 'spare part creation') (action.name = 'stop notice') (action.name = 'testing') (action.name = 'work definition')}
description	action.description	41		executed_action <= action action.description
id	action.id	41		executed_action <= action action.id
internal	action_method.purpose	41		executed_action <= action action.chosen_method -> action_method action_method.purpose {#1: (action_method.purpose) #2: (action_method.purpose = 'internal') #3: (action_method.purpose = 'external')}
status	action_status.status	41	58	executed_action <- action_status.assigned_action action_status action_status.status

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity to date_-time (as actual_end_-date)	PATH			executed_action <= action #4: (date_item = action date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'actual end' } date_assignment.assigned_date -> date => calendar_date) #5: (date_and_time_item = action date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role -> date_time_role date_time_role.name = 'actual end'} date_and_time_assignment.assigned_date_and_time -> date_and_time)
activity to date_-time (as actual_start_-date)	PATH			executed_action <= action #4: (date_item = action date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'actual start' } date_assignment.assigned_date -> date => calendar_date)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				#5: (date_and_time_item = action date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->>br>date_time_role date_time_role.name = 'actual start'} date_and_time_assignment.assigned_date_and_time ->>br>date_and_time)
activity to activity_method (as chosen_-method)	PATH			executed_action <= action action.chosen_method ->>br>action_method
activity to organization (as concerned_-organization)	PATH			executed_action <= action organization_item = action organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->>br>organization_role organization_role.name = 'concerned organization'} organization_assignment.assigned_organization ->>br>organization
activity to multi_language_-string (as description)	PATH		104	executed_action <= action #6: (attribute_language_item = action attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #7: (multi_language_attribute_item = action

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
activity to date_-time (as planned_end_-date)	PATH			executed_action <= action #4: (date_item = action date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'planned end' } date_assignment.assigned_date -> date => calendar_date) #5: (date_and_time_item = action date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role -> date_time_role date_time_role.name = 'planned end'} date_and_time_assignment.assigned_date_and_time -> date_and_time)
activity to duration (as planned_end_-date)	PATH		47	executed_action <= action characterized_action_definition = action characterized_action_definition <- action_property.definition action_property <- property {action_property.name = 'duration property'}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_property_representation.property action_property_representation action_property_representation.representation -> representation {representation.name = 'planned duration'} representation.items[1] -> representation_item => measure_representation_item <= measure_with_unit => time_measure_with_unit
activity to event_reference (as planned_end_-date)	PATH			executed_action <= action event_occurrence_item = action event_occurrence_item <- applied_event_occurrence_assignment.items[i] applied_event_occurrence_assignment <= event_occurrence_assignment {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'planned end'} event_occurrence_assignment.assigned_event_occurrence -> #10: (|event_occurrence|) #11: (event_occurrence => relative_event_occurrence)
activity to date_-time (as planned_-start_date)	PATH		47	executed_action <= action #4: (date_item = action date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'planned start' } date_assignment.assigned_date -> date =>

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				calendar_date) #5: (date_and_time_item = action date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->) date_time_role date_time_role.name = 'planned start'} date_and_time_assignment.assigned_date_and_time ->) date_and_time)
activity to event_reference (as planned_-start_date)	PATH		47	executed_action <= action event_occurrence_item = action event_occurrence_item <- applied_event_occurrence_assignment.items[i] applied_event_occurrence_assignment <= event_occurrence_assignment {event_occurrence_assignment.role ->) event_occurrence_role event_occurrence_role.name = 'planned start'} event_occurrence_assignment.assigned_event_occurrence ->) #10: (event_occurrence) #11: (event_occurrence => relative_event_occurrence)
activity to date_-and_person_-organization (as requestor)	PATH			executed_action <= action #8: (person_and_organization_item = action person_and_organization_item <- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment <= person_and_organization_assignment {person_and_organization_assignment.role ->) person_and_organization_role person_and_organization_role.name = 'requestor'} person_and_organization_assignment.assigned_person_and_organization ->)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				person_and_organization) #9: (organization_item = action organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'requestor'} organization_assignment.assigned_organization ->> organization)
activity to work_- request (as resolved_- request)	PATH			#12: (executed_action <= action action.chosen_method ->> action_method <- action_request_solution.method action_request_solution action_request_solution.request ->) #13: (executed_action => directed_action directed_action.directive ->> action_directive action_directive.requests[i] ->) versioned_action_request
activity to organization (as supplying_- organization)	PATH			executed_action <= action organization_item = action organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'supplying organization'} organization_assignment.assigned_organization ->> organization

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
ACTIVITY_ELEMENT #1: If item_instance is not used in the context of UoF S7. #2: If item_instance is used in the context of UoF S7. #3: If item_instance_-relationship is a general_-item_instance_-relationship, a same_time_-machining_relationship, or a replaced_usage_-relationship with a process_operation_input_or_-output as usage_context. #4: If item_instance_-relationship is a replaced_-usage_relationship with an item_definition_instance_-relationship or a product_-structure_relationship as usage_context. #5: If no item_version is associated. #6: If an item_version is associated. #7: If activity_element is not used in the context of UoF S7. #8: If activity_element is used in the context of UoF S7. #9: If property_value_-association is of type item_property_association.	applied_action_-assignment	214		applied_action_assignment <= action_assignment {action_assignment.role ->> object_role object_role.description = 'activity element'}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
#10: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #11: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #12: If specification_-category.implicit_-exclusive_condition is FALSE. #13: If specification_-category.implicit_-exclusive_condition is TRUE. #14: If the styled_model is used with UoF P2. #15: If the styled_model is used without UoF P2. #16: The general case for a view_area. #17: If the view_area is in a single window and in 3D context. #18: If the document_-representation is not a physical_model. #19: If the document_-				

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
representation is a physical_model.				
role	object_role.name	41	32	applied_action_assignment <= action_assignment action_assignment.role -> object_role object_role.name {(object_role.name) (object_role.name = 'control') (object_role.name = 'input') (object_role.name = 'output')}
activity_element to activity (as associated_-activity)	PATH			applied_action_assignment <= action_assignment action_assignment.assigned_action -> action => executed_action
activity_element to activity_-method (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = action_method action_method
activity_element to alternate_-item_-relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = alternate_product_relationship alternate_product_relationship
activity_element to assembly_-substitute_-relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = assembly_component_usage_substitute assembly_component_usage_substitute

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to class_-category_-association (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_concept_feature_category_usage product_concept_feature_category_usage
activity_element to class_-condition_-association (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_concept_feature_association product_concept_feature_association
activity_element to class_-inclusion_-association (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_concept_feature_association product_concept_feature_association
activity_element to class_-specification_-association (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_concept_feature_association product_concept_feature_association
activity_element to class_-structure_-relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = configuration_design configuration_design
activity_element to complex_-product (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_formation product_definition_formation
activity_element to configuration (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = configured_effectivity_assignment configured_effectivity_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to design_- constraint (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = product_definition_formation product_definition_formation {product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'}
activity_element to design_- discipline_item_- definition (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
activity_element to document (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
activity_element to document_file (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->> action_item action_item = document_file document_file

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to document_-representation (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition #18: (product_definition) #19: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
activity_element to document_-version (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_formation product_definition_formation {product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <=product_category product_category.name = 'document'}
activity_element to drawing (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = drawing_revision drawing_revision
activity_element to feature_-occurrence (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = shape_aspect shape_aspect
activity_element to geometric_-model (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = shape_representation shape_representation

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to item (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product
activity_element to item_- definition_- instance_- relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_relationship product_definition_relationship
activity_element to item_- definition_- relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_relationship product_definition_relationship
activity_element to item_instance (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item #1: (action_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #2: (action_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
activity_element to item_instance_- relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item #3: (action_item = product_definition_relationship product_definition_relationship) #4: (action_item = product_definition_substitute product_definition_substitute)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to item_version (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_formation product_definition_formation
activity_element to kinematic_-simulation_-information (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = property_definition property_definition => kinematic_property_definition
activity_element to manufacturing_-configuration (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = configuration_effectivity configuration_effectivity
activity_element to material (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = material_designation material_designation
activity_element to physical_-assembly_-relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage
activity_element to physical_-instance (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element.name = 'physical occurrence'}
activity_element to process_-operation_-definition (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = action_method action_method =>process_operation
activity_element to process_-operation_-occurrence (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = action_relationship action_relationship
activity_element to process_plan (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = action action => #5: (process_plan) #6: (product_definition_process =>product_process_plan)
activity_element to product_class (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = product_concept #7: ([product_concept]) #8: (product_concept =>product_class)
activity_element to product_-identification (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] ->action_item action_item = configuration_item #7: ([configuration_item]) #8: (configuration_item =>product_identification)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to product_-structure_-relationship (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_definition_relationship product_definition_relationship => product_definition_usage
activity_element to property (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = general_property general_property
activity_element to property_-value_-association (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item #9: (action_item = property_definition property_definition) #10: (action_item = action_property action_property) #11: (action_item = resource_property resource_property)
activity_element to specification (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature product_concept_feature
activity_element to specification_-category (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature_category product_concept_feature_category #12: (|product_concept_feature_category|) #13: (product_concept_feature_category => exclusive_product_concept_feature_category)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
activity_element to specification_- expression (as element)	PATH			applied_action_assignment {applied_action_assignment <= action_assignment action_assignment.role -> object_role object_role.name = 'activity element'} applied_action_assignment.items[i] -> action_item action_item = product_concept_feature product_concept_feature => conditional_concept_feature
activity_element to specification_- inclusion (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
activity_element to styled_model (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item #14: (action_item = draughting_model draughting_model) #15: (action_item = mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
activity_element to view_area (as element)	PATH			applied_action_assignment applied_action_assignment.items[i] -> action_item action_item = presentation_area #16: (presentation_area) #17: (presentation_area => mechanical_design_geometric_presentation_area)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
ACTIVITY_METHOD #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	action_method	41		
consequence	action_method. consequence	41		
description	action_method. description	41		
name	action_method.name	41		
activity_method to multi_- language_string (as description)	#1: ([action_method. description] [PATH]) #2: (PATH)	41	106	action_method #1: (attribute_language_item = action_method attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action_method multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
activity_method to multi_- language_string (as name)	#1: ([action_method. name] [PATH]) #2: (PATH)	41	106	action_method #1: (attribute_language_item = action_method attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = action_method multi_language_attribute_item <-

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
ACTIVITY_METHOD_- ASSIGNMENT	action_request_- solution	41		
relation_type	action_request_- solution.name	41		{(action_request_solution.name) (action_request_solution.name = 'recommended method') (action_request_solution.name = 'non recommended method')}
activity_method_- assignment to activity_method (as assigned_- method)	PATH			action_request_solution action_request_solution.method ->> action_method
activity_method_- assignment to work_request (as associated_- request)	PATH			action_request_solution action_request_solution.request ->> versioned_action_request
ACTIVITY_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	action_relationship	41		
description	action_relationship. description	41		
relation_type	action_relationship. name	41		{(action_relationship.name) (action_relationship.name = 'alternative') (action_relationship.name = 'decomposition') (action_relationship.name = 'derivation') (action_relationship.name = 'exclusiveness') (action_relationship.name = 'precedence') (action_relationship.name = 'sequence')

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				(action_relationship.name = 'simultaneity')}
activity_-relationship to multi_language_-string (as description)	#1: ([action_-relationship.description] [PATH]) #2: (PATH)	41	108	action_relationship #1: (attribute_language_item = action_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
activity_-relationship to activity (as related)	PATH			action_relationship action_relationship.related_action -> action => executed_action
activity_-relationship to activity (as relating)	PATH			action_relationship action_relationship.relating_action -> action => executed_action

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
CHANGE #1: If the described_- change is a design_- constraint_relationship, a replaced_definition_- relationship, or a replaced_usage_- relationship. #2: If the described_- change is a complex_- product_relationship, or an item_version_- relationship. #3: If the described_- change is a process_plan_- relationship or process_- operation_occurrence_- relationship. #4: If the described_- change is a shape_element_- relationship. #5: If replaced_usage_- relationship.usage_context is a process_operation_- input_or_output. #6: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship or a product_structure_- relationship. #7: For the primary_- language_dependent_string. #8: For any additional_- language_dependent_string.	#1: (product_- definition_- relationship) #2: (product_- definition_formation_- relationship) #3: (action_- relationship) #4: (shape_aspect_- relationship)	41 41 41 41		{#1: (product_definition_relationship product_definition_relationship.name = 'change') #2: (product_definition_formation_relationship product_definition_formation_relationship.name = 'change') #3: (action_relationship action_relationship.name = 'change') #4: (shape_aspect_relationship shape_aspect_relationship.name = 'change')}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
description	#1: (product_-definition_-relationship.description) #2: (product_-definition_formation_-relationship.description) #3: (action_-relationship.description) #4: (shape_aspect_-relationship.description)	41 41 41 41		
change to complex_product_-relationship (as described_-change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation] product_definition_formation_relationship
change to design_-constraint_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
change to item_- version_- relationship (as described_- change)	PATH			product_definition_formation_relationship {product_definition_formation_relationship.name = 'change'} [product_definition_formation_relationship.relating_product_definition_formation ->] product_definition_formation <- product_definition_formation_relationship.relating_product_definition_formation] [product_definition_formation_relationship.related_product_definition_formation ->] product_definition_formation <- product_definition_formation_relationship.related_product_definition_formation]
change to process_- operation_- occurrence_- relationship (as described_- change)	PATH			product_definition_formation_relationship {action_relationship.name = 'change'} [action_relationship.relating_action ->] action <- action_relationship.relating_action] [action_relationship.related_action ->] action <- action_relationship.related_action]
change to process_plan_- relationship (as described_- change)	PATH			action_relationship {action_relationship.name = 'change'} [action_relationship.relating_action ->] action <- action_relationship.relating_action] [action_relationship.related_action ->] action <- action_relationship.related_action]
change to replaced_- definition_- relationship (as described_- change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} [product_definition_relationship.relating_product_definition ->] product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition ->] product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition_relationship.name = 'definition replacement'}
change to replaced_usage_-relationship (as described_-change)	PATH			product_definition_relationship {product_definition_relationship.name = 'change'} #5: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.relating_product_definition] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_relationship.related_product_definition] product_definition_relationship {product_definition_relationship.name = 'usage replacement'}) #6: ([product_definition_relationship.relating_product_definition -> product_definition <- product_definition_relationship.related_product_definition product_definition_relationship <- product_definition_substitute.context_relationship] [product_definition_relationship.related_product_definition -> product_definition <- product_definition_substitute.substitute_definition] product_definition_substitute)
change to multi_-language_string (as description)	#1: (#7: ([product_-definition_-relationship. description] [PATH]) #8: (PATH))	41	108,152, 153,165	#7: (#1: (product_definition_relationship attribute_language_item = product_definition_relationship) #2: (product_definition_formation_relationship attribute_language_item = product_definition_formation_relationship) #3: (action_relationship attribute_language_item = action_relationship) #4: (shape_aspect_relationship attribute_language_item = shape_aspect_relationship) attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'})
	#2: (#7: ([product_-definition_formation_-relationship. description] [PATH]) #8: (PATH))	41		
	#3: (#7: ([action_-relationship. description]	41		

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
	[PATH]) #8: (PATH)) #4: (#7: ([shape_- aspect_relationship. description] [PATH]) #8: (PATH))	41		#8: (#1: (product_definition_relationship multi_language_attribute_item = product_definition_relationship) #2: (product_definition_formation_relationship multi_language_attribute_item = product_definition_formation_relationship) #3: (action_relationship multi_language_attribute_item = action_relationship) #4: (shape_aspect_relationship multi_language_attribute_item = shape_aspect_relationship) multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
ELEMENT_DELIVERY #1: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #2: If the value_with_- unit is a value_range.	element_delivery	214		element_delivery <= action
element_delivery to activity_- element (as deliverable_- element)	PATH			element_delivery <= action <- action_assignment.assigned_action action_assignment => {action_assignment.role ->) object_role object_role.name = 'deliverable element'} applied_action_assignment applied_action_assignment.items[1] -> action_item action_item = applied_action_assignment applied_action_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				{applied_action_assignment <= action_assignment action_assignment.role -> object_role object_role.description = 'activity element'}
element_delivery to organization (as destination)	PATH			element_delivery <= action organization_item = action organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role -> organization_role organization_role.name = 'destination'} organization_assignment.assigned_organization -> organization
element_delivery to value_with_- unit (as quantity)	PATH			element_delivery <= action characterized_action_definition = action characterized_action_definition <- action_property.definition action_property <- action_property_representation.property action_property_representation action_property_representation.representation -> representation {representation.name = 'delivery quantity'} representation.items[1] -> representation_item => #1: (measure_representation_item) #2: (compound_representation_item => value_range)
ORGANIZATION_- RELATIONSHIP	organization_- relationship	41		

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
description	organization_- relationship. description	41		
relation_type	organization_- relationship.name	41		{(organization_relationship.name) (organization_relationship.name = 'hierarchy') (organization_relationship.name = 'legal succession') (organization_relationship.name = 'reorganization')}
organization_- relationship to multi_language_- string (as description)	#1: ([organization_- relationship. description] [PATH]) #2: (PATH)	41	137	organization_relationship #1: (attribute_language_item = organization_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = organization_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
organization_- relationship to organization (as related)	PATH			organization_relationship organization_relationship.related_organization ->organization
organization_- relationship to organization (as relating)	PATH			organization_relationship organization_relationship.relating_organization ->organization

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
PROJECT #1: If only a certain day is known. #2: If a certain day and the time of day is known. #3: If no duration is specified as planned_end. #4: If a duration is specified as planned_end. #5: For the primary_-language_dependent_string. #6: For any additional_-language_dependent_string. #7: If event_reference.offset is not instantiated. #8: If event_reference.offset is instantiated.	organizational_project	41		
description	organizational_project.description	41		
id	organizational_project.id	41		
name	organizational_project.name	41		
project to date_-time (as actual_end_-date)	PATH			organizational_project #1: (date_item = organizational_project date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'actual end'} date_assignment.assigned_date -> date =>

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				calendar_date) #2: (date_and_time_item = organizational_project date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->> date_time_role date_time_role.name = 'actual end'} date_and_time_assignment.assigned_date_and_time ->> date_and_time)
project to date_- time (as actual_start_- date)	PATH			organizational_project #3: (#1: (date_item = organizational_project date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role ->> date_role date_role.name = 'actual start'} date_assignment.assigned_date -> date => calendar_date) #2: (date_and_time_item = organizational_project date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->> date_time_role date_time_role.name = 'actual start'} date_and_time_assignment.assigned_date_and_time -> date_and_time)) #4: (time_interval_item = organizational_project time_interval_item <- applied_time_interval_assignment.items[i]

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_time_interval_assignment <= time_interval_assignment time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time))
project to product_class (as affected_- product_class)	PATH		34	organizational_project <- organizational_project_assignment.assigned_organizational_project organizational_project_assignment => {organizational_project_assignment.role -> organizational_project_role organizational_project_role.name = 'affecting project'} applied_organizational_project_assignment applied_organizational_project_assignment.items[i] -> organizational_project_item organizational_project_item = product_concept product_concept
project to multi_- language_string (as description)	#5: ([organizational_- project. description][PATH]) #6: (PATH)		139	organizational_project #5: (attribute_language_item = organizational_project attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #6: (multi_language_attribute_item = organizational_project multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				{multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
project to multi_-language_string (as name)	#5: ([organizational_-project.name] [PATH]) #6: (PATH)		139	organizational_project #5: (attribute_language_item = organizational_project attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #6: (multi_language_attribute_item = organizational_project multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
project to date_-time (as planned_end_-date)	PATH			organizational_project #1: (date_item = organizational_project date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment {date_assignment.role -> date_role date_role.name = 'planned end'} date_assignment.assigned_date -> date => calendar_date) #2: (date_and_time_item = organizational_project date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				date_time_role date_time_role.name = 'planned end'} date_and_time_assignment.assigned_date_and_time -> date_and_time)
project to duration (as planned_end_-date)	PATH		47	organizational_project time_interval_item = organizational_project time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'planned period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.duration -> time_measure_with_unit
project to event_-reference (as planned_end_-date)	PATH			organizational_project event_occurrence_item = organizational_project event_occurrence_item <- applied_event_occurrence_assignment.items[i] event_occurrence_assignment {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'planned end'} event_occurrence_assignment.assigned_event_occurrence -> #7: (event_occurrence) #8: (event_occurrence => relative_event_occurrence)
project to date_-time (as planned_-start_date)	PATH		47	organizational_project #3: (#1: (date_item = organizational_project date_item <- applied_date_assignment.items[i] applied_date_assignment <= date_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				{date_assignment.role -> date_role date_role.name = 'planned start'} date_assignment.assigned_date ->) date => calendar_date) #2: (date_and_time_item = organizational_project date_and_time_item <- applied_date_and_time_assignment.items[i] applied_date_and_time_assignment <= date_and_time_assignment {date_and_time_assignment.role ->) date_time_role date_time_role.name = 'planned start'} date_and_time_assignment.assigned_date_and_time ->) date_and_time)) #4: (time_interval_item = organizational_project time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role ->) time_interval_role time_interval_role.name = 'planned period'} time_interval_assignment.assigned_time_interval ->) time_interval => time_interval_with_bounds time_interval_with_bounds.primary_bound ->) date_time_or_event_occurrence date_time_or_event_occurrence = date_time_select #1: (date_time_select = date date => calendar_date) #2: (date_time_select = date_and_time date_and_time))

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
project to event_-reference (as planned_-start_date)	PATH		47	organizational_project #3: (event_occurrence_item = organizational_project event_occurrence_item <- applied_event_occurrence_assignment.items[i] event_occurrence_assignment {event_occurrence_assignment.role -> event_occurrence_role event_occurrence_role.name = 'planned start'} event_occurrence_assignment.assigned_event_occurrence -> #7: (|event_occurrence|) #8: (event_occurrence => relative_event_occurrence)) #4: (time_interval_item = organizational_project time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <= time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'planned period'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence #7: (|event_occurrence|) #8: (event_occurrence => relative_event_occurrence))
project to activity (as work_-program)	PATH		34	organizational_project <- organizational_project_assignment.assigned_organizational_project organizational_project_assignment => {organizational_project_assignment.role -> organizational_project_role organizational_project_role.name = 'work program'} applied_organizational_project_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_organizational_project_assignment.items [i] -> organizational_project_item organizational_project_item = executed_action executed_action
PROJECT_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	organizational_project_- relationship	41		
description	organizational_project_- relationship. description	41		
relation_type	organizational_project_- relationship.name	41		{organizational_project_relationship (organizational_project_relationship.name) (organizational_project_relationship.name = 'sequence') (organizational_project_relationship.name = 'decomposition') (organizational_project_relationship.name = 'dependency') (organizational_project_relationship.name = 'succession')}
project_- relationship to multi_language_- string (as description)	#1: ([organizational_- project_relationship. description] [PATH]) #2: (PATH)	41	140	organizational_project_relationship #1: (attribute_language_item = organizational_project_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = organizational_project_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
project_- relationship to project (as related)	PATH			organizational_project_relationship organizational_project_relationship.related_organizational_project ->organizational_project
project_- relationship to project (as relating)	PATH			organizational_project_relationship organizational_project_relationship.relating_organizational_project ->organizational_project
WORK_ORDER #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	action_directive	41	9	
description	action_directive. comment	41		
id	action_directive.name	41		
version_id	identification_- assignment.assigned_id	41	29,195	action_directive identification_item = action_directive identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->identification_role identification_role.name = 'version'} identification_assignment.assigned_id
work_order_type	action_directive. description	41		{action_directive (action_directive.description) (action_directive.description = 'design release') (action_directive.description = 'manufacturing release') (action_directive.description = 'management resolution') (action_directive.description = 'design deviation permit') (action_directive.description = 'production deviation permit')}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_order to multi_language_string (as description)	#1: ([action_directive.comment] [PATH]) #2: (PATH)	41	105	action_directive #1: (attribute_language_item = action_directive attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'comment'}) #2: (multi_language_attribute_item = action_directive multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'comment'})
work_order to activity (as is_controlling)	PATH			action_directive <- directed_action.directive directed_action <= executed_action

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
WORK_REQUEST #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If used for a person as member of an organization. #4: If used for an organization. #5: If item_instance is not used in the context of UoF S7. #6: If item_instance is used in the context of UoF S7. #7: If item_instance_- relationship is a general_- item_instance_- relationship, a same_time_- machining_relationship, or a replaced_usage_- relationship with a process_operation_input_or_- output as usage_context. #8: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #9: If no item_version is associated. #10: If an item_version is associated.	versioned_action_- request	41		

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
#11: If work_request is not used in the context of UoF S7. #12: If work_request is used in the context of UoF S7. #13: If property_value_-association is of type item_property_association. #14: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #15: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #16: If specification_-category.implicit_-exclusive_condition is FALSE. #17: If specification_-category.implicit_-exclusive_condition is TRUE. #18: If the styled_model is used with UoF P2. #19: If the styled_model is used without UoF P2.				

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
#20: The general case for a view_area. #21: If the view_area is in a single window and in 3D context. #22: If the document_-representation is not a physical_model. #23: If the document_-representation is a physical_model.				
description	versioned_action_-request.description	41		
id	versioned_action_-request.id	41		
request_type	versioned_action_-request.purpose	41		{(versioned_action_request.purpose) (versioned_action_request.purpose = 'change of standard') (versioned_action_request.purpose = 'cost reduction') (versioned_action_request.purpose = 'customer rejection') (versioned_action_request.purpose = 'customer request') (versioned_action_request.purpose = 'durability improvement') (versioned_action_request.purpose = 'government regulation') (versioned_action_request.purpose = 'production alignment') (versioned_action_request.purpose = 'procurement alignment') (versioned_action_request.purpose = 'production relief') (versioned_action_request.purpose = 'production requirement') (versioned_action_request.purpose = 'quality improvement') (versioned_action_request.purpose = 'security reason') (versioned_action_request.purpose = 'standardization') (versioned_action_request.purpose = 'supplier request') (versioned_action_request.purpose = 'technical improvement') (versioned_action_request.purpose = 'tool improvement')}
status	action_request_status.status	41	271	versioned_action_request <- action_request_status.assigned_request action_request_status

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				action_request_status.status {(action_request_status.status) (action_request_status.status = 'in work') (action_request_status.status = 'issued') (action_request_status.status = 'proposed') (action_request_status.status = 'resolved')}
version_id	versioned_action_- request.version	41		
work_request to multi_language_- string (as description)	#1: ([versioned_- action_request. description] [PATH]) #2: (PATH)	41	171	versioned_action_request #1: (attribute_language_item = versioned_action_request attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = versioned_action_request multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
work_request to date_and_person_- organization (as notified_- person)	PATH		270	versioned_action_request #3: (person_and_organization_item = versioned_action_request person_and_organization_item <- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment <= person_and_organization_assignment {person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.name = 'notified person or organization'} person_and_organization_assignment.assigned_person_and_organization ->> person_and_organization) #4: (organization_item = versioned_action_request organization_item <-

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'notified person or organization'} organization_assignment.assigned_organization ->> organization)
work_request to date_and_person_-organization (as requestor)	PATH			versioned_action_request #3: (person_and_organization_item = versioned_action_request person_and_organization_item <- applied_person_and_organization_assignment.items[i] applied_person_and_organization_assignment <= person_and_organization_assignment {person_and_organization_assignment.role ->> person_and_organization_role person_and_organization_role.name = 'requestor'} person_and_organization_assignment.assigned_person_and_organization ->> person_and_organization) #4: (organization_item = versioned_action_request organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'requestor'} organization_assignment.assigned_organization ->> organization)
work_request to activity_method (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_action_request_assignment.items[i] -> action_request_item action_request_item = action_method action_method
work_request to alternate_item_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = alternate_product_relationship alternate_product_relationship
work_request to assembly_-substitute_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = assembly_component_usage_substitute assembly_component_usage_substitute
work_request to class_category_-association (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature_category_usage

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_concept_feature_category_usage
work_request to class_condition_-association (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature_association product_concept_feature_association
work_request to class_inclusion_-association (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature_association product_concept_feature_association
work_request to class_-specification_-association (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature_association product_concept_feature_association

Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_request to class_structure_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = configuration_design configuration_design
work_request to complex_product (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition_formation product_definition_formation
work_request to configuration (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = configured_effectivity_assignment configured_effectivity_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_request to design_-constraint (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition_formation product_definition_formation
work_request to design_-discipline_item_-definition (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
work_request to document (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
work_request to document_file (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->) object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->) action_request_item action_request_item = document_file document_file
work_request to document_-representation (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->) object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->) action_request_item action_request_item = product_definition #22: (product_definition) #23: (product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)
work_request to document_version (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->) object_role

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = product_definition_formation product_definition_formation {product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <=product_category product_category.name = 'document'}
work_request to drawing (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = drawing_revision drawing_revision
work_request to feature_-occurrence (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = shape_aspect shape_aspect

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_request to geometric_model (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = shape_representation shape_representation
work_request to item (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = product product
work_request to item_definition_-instance_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = product_definition_relationship product_definition_relationship

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_request to item_definition_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition_relationship product_definition_relationship
work_request to item_instance (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item #5: (action_request_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #6: (action_request_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
work_request to item_instance_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item #7: (action_request_item = product_definition_relationship product_definition_relationship) #8: (action_request_item = product_definition_substitute product_definition_substitute)
work_request to item_version (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = product_definition_formation product_definition_formation
work_request to kinematic_-simulation_-information (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = property_definition property_definition => kinematic_property_definition
work_request to manufacturing_-configuration (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'}

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = configuration_effectivity configuration_effectivity
work_request to material (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = material_designation material_designation
work_request to physical_-assembly_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage
work_request to physical_-instance (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <<= application_context_element application_context_element.name = 'physical occurrence'}
work_request to process_-operation_-definition (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = action_method action_method => process_operation
work_request to process_-operation_-occurrence (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->> action_request_item action_request_item = action_relationship action_relationship
work_request to process_plan (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->> object_role

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = action action => #9: (process_plan) #10: (product_definition_process => product_process_plan)
work_request to product_class (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = product_concept #11: (|product_concept|) #12: (product_concept => product_class)
work_request to product_-identification (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = configuration_item #11: (|configuration_item|) #12: (configuration_item => product_identification)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
work_request to product_-structure_-relationship (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_definition_relationship product_definition_relationship => product_definition_usage
work_request to property (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = general_property general_property
work_request to property_value_-association (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item #13: (action_request_item = property_definition property_definition) #14: (action_request_item = action_property action_property)

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				#15: (action_request_item = resource_property resource_property)
work_request to specification (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature product_concept_feature
work_request to specification_- category (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature_category #16: (|product_concept_feature_category|) #17: (product_concept_feature_category => exclusive_product_concept_feature_category)
work_request to specification_- expression (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role -> object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] -> action_request_item action_request_item = product_concept_feature

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Table 27 – Mapping table work_management UoF (S5) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_concept_feature => conditional_concept_feature
work_request to specification_-inclusion (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item action_request_item = product_concept_feature product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature
work_request to styled_model (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment applied_action_request_assignment.items[i] ->action_request_item #18: (action_request_item = draughting_model draughting_model) #19: (action_request_item = \ mechanical_design_geometric_presentation_representation mechanical_design_geometric_presentation_representation)
work_request to view_area (as scope)	PATH			versioned_action_request <- action_request_assignment.assigned_action_request action_request_assignment => {action_request_assignment.role ->object_role object_role.name = 'scope'} applied_action_request_assignment

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Table 27 – Mapping table work_management UoF (S5) (concluded)

Application element	AIM element	Source	Rules	Reference path
				applied_action_request_assignment.items[i] -> action_request_item action_request_item = presentation_area #20: (presentation_area) #21: (presentation_area => mechanical_design_geometric_presentation_area)

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Table 28 – Mapping table classification UoF (S6)

Application element	AIM element	Source	Rules	Reference path
CLASSIFICATION_- ASSOCIATION #1: If classification_- association.definitional is TRUE. #2: If classification_- association.definitional is FALSE. #3: If classification_- association.definitional is not instantiated. #4: If the document_- representation is not a physical_model. #5: If the document_- representation is a physical_model. #6: If product_class is used without UoF S7. #7: If product_class is used with UoF S7. #8: If specification_- category.implicit_- exclusive_condition = FALSE. #9: If specification_- category.implicit_- exclusive_condition = TRUE. #10: If the design_- discipline_item_definition is not specifed as a resource_definition by a process_operation_resource_- assignment. #11: If the design_-	applied_classification_- assignment	214	80	applied_classification_assignment <= classification_assignment {classification_assignment.role ->> classification_role classification_role.name #1: (classification_role.name = 'definitional') #2: (classification_role.name = 'non-definitional') #3: (classification_role.name = '')}

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
discipline_item_definition is specifed as a resource_-definition by a process_-operation_resource_-assignment. #12: If property_value_-association is of type item_property_association. #13: If property_value_-association is of type process_property_-association and references an element in the process_-property_select which is not process_operation_-resource_assignment. #14: If property_value_-association is of type process_property_-association and references process_operation_resource_-assignment in the process_-property_select. #15: If item_instance is not used in the context of UoF S7. #16: If item_instance is used in the context of UoF S7. #17: If no item_version is associated. #18: If an item_version is associated. #19: If product_-identification is used with UoF S4.				

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
#20: If product_-identification is used with UoF S7.				
definitional	classification_role.name	41	13,80	applied_classification_assignment <= classification_assignment classification_assignment.role -> classification_role classification_role.name {#1: (classification_role.name = 'definitional') #2: (classification_role.name = 'non-definitional') #3: (classification_role.name = '')}
role	classification_role.description	41		applied_classification_assignment <= classification_assignment classification_assignment.role -> classification_role classification_role.description
classification_-association to general_-classification (as associated_-classification)	PATH			applied_classification_assignment <= classification_assignment classification_assignment.assigned_class -> group => class
classification_-association to activity (as classified_-element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] -> classification_item = executed_action executed_action
classification_-association to activity_method (as classified_-element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] -> classification_item classification_item = action_method action_method

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to approval_status (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = approval_status approval_status
classification_- association to catalogue_thread (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = feature_definition feature_definition => {feature_definition <= characterized_object characterized_object.description = 'thread'} externally_defined_feature_definition
classification_- association to complex_product (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = product_definition_formation product_definition_formation
classification_- association to contract (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = contract contract
classification_- association to design_- constraint (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = product_definition_formation product_definition_formation

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to design_- discipline_item_- definition (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = product_definition product_definition #10: (product_definition) #11: (product_definition => product_definition_resource)
classification_- association to document (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = product product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
classification_- association to document_file (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = document_file document_file
classification_- association to document_- representation (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item #4: (classification_item = product_definition product_definition) #5: (classification_item = product_definition product_definition => product_definition_with_associated_documents => physically_modelled_product_definition)

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to document_version (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item = product_definition_formation {product_definition_formation product_definition_formation.of_product ->> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'document'}
classification_- association to feature_- definition (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item = feature_definition feature_definition
classification_- association to general_feature (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item = general_feature general_feature
classification_- association to item (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = product product
classification_- association to item_instance (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item #15: (classification_item = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage) #16: (classification_item = product_definition product_definition)

Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to item_version (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = product_definition_formation product_definition_formation
classification_- association to material (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = material_designation material_designation
classification_- association to process_- operation_- definition (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = process_operation process_operation
classification_- association to process_- operation_- occurrence (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = action_relationship action_relationship {action_relationship.name = 'process operation occurrence' }
classification_- association to process_plan (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = action #17: (action => process_plan) #18: (action => product_definition_process => product_process_plan)

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to product_class (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = product_concept #6: (product_concept) #7: (product_concept => product_class)
classification_- association to product_- identification (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = configuration_item #19: (configuration_item) #20: (configuration_item => product_identification)
classification_- association to project (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = organizational_project organizational_project
classification_- association to property (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item classification_item = general_property general_property
classification_- association to property_value_- association (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->) classification_item #12: (classification_item = property_definition property_definition) #13: (classification_item = action_property action_property) #14: (classification_item = resource_property resource_property)

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to security_level (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = security_classification_level security_classification_level
classification_- association to shape_element (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = shape_aspect shape_aspect
classification_- association to specification_- category (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = product_concept_feature_category #8: (product_concept_feature_category) #9: (product_concept_feature_category => exclusive_product_concept_feature_category)
classification_- association to thread_feature (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = shape_aspect shape_aspect => applied_area
classification_- association to transition_- feature (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = shape_aspect shape_aspect => transition_feature
classification_- association to work_order (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->> classification_item classification_item = action_directive action_directive

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- association to work_request (as classified_- element)	PATH			applied_classification_assignment applied_classification_assignment.items[i] ->classification_item classification_item = versioned_action_request versioned_action_request
CLASSIFICATION_- ATTRIBUTE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	property_definition	41		
description	property_definition. description	41		
id	property_definition.id	41		
name	property_definition. name	41		
classification_- attribute to property_value_- representation (as allowed_- value)	PATH			property_definition {derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition ->general_property} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation

Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
classification_- attribute to general_- classification (as associated_- classification)	PATH			property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_object characterized_object => characterized_class
classification_- attribute to property (as attribute_- definition)	PATH			property_definition derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association {general_property_association.name = 'attribute definition'} general_property_association.base_definition ->) general_property
classification_- attribute to multi_language_- string (as description)	#1: ([property_- definition. description] [PATH]) #2: (PATH)	41	156	property_definition #1: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
classification_- attribute to multi_language_- string (as name)	#1: ([property_- definition.name] [PATH]) #2: (PATH)	41	156	property_definition #1: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
CLASSIFICATION_- SYSTEM #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	class_system	214		class_system <= group
description	group.description	41		class_system <= group group.description
id	group.name	41		class_system <= group group.name
classification_- system to multi_- language_string (as description)	#1: ([group. description] [PATH]) #2: (PATH)	41	131	class_system <= group #1: (attribute_language_item = group attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = group multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
EXTERNAL_LIBRARY_-REFERENCE #1: If external_library_-reference is referenced by a general_classification as the classification_-source. #2: If external_library_-reference is referenced by a property as the property_-source. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: (externally_-defined_class) #2: (externally_-defined_general_-property)	214 214		#1: (externally_defined_class <= [class <= group] [externally_defined_item]) #2: (externally_defined_general_property <= [general_property] [externally_defined_item])
description	external_source.-description	41		#1: (externally_defined_class <=) #2: (externally_defined_general_property <=) externally_defined_item externally_defined_item.source ->- external_source external_source.description
external_id	externally_defined_-item.item_id	41		#1: (externally_defined_class <=) #2: (externally_defined_general_property <=) externally_defined_item externally_defined_item.item_id
library_type	external_source.source_-id	41		#1: (externally_defined_class <=) #2: (externally_defined_general_property <=) externally_defined_item externally_defined_item.source ->- external_source external_source.source_id {external_source.source_id ->- source_item source_item = identifier

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				identifier}
external_library_- reference to multi_language_- string (as description)	#3: ([external_source. description] [PATH]) #4: (PATH)	41	126	#1: (externally_defined_class <=) #2: (externally_defined_general_property <=) externally_defined_item externally_defined_item.source ->) external_source #3: (attribute_language_item = external_source attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = external_source multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
GENERAL_- CLASSIFICATION #1: If the general_- classification is not referenced by an classification_attribute. #2: If the general_- classification is referenced by an classification_attribute. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string.	#1: (class) #2: (characterized_- class)	214 214		#1: (class <=) #2: (characterized_class <= class <=) group

Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
description	group.description	41		class <= group group.description
id	group.name	41		class <= group group.name
version_id	identification_- assignment.assigned_id	41	29,198	class identification_item = class identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
general_- classification to external_- library_- reference (as classification_- source)	IDENTICAL MAPPING			{class => externally_defined_class}
general_- classification to plib_class_- reference (as classification_- source)	IDENTICAL MAPPING			{class => externally_defined_class <= externally_defined_item externally_defined_item.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'}

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
general_- classification to multi_- language_string (as description)	#3: ([group. description] [PATH]) #4: (PATH)	41	131	#2: (characterized_class <= class <=) #1: (class <=) group #3: (attribute_language_item = group attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = group multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
general_- classification to classification_- system (as used_- classification_- system)	PATH		80,87	#2: (characterized_class <= class) #1: (class) classification_item = class classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {classification_assignment.role ->> classification_role classification_role.name = 'class system membership'} classification_assignment.assigned_class ->> group => class_system

Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
GENERAL_- CLASSIFICATION_- HIERARCHY	group_relationship	41	102	{group_relationship [group_relationship.name = 'class hierarchy'] [[group_relationship.related_group ->] [group_relationship.relating_group ->] group => class]}
general_- classification_- hierarchy to general_- classification (as sub_- classification)	PATH			group_relationship group_relationship.related_group ->> group => class
general_- classification_- hierarchy to general_- classification (as super_- classification)	PATH			group_relationship group_relationship.relating_group ->> group => class
PLIB_CLASS_- REFERENCE	externally_defined_- class	214	175	externally_defined_class <= [class <= group] [externally_defined_item {externally_defined_item.source ->> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'}]
code	externally_defined_- item.item_id	41		externally_defined_class <= externally_defined_item {externally_defined_item externally_defined_item.source ->> external_source => known_source <= pre_defined_item

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				pre_defined_item.name = 'ISO 13584 library'} externally_defined_item.item_id
supplier_bsu	organization.id	41	34,59	externally_defined_class <= {externally_defined_class <= externally_defined_item externally_defined_item.source ->> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} class organization_item = class organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'class supplier'} organization_assignment.assigned_organization ->> organization organization.id
version	identification_- assignment.assigned_id	41	66	externally_defined_class {externally_defined_class <= externally_defined_item externally_defined_item.source ->> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} external_identification_item = externally_defined_class external_identification_item <- applied_external_identification_assignment.items[i] applied_external_identification_assignment <= external_identification_assignment <= {external_identification_assignment

Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				external_identification_assignment.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
PLIB_PROPERTY_- REFERENCE	externally_defined_- general_property	214		externally_defined_general_property <= [general_property] [externally_defined_item]
code	externally_defined_- item.item_id	41		externally_defined_general_property <= externally_defined_item externally_defined_item.item_id
version	identification_- assignment.assigned_id	41	68	externally_defined_general_property {externally_defined_general_property <= externally_defined_item externally_defined_item.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} external_identification_item = externally_defined_general_property external_identification_item <- applied_external_identification_assignment.items[i] applied_external_identification_assignment <= external_identification_assignment <= {external_identification_assignment external_identification_assignment.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} identification_assignment

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				{identification_assignment.role -> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
plib_property_- reference to plib_class_- reference (as name_scope)	PATH		67,100	externally_defined_general_property <= externally_defined_item <- {externally_defined_item.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} externally_defined_item_relationship.relating_item externally_defined_item_relationship {externally_defined_item_relationship.name = 'name scope'} externally_defined_item_relationship.related_item -> externally_defined_item => {externally_defined_item.source -> external_source => known_source <= pre_defined_item pre_defined_item.name = 'ISO 13584 library'} externally_defined_class
SPECIFIC_ITEM_- CLASSIFICATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_related_- product_category	41		
classification_- name	product_category.name	41		product_related_product_category <= product_category product_category.name {(product_category.name) (product_category.name = 'application control') (product_category.name = 'assembly') (product_category.name = 'collection')

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Table 28 – Mapping table classification UoF (S6) (continued)

Application element	AIM element	Source	Rules	Reference path
				(product_category.name = 'completely knocked down') (product_category.name = 'detail') (product_category.name = 'in process') (product_category.name = 'part') (product_category.name = 'prototype') (product_category.name = 'raw material') (product_category.name = 'regulated') (product_category.name = 'safety') (product_category.name = 'service') (product_category.name = 'tool')}
description	product_category. description	41		product_related_product_category <= product_category product_category.description
specific_item_- classification to item (as associated_- item)	PATH			product_related_product_category product_related_product_category.products[i] ->> product
specific_item_- classification to multi_- language_string (as description)	#1: ([product_- category.description] [PATH]) #2: (PATH)	41	144	product_related_product_category #1: (attribute_language_item = product_related_product_category attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_related_product_category multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 28 – Mapping table classification UoF (S6) (concluded)

Application element	AIM element	Source	Rules	Reference path
SPECIFIC_ITEM_- CLASSIFICATION_- HIERARCHY	product_category_- relationship	41		{product_category_relationship product_category_relationship.name = 'hierarchy'}
specific_item_- classification_- hierarchy to specific_item_- classification (as sub_- classification)	PATH			product_category_relationship product_category_relationship.sub_category ->) product_category => product_related_product_category
specific_item_- classification_- hierarchy to specific_item_- classification (as super_- classification)	PATH			product_category_relationship product_category_relationship.category ->) product_category => product_related_product_category

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Table 29 – Mapping table specification_control UoF (S7)

Application element	AIM element	Source	Rules	Reference path
ALTERNATIVE_-SOLUTION	product_definition_-formation	41	77,181,4	{product_definition_formation [product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'alternative solution'] [product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'alternative definition']}
alternative_-solution to alternative_-solution (as base_-element)	PATH		184	product_definition_formation <- product_definition.formation product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'solution alternative definition'} product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'alternative definition'} product_definition.formation ->product_definition_formation
alternative_-solution to product_-component (as base_-element)	PATH		184	product_definition_formation <- product_definition.formation product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'solution alternative definition'} product_definition_relationship.relating_product_definition ->product_definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation -> product_definition_formation
alternative_- solution to product_function (as base_- element)	PATH		184	product_definition_formation <- product_definition.formation product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'solution alternative definition'} product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'functional definition'} product_definition.formation -> product_definition_formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
CLASS_CATEGORY_-ASSOCIATION #1: If class_category_-association.mandatory is TRUE. #2: If class_category_-association.mandatory is FALSE. #3: If specification_-category.implicit_-exclusive_condition is FALSE. #4: If specification_-category.implicit_-exclusive_condition is TRUE.	product_concept_-feature_category_usage	214		product_concept_feature_category_usage <= group_assignment
mandatory	object_role.name	41	32	product_concept_feature_category_usage <= group_assignment group_assignment.role ->object_role object_role.name {#1: (object_role.name = 'mandatory category usage') #2: (object_role.name = 'optional category usage')}
class_category_-association to specification_-category (as associated_-category)	PATH			product_concept_feature_category_usage <= group_assignment group_assignment.assigned_group ->group => product_concept_feature_category {#3: (|product_concept_feature_category|) #4: (product_concept_feature_category => exclusive_product_concept_feature_category)}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
class_category_-association to product_class (as associated_-product_class)	PATH			product_concept_feature_category_usage product_concept_feature_category_usage.items[1] ->category_usage_item category_usage_item = product_class product_class
CLASS_CONDITION_-ASSOCIATION #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_concept_-feature_association	44		
condition_type	product_concept_-feature_association.name	44		{product_concept_feature_association (product_concept_feature_association.name) (product_concept_feature_association.name = 'part usage') (product_concept_feature_association.name = 'identification') (product_concept_feature_association.name = 'validity') (product_concept_feature_association.name = 'design case')}
description	product_concept_-feature_association.description	44		
class_condition_-association to specification_-expression (as associated_-condition)	PATH			product_concept_feature_association product_concept_feature_association.feature ->product_concept_feature => |conditional_concept_feature|
class_condition_-association to product_class (as associated_-product_class)	PATH			product_concept_feature_association product_concept_feature_association.concept ->product_concept => product_class

Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
class_condition_- association to multi_language_- string (as description)	#1: ([product_concept_- feature_association. description] [PATH]) #2: (PATH)	44	148	product_concept_feature_association #1: (attribute_language_item = product_concept_feature_association attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept_feature_association multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
CLASS_INCLUSION_- ASSOCIATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_concept_- feature_association	44		
description	product_concept_- feature_association. description	44		
class_inclusion_- association to specification_- inclusion (as associated_- inclusion)	PATH			product_concept_feature_association product_concept_feature_association.feature ->) product_concept_feature => conditional_concept_feature => inclusion_product_concept_feature

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
class_inclusion_- association to product_class (as associated_- product_class)	PATH			product_concept_feature_association product_concept_feature_association.concept ->product_concept => product_class
class_inclusion_- association to multi_language_- string (as description)	#1: ([product_concept_- feature_association. description] [PATH]) #2: (PATH)	44	148	product_concept_feature_association #1: (attribute_language_item = product_concept_feature_association attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept_feature_association multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
CLASS_- SPECIFICATION_- ASSOCIATION #1: If class_- specification_association. associated_specification. package is FALSE. #2: If class_- specification_association. associated_specification. package is TRUE.	product_concept_- feature_association	44		
association_type	product_concept_- feature_association. name	44		{(product_concept_feature_association.name) (product_concept_feature_association.name = 'replaceable standard') (product_concept_feature_association.name = 'non replaceable standard') (product_concept_feature_association.name = 'availability')

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				(product_concept_feature_association.name = 'identification') (product_concept_feature_association.name = 'option') (product_concept_feature_association.name = 'part usage')}
class_- specification_- association to product_class (as associated_- product_class)	PATH			product_concept_feature_association product_concept_feature_association.concept ->>> product_concept => product_class
class_- specification_- association to specification (as associated_- specification)	PATH			product_concept_feature_association product_concept_feature_association.feature ->>> product_concept_feature {#1: (|product_concept_feature|) #2: (product_concept_feature => package_product_concept_feature)}
CLASS_STRUCTURE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If class_structure_- relationship.related is a product_function. #4: If class_structure_- relationship.related is a product_component.	configuration_design	44		
description	configuration_design. description	44		
relation_type	configuration_design. name	44	93	{(configuration_design.name) (configuration_design.name ≠ 'functionality') (configuration_design.name ≠ 'realization')}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
class_structure_- relationship to multi_language_- string (as description)	#1: ([configuration_- design.description] [PATH]) #2: (PATH)	41	114	configuration_design #1: (attribute_language_item = configuration_design attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = configuration_design multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
class_structure_- relationship to product_- component (as related)	PATH			configuration_design configuration_design.design ->> configuration_design_item configuration_design_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation ->> product_definition_formation
class_structure_- relationship to product_function (as related)	PATH			configuration_design configuration_design.design ->> configuration_design_item configuration_design_item = product_definition product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'functional definition'} product_definition.formation ->>

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation
class_structure_- relationship to product_class (as relating)	PATH			configuration_design configuration_design.configuration ->& configuration_item {#3: (configuration_item.name = 'functional structure item') #4: (configuration_item.name = 'conceptual structure item')} configuration_item.item_concept ->& product_concept => product_class
COLLECTED_ITEM_- ASSOCIATION	product_definition_- relationship	41	184	{product_definition_relationship product_definition_relationship.name = 'collection membership'}
collected_item_- association to collection_- definition (as relating)	PATH		40	product_definition_relationship {product_definition_relationship.name = 'collection membership'} product_definition_relationship.relating_product_definition ->& product_definition {product_definition <-& product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role ->& product_definition_context_role product_definition_context_role.name = 'part definition type'} product_definition_context_association.frame_of_reference ->& product_definition_context <= application_context_element application_context_element.name = 'collection definition'}
COLLECTION_- DEFINITION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition	41	40	{product_definition <-& product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role ->& product_definition_context_role product_definition_context_role.name = 'part definition type'} product_definition_context_association.frame_of_reference ->& product_definition_context <= application_context_element application_context_element.name = 'collection definition'}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
purpose	product_definition. name	41		[1]
collection_- definition to multi_language_- string (as purpose)	#1: ([product_- definition.name] [PATH]) #2: (PATH)	41	150	product_definition #1: (attribute_language_item = product_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
COMPLEX_PRODUCT #1: If complex_product is an alternative_solution. #2: If complex_product is a product_component. #3: If complex_product is a product_function.	product_definition_- formation	41	181,4	{[product_definition_formation product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category #1: (product_category.name = 'alternative solution') #2: (product_category.name = 'conceptual product') #3: (product_category.name = 'functionality')] [product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->product_definition_context <= application_context_element #1: (application_context_element.name = 'alternative definition') #2: (application_context_element.name = 'conceptual definition') #3: (application_context_element.name = 'functional definition')]}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
id	product.id	41		product_definition_formation product_definition_formation.of_product ->product product.id
version_id	product_definition_-formation.id	41		
COMPLEX_PRODUCT_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_definition_-formation_relationship	41		
description	product_definition_-formation_relationship.description	41		
relation_type	product_definition_-formation_relationship.name	41		{(product_definition_formation_relationship.name) (product_definition_formation_relationship.name = 'derivation') (product_definition_formation_relationship.name = 'hierarchy')[2)] (product_definition_formation_relationship.name = 'sequence')[3)] (product_definition_formation_relationship.name = 'replacement')}
complex_product_-relationship to multi_language_-string (as description)	#1: ([product_-definition_formation_-relationship.description][PATH]) #2: (PATH)	41	152	product_definition_formation_relationship #1: (attribute_language_item = product_definition_formation_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
complex_product_-relationship to complex_product (as related)	PATH			product_definition_formation_relationship product_definition_formation_relationship.related_product_definition_formation -> product_definition_formation
complex_product_-relationship to complex_product (as relating)	PATH			product_definition_formation_relationship product_definition_formation_relationship.relating_product_definition_formation -> product_definition_formation
COMPONENT_-PLACEMENT #1: If component_-placement.transformation is a geometric_model_-relationship_with_-transformation. #2: If component_-placement.transformation is a template_instance.	#1: (representation_-relationship_with_-transformation) #2: (mapped_item)	43 43		#1: ({representation_relationship_with_transformation <= representation_relationship representation_relationship.name = 'component placement'})
component_-placement to product_-component (as placed_-component)	PATH			#1: (representation_relationship_with_transformation <= representation_relationship {representation_relationship.name = 'component placement'} representation_relationship.rep_1 ->) #2: (mapped_item mapped_item.mapping_source -> representation_map representation_map.mapped_representation ->) representation <- {representation.name = 'model property value'} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation -> product_definition_formation
component_- placement to geometric_model_- relationship_- with_- transformation (as placement)	IDENTICAL MAPPING			{representation_relationship_with_transformation <= representation_relationship representation_relationship.name = 'component placement'}
component_- placement to template_- instance (as placement)	IDENTICAL MAPPING			{mapped_item mapped_item.mapping_target -> representation_item => geometric_representation_item => (placement) (cartesian_transformation_operator (cartesian_transformation_operator.scl = 1.0) ((see NOTE 4)[4]))}
component_- placement to product_- component (as reference_- product_- component)	PATH			#1: (representation_relationship_with_transformation <= representation_relationship {representation_relationship.name = 'component placement'} representation_relationship.rep_2 ->) #2: (mapped_item <= representation_item <- representation.items[i])

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation <- {representation.name = 'model property value'} property_definition_representation.used_representation property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition property_definition.definition ->) characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation ->) product_definition_formation
CONFIGURATION #1: If the configured process_plan is not associated to an item_-version. #2: If the configured process_plan is associated to an item_version.	configured_effectivity_-assignment	214		configured_effectivity_assignment <= effectivity_assignment {effectivity_assignment.assigned_effectivity ->) |effectivity| effectivity.id = 'configuration validity'}
configuration_-type	object_role.name	41	32	configured_effectivity_assignment <= effectivity_assignment effectivity_assignment.role ->) object_role object_role.name {(object_role.name = 'design') (object_role.name = 'usage')}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
inheritance_type	object_role.description	41	32	configured_effectivity_assignment <= effectivity_assignment effectivity_assignment.role -> object_role object_role.description {(object_role.description = 'exception') (object_role.description = 'inherited') (object_role.description = 'local')}
configuration to alternative_solution (as configured_element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] -> configured_effectivity_item configured_effectivity_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition'} product_definition.formation -> product_definition_formation
configuration to item_instance (as configured_element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] -> configured_effectivity_item configured_effectivity_item = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}
configuration to process_operation_occurrence (as configured_element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] -> configured_effectivity_item configured_effectivity_item = action_relationship action_relationship

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to process_plan (as configured_-element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] ->configured_effectivity_item #1: (configured_effectivity_item = process_plan process_plan) #2: (configured_effectivity_item = product_process_plan product_process_plan)
configuration to product_-component (as configured_-element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] ->configured_effectivity_item configured_effectivity_item = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation ->product_definition_formation
configuration to product_function (as configured_-element)	PATH			configured_effectivity_assignment configured_effectivity_assignment.items[1] ->configured_effectivity_item configured_effectivity_item = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'functional definition'} product_definition.formation ->product_definition_formation
configuration to class_condition_-association (as is_solution_-for)	PATH			configured_effectivity_assignment <=effectivity_assignment <-effectivity_context_assignment.assigned_effectivity_assignment effectivity_context_assignment =>configured_effectivity_context_assignment configured_effectivity_context_assignment.items[1] ->configured_effectivity_context_item configured_effectivity_context_item = product_concept_feature_association product_concept_feature_association

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
configuration to class_-specification_-association (as is_solution_-for)	PATH			configured_effectivity_assignment <= effectivity_assignment <- effectivity_context_assignment.assigned_effectivity_assignment effectivity_context_assignment => configured_effectivity_context_assignment configured_effectivity_context_assignment.items[1] -> configured_effectivity_context_item configured_effectivity_context_item = product_concept_feature_association product_concept_feature_association
DESCRIPTIVE_-SPECIFICATION #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	descriptive_-representation_item	45		
description	descriptive_-representation_item.description	45		
id	representation_item.name	43		descriptive_representation_item <= representation_item representation_item.name
descriptive_-specification to multi_language_-string (as description)	#1: ([descriptive_-representation_item.description] [PATH]) #2: (PATH)	45	120	descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
DESIGN_-CONSTRAINT	product_definition_-formation	41	181,51	{product_definition_formation [product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'requirement'] [product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'design constraint definition']}
constraint_id	product.id	41		product_definition_formation product_definition_formation.of_product ->product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'requirement'} product.id
description	product_definition_-formation.description	41		
name	product.name	41		product_definition_formation product_definition_formation.of_product ->product {product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'requirement'} product.name

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
design_- constraint to multi_language_- string (as description)	#1: ([product_- definition_formation. description] [PATH]) #2: (PATH)	41	151	product_definition_formation #1: (attribute_language_item = product_definition_formation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
design_- constraint to product_class (as is_valid_- for)	PATH			product_definition_formation <- product_definition.formation product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'} configuration_design_item = product_definition configuration_design_item <- configuration_design.design configuration_design configuration_design.configuration -> configuration_item {configuration_item.name = 'design constraint usage'} configuration_item.item_concept -> product_concept => product_class
design_- constraint to multi_language_- string (as name)	#1: ([product.name] [PATH]) #2: (PATH)	41	145	product_definition_formation product_definition_formation.of_product -> product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
DESIGN_- CONSTRAINT_- ASSOCIATION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If design_constraint_- association.is_- constraining is an alternative_solution. #4: If design_constraint_- association.is_- constraining is a product_- component. #5: If design_constraint_- association.is_- constraining is a product_- function.	product_definition_- relationship	41	184	{product_definition_relationship.name = 'design constraint association'}
name	product_definition_- relationship. description	41		
design_- constraint_- association to design_- constraint (as is_based_on)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'} product_definition.formation ->product_definition_formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
name	product_definition_-relationship.description	41		
design_-constraint_-association to design_-constraint (as is_based_on)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'} product_definition.formation -> product_definition_formation
design_-constraint_-association to complex_product (as is_-constraining)	PATH			product_definition_relationship product_definition_relationship.related_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element #3: (application_context_element.name = 'alternative definition') #4: (application_context_element.name = 'conceptual definition') #5: (application_context_element.name = 'functional definition')} product_definition.formation -> product_definition_formation
design_-constraint_-association to multi_language_-string (as name)	#1: ([product_-definition_-relationship.description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
DESIGN_- CONSTRAINT_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41		
description	product_definition_- relationship. description	41		
relation_type	product_definition_- relationship.name	41		{(product_definition_relationship.name) (product_definition_relationship.name = 'decomposition') (product_definition_relationship.name = 'precedence')}
design_- constraint_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship.name] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
design_- constraint_- relationship to design_- constraint (as related)	PATH			product_definition_relationship product_definition_relationship.related_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'design constraint definition'} product_definition.formation ->> product_definition_formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
design_- constraint_- relationship to design_- constraint (as relating)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'design constraint definition'} product_definition.formation ->product_definition_formation
DESIGN_- CONSTRAINT_- VERSION	product_definition_- formation	41		{product_definition_formation [product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <=product_category product_category.name = 'requirement'] [product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'design constraint definition']}
version_id	product_definition_- formation.id	41		
FINAL_SOLUTION #1: If final_solution is not a complex instance. #2: If final_solution is also of type technical_-solution. #3: If final_solution is also of type supplier_-solution. #4: If final_solution is also of type technical_-solution and supplier_-solution.	product_definition_- formation	41	77	{product_definition_formation <- product_definition.formation product_definition [#1: (product_definition.name = 'final') #2: (product_definition.name = 'technical final') #3: (product_definition.name = 'supplier final') #4: (product_definition.name = 'technical supplier final')] [product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'alternative definition']}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
final_status	descriptive_- representation_item. description	45		product_definition_formation <- product_definition.formation product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'final item characteristics'} representation.items[i] -> representation_item => {representation_item.name = 'final item status'} descriptive_representation_item descriptive_representation_item.description
final_solution to descriptive_- specification (as final_- specification)	PATH		184	product_definition_formation <- product_definition.formation product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation property_definition_representation.used_representation -> representation {representation.name = 'final item characteristics'} representation.items[i] -> representation_item => {representation_item.name = 'final specification'} descriptive_representation_item
final_solution to design_-discipline_item_-definition (as final_-specification)	PATH		184	product_definition_formation <- product_definition.formation product_definition <- {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'alternative definition'} product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name = 'final specification'} product_definition_relationship.related_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'part definition'}
final_solution to physical_-instance (as final_-specification)	PATH		184	product_definition_formation <- product_definition.formation product_definition <- {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'alternative definition'} product_definition_relationship.relating_product_definition product_definition_relationship {product_definition_relationship.name = 'final specification'} product_definition_relationship.related_product_definition ->product_definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
GENERAL_ITEM_- DEFINITION_- INSTANCE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41		{product_definition_relationship [product_definition_relationship.relating_product_definition -> product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'] [product_definition_relationship.related_product_definition ->] product_definition product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}
description	product_definition_- relationship. description	41		
relation_type	product_definition_- relationship.name	41		
general_item_- definition_- instance_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description][PATH]) #2: (PATH)		153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
GENERAL_ITEM_- INSTANCE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship	41		{product_definition_relationship [product_definition_relationship.relating_product_definition ->] [product_definition_relationship.related_product_definition ->] product_definition product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}
description	product_definition_- relationship. description	41		
relation_type	product_definition_- relationship.name	41		
general_item_- instance_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
INSTANCE_- PLACEMENT #1: If instance_placement. transformation is a geometric_model_- relationship_with_- transformation. #2: If instance_placement. transformation is a template_instance.	#1: (representation_- relationship_with_- transformation) #2: (mapped_item)	43 43		#1: ({representation_relationship_with_transformation <= representation_relationship representation_relationship.name = 'instance placement'})
instance_- placement to single_instance (as placed_- instance)	PATH			#1: (representation_relationship_with_transformation <= representation_relationship {representation_relationship.name = 'instance placement'} representation_relationship.rep_1 ->) #2: (mapped_item mapped_item.mapping_source ->) representation_map representation_map.mapped_representation ->) representation <- {representation => shape_representation} property_definition_representation.used_representation property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition {property_definition => product_definition_shape} property_definition.definition ->) characterized_definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition {[product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [product_definition.name = 'single instance']}
instance_- placement to geometric_model_- relationship_- with_- transformation (as placement)	IDENTICAL MAPPING			{representation_relationship_with_transformation <= representation_relationship representation_relationship.name = 'instance placement'}
instance_- placement to template_- instance (as placement)	IDENTICAL MAPPING			{mapped_item mapped_item.mapping_target -> representation_item => geometric_representation_item => (placement) (cartesian_transformation_operator (cartesian_transformation_operator.scl = 1.0) ((see NOTE 5)[5])}
instance_- placement to product_- component (as reference_- product_- component)	PATH			#1: (representation_relationship_with_transformation <= representation_relationship {representation_relationship.name = 'instance placement'} representation_relationship.rep_2 ->) #2: (mapped_item <= representation_item <- representation.items[i]) representation <= {representation.name = 'model property value'} property_definition_representation.used_representation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation property_definition_representation.definition ->represented_definition represented_definition = property_definition property_definition property_definition.definition ->characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'conceptual definition'} product_definition.formation ->product_definition_formation
ITEM_FUNCTION_-ASSOCIATION #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_definition_-relationship	41		
association_type	product_definition_-relationship.name	41		{(product_definition_relationship.name) (product_definition_relationship.name = 'realization') (product_definition_relationship.name = 'additional functionality')}
description	product_definition_-relationship.description	41		
item_function_-association to product_function (as associated_-function)	PATH			product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'functional definition'}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition.formation -> product_definition_formation
item_function_- association to design_- discipline_item_- definition (as associated_- item)	PATH			product_definition_relationship product_definition_relationship.related_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
item_function_- association to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
ITEM_INSTANCE_- RELATIONSHIP #1: If item_instance_- relationship is a general_- item_instance_- relationship, or a same_- time_machining_- relationship. #2: If item_instance_- relationship is a replaced_- usage_relationship with a process_operation_input_or_- output as usage_context. #3: If item_instance_- relationship is a replaced_- usage_relationship with an item_definition_instance_- relationship or a product_- structure_relationship as usage_context. #4: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship of type assembly_component_- relationship. #5: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship of type collected_item_- association, or general_- item_definition_instance_- relationship, or if replaced_usage_- relationship.usage_context	#1: (product_- definition_- relationship) #2: (product_- definition_- relationship) #3: (product_- definition_substitute)	41 41 41		

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
is a product_structure_-relationship.				
item_instance_-relationship to item_instance (as related)	PATH			#1: (product_definition_relationship product_definition_relationship.related_product_definition ->) #2: (product_definition_relationship {product_definition_relationship.name = 'process input or output replacement'} product_definition_relationship.related_product_definition ->) #3: (product_definition_substitute product_definition_substitute.substitute_definition ->) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}
item_instance_-relationship to item_instance (as relating)	PATH			#1: (product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #2: (product_definition_relationship {product_definition_relationship.name = 'process input or output replacement'} product_definition_relationship.relating_product_definition -> product_definition {[product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [characterized_product_definition = product_definition characterized_product_definition <- process_product_association.defined_product process_product_association]}) #3: (product_definition_substitute product_definition_substitute.context_relationship ->

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				#4: (product_definition_relationship => product_definition_usage => assembly_component_usage <- product_definition_occurrence_relationship.occurrence_usage product_definition_occurrence_relationship product_definition_occurrence_relationship.occurrence ->) #5: (product_definition_relationship product_definition_relationship.related_product_definition ->) product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'})
PHYSICAL_- ASSEMBLY_- RELATIONSHIP	assembly_component_- usage	44		{assembly_component_usage <= product_definition_usage <= product_definition_relationship product_definition_relationship.name = 'physical occurrence usage'}
physical_- assembly_- relationship to item_instance (as is_- realization_of)	PATH		184	assembly_component_usage <= product_definition_usage <= product_definition_relationship {product_definition_relationship.name = 'physical occurrence usage'} product_definition_relationship.related_product_definition -> product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'} product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'physical realization'} product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_- assembly_- relationship to physical_- instance (as physical_- assembly)	PATH		184	assembly_component_usage <= product_definition_usage <= product_definition_relationship {product_definition_relationship.name = 'physical occurrence usage'} product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
physical_- assembly_- relationship to physical_- instance (as physical_- component)	PATH			assembly_component_usage <= product_definition_usage <= product_definition_relationship {product_definition_relationship.name = 'physical occurrence usage'} product_definition_relationship.related_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
PHYSICAL_- INSTANCE #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition	41	181,65	{product_definition [product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'] [product_definition.formation ->product_definition_formation product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'physically realized product']}
description	product.description	41		product_definition product_definition.formation ->product_definition_formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation.of_product -> product product.description
inventory_number	identification_- assignment.assigned_id	41	29	product_definition product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product identification_item = product identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'inventory number'} identification_assignment.assigned_id
lot_id	identification_- assignment.assigned_id	41	29	product_definition product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product identification_item = product identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role -> identification_role identification_role.name = 'lot context'} identification_assignment.assigned_id
serial_number	product.id	41		product_definition product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				product.id
physical_- instance to multi_language_- string (as description)	#1: ([product. description] [PATH]) #2: (PATH)	41	150	product_definition product_definition.formation ->) product_definition_formation product_definition_formation.of_product ->) product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
physical_- instance to design_- discipline_item_- definition (as is_- realization_of)	PATH			product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'physical realization'} product_definition_relationship.relating_product_definition ->) product_definition {product_definition.frame_of_reference ->) product_definition_context <= application_context_element application_context_element.name = 'part definition'}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_- instance to product_- identification (as is_- realization_of)	PATH			product_definition configuration_design_item = product_definition configuration_design_item <- configuration_design.design configuration_design {configuration_design.name = 'physical instance basis'} configuration_design.configuration ->> configuration_item => product_identification
PHYSICAL_- INSTANCE_TEST_- RESULT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	property_definition	41		{property_definition.name = 'test result'}
description	property_definition. description	41		
id	property_definition.id	41		
physical_- instance_test_- result to multi_- language_string (as description)	#1: ([property_- definition. description] [PATH]) #2: (PATH)	41	156	property_definition #1: (attribute_language_item = property_definition attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = property_definition multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_- instance_test_- result to activity (as test_- activity)	PATH			property_definition action_item = property_definition action_item <- applied_action_assignment.items[i] applied_action_assignment <= action_assignment {action_assignment.role ->) object_role object_role.name = 'test activity'} action_assignment.assigned_action -> action => executed_action
physical_- instance_test_- result to process_- operation_- occurrence (as test_- activity)	PATH			property_definition action_item = property_definition action_item <- applied_action_assignment.items[i] applied_action_assignment <= action_assignment {action_assignment.role ->) object_role object_role.name = 'test activity'} action_assignment.assigned_action -> action <- action_relationship.related_action action_relationship {action_relationship.name = 'process operation occurrence'}
physical_- instance_test_- result to property_value_- representation (as test_result)	PATH			property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
physical_- instance_test_- result to physical_- instance (as tested_- instance)	PATH			property_definition {[property_definition.name = 'test result'] [derived_property_select = property_definition derived_property_select <- general_property_association.derived_definition general_property_association general_property_association.base_definition -> general_property]} property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
PRODUCT_CLASS #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_class	214		product_class <= [product_concept] [characterized_object]
description	product_concept. description	44		product_class <= product_concept product_concept.description
id	product_concept.id	44		product_class <= product_concept product_concept.id
level_type	characterized_object. name	41		product_class <= characterized_object characterized_object.name
name	product_concept.name	44		product_class <= product_concept product_concept.name

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
version_id	identification_- assignment.assigned_id		29,206	product_class <= product_concept identification_item = product_concept identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
product_class to multi_language_- string (as description)	#1: ([product_concept. description] [PATH]) #2: (PATH)	44	146	product_class <= product_concept #1: (attribute_language_item = product_concept attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_class to multi_language_- string (as name)	#1: ([product_concept. name] [PATH]) #2: (PATH)	44	146	product_class <= product_concept #1: (attribute_language_item = product_concept attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (multi_language_attribute_item = product_concept multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
PRODUCT_CLASS_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_concept_- relationship	44		
description	product_concept_- relationship. description	44		
relation_type	product_concept_- relationship.name	44		{(product_concept_relationship.name) (product_concept_relationship.name = 'derivation') (product_concept_relationship.name = 'hierarchy') (product_concept_relationship.name = 'version sequence') (product_concept_relationship.name = 'substitution')}
product_class_- relationship to multi_language_- string (as description)	#1: ([product_concept_- relationship. description] [PATH]) #2: (PATH)	44	149	product_concept_relationship #1: (attribute_language_item = product_concept_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
product_class_- relationship to product_class (as related)	PATH			product_concept_relationship product_concept_relationship.related_product_concept ->product_concept => product_class
product_class_- relationship to product_class (as relating)	PATH			product_concept_relationship product_concept_relationship.relating_product_concept ->product_concept => product_class
PRODUCT_- COMPONENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If product_component. instance_required is TRUE. #4: If product_component. instance_required is FALSE.	product_definition_- formation	41	179,181, 4	{[product_definition_formation.of_product ->product <- product_related_product_category.products[i] product_related_product_category <=product_category product_category.name = 'conceptual product'] [product_definition_formation <- product_definition.formation product_definition product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'conceptual definition']}
description	product_definition_- formation.description	41		
instance_- required	product_definition. name	41		product_definition_formation <- product_definition.formation product_definition product_definition.name {#3: (product_definition.name = 'instance required') #4: (product_definition.name = 'no instance required')}
name	product.name	41		product_definition_formation product_definition_formation.of_product ->product product.name

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
product_- component to multi_language_- string (as description)	#1: ([product_- definition_formation. description] [PATH]) #2: (PATH)	41	150	product_definition_formation #1: (attribute_language_item = product_definition_formation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_- component to class_category_- association (as is_- influenced_by)	PATH		24	product_definition_formation <- product_definition.formation product_definition class_usage_effectivity_context_item = product_definition class_usage_effectivity_context_item <- class_usage_effectivity_context_assignment.items[1] class_usage_effectivity_context_assignment <= effectivity_context_assignment {effectivity_context_assignment.role -> effectivity_context_role effectivity_context_role.name = 'class usage influence'} effectivity_context_assignment.assigned_effectivity_assignment -> effectivity_assignment => {effectivity_assignment.assigned_effectivity -> |effectivity| effectivity.id = 'class usage'} applied_effectivity_assignment applied_effectivity_assignment.items[i] -> effectivity_item effectivity_item = product_concept_feature_category_usage product_concept_feature_category_usage

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
product_- component to application_- context (as is_relevant_- for)	PATH		40	product_definition_formation <- product_definition.formation product_definition <- product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role ->> product_definition_context_role product_definition_context_role.name = 'application context'} product_definition_context_association.frame_of_reference ->> product_definition_context
product_- component to multi_language_- string (as name)	#1: ([product.name] [PATH]) #2: (PATH)	41	145	product_definition_formation product_definition_formation.of_product -> product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
PRODUCT_FUNCTION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- formation	41	179,181, 4	{product_definition_formation [product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'functionality'] [product_definition_formation <- product_definition.formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition product_definition.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'functional definition']}
description	product_definition_-formation.description	41		
name	product.name	41		product_definition_formation product_definition_formation.of_product ->product product.name
product_function to multi_-language_string (as description)	#1: ([product_-definition_formation.description] [PATH]) #2: (PATH)	41	150	product_definition_formation #1: (attribute_language_item = product_definition_formation attribute_language_item <-attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <-multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_function to application_-context (as is_relevant_-for)	PATH		40	product_definition_formation <-product_definition.formation product_definition <-product_definition_context_association.definition product_definition_context_association {product_definition_context_association.role ->product_definition_context_role product_definition_context_role.name = 'application context'} product_definition_context_association.frame_of_reference ->product_definition_context

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
product_function to multi_-language_string (as name)	#1: ([product.name] [PATH]) #2: (PATH)	41	150	product_definition_formation product_definition_formation.of_product -> product #1: (attribute_language_item = product attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = product multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
PRODUCT_-IDENTIFICATION #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_identification	214		product_identification <= [configuration_item] [characterized_object]
description	configuration_item. description	44		product_identification <= configuration_item configuration_item.description
id	configuration_item.id	44		product_identification <= configuration_item configuration_item.id
name	configuration_item. name	44	32,158	product_identification <= configuration_item configuration_item.name
version_id	identification_-assignment.assigned_id	41	29,199	product_identification <= configuration_item identification_item = configuration_item

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
product_- identification to product_class (as associated_- product_class)	PATH			product_identification <= configuration_item configuration_item.item_concept ->> product_concept => product_class
product_- identification to multi_- language_string (as description)	#1: ([configuration_- item.description] [PATH]) #2: (PATH)	44	115	product_identification <= configuration_item #1: (attribute_language_item = configuration_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = configuration_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_- identification to multi_- language_string (as name)	#1: ([configuration_- item.name] [PATH]) #2: (PATH)	44	115	product_identification <= configuration_item #1: (attribute_language_item = configuration_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = configuration_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
PRODUCT_- SPECIFICATION #1: If product_- specification.defining_- specification.package is FALSE. #2: If product_- specification.defining_- specification.package is TRUE.	product_specification	214		product_specification <= [product_identification] [configurable_item]
product_- specification to specification (as defining_- specification)	PATH			product_specification <= configurable_item configurable_item.item_concept_feature[i] ->) product_concept_feature_association product_concept_feature_association.feature ->) product_concept_feature #1: (|product_concept_feature|) #2: (product_concept_feature => package_product_concept_feature)

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
PRODUCT_- STRUCTURE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If product_structure_- relationship.related is of type item_instance. #4: If product_structure_- relationship.related is of type product_function or product_component.	product_definition_- usage	41	168	
description	product_definition_- relationship. description	41		product_definition_usage <= product_definition_relationship product_definition_relationship.description
relation_type	product_definition_- relationship.name	41		product_definition_usage <= product_definition_relationship product_definition_relationship.name {(product_definition_relationship.name) (product_definition_relationship.name = 'decomposition') (product_definition_relationship.name = 'functionality') (product_definition_relationship.name = 'realization') (product_definition_relationship.name = 'specialization') (product_definition_relationship.name = 'occurrence')}
product_- structure_- relationship to multi_language_- string (as description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	41	153	product_definition_usage <= product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
product_- structure_- relationship to product_- constituent (as related)	PATH			product_definition_usage <= product_definition_relationship product_definition_relationship.related_product_definition -> #3: (product_definition) #4: (product_definition product_definition.formation -> product_definition_formation)
product_- structure_- relationship to complex_product (as relating)	PATH			product_definition_usage <= product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition product_definition.formation -> product_definition_formation

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
REPLACED_USAGE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If replaced_usage_- relationship.usage_context is a process_operation_- input_or_output. #4: If replaced_usage_- relationship.usage_context is an item_definition_- instance_relationship or a product_structure_- relationship.	#3: (product_- definition_- relationship) #4: (product_- definition_substitute)	41 41	183	{#3: (product_definition_relationship.name = 'usage replacement')}
description	#3: (product_- definition_- relationship. description) #4: (product_- definition_substitute. description)	41 41		
replaced_usage_- relationship to multi_language_- string (as description)	#3: (#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)) #4: (#1: ([product_- definition_substitute. description] [PATH]) #2: (PATH))	41 41	153,154	#3: (product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				{multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
				#4: (product_definition_substitute #1: (attribute_language_item = product_definition_substitute attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_substitute multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
replaced_usage_-relationship to item_definition_-instance_-relationship (as usage_-context)	PATH			product_definition_substitute product_definition_substitute.context_relationship -> product_definition_relationship
replaced_usage_-relationship to process_-operation_input_-or_output (as usage_-context)	PATH		32	product_definition_relationship {product_definition_relationship.name = 'process input or output replacement'} product_definition_relationship.relating_product_definition -> product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'} characterized_product_definition = product_definition characterized_product_definition <-

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				process_product_association.defined_product process_product_association
replaced_usage_- relationship to product_- structure_- relationship (as usage_- context)	PATH			product_definition_substitute product_definition_substitute.context_relationship ->> product_definition_relationship => product_definition_usage
SPECIFICATION #1: If specification. package is FALSE. #2: If specification. package is TRUE. #3: For the primary_- language_dependent_string. #4: For any additional_- language_dependent_string. #5: If specification_- category.implicit_- exclusive_condition is FALSE. #6: If specification_- category.implicit_- exclusive_condition is TRUE.	product_concept_- feature	44	71	#1: (|product_concept_feature|) #2: (package_product_concept_feature <= product_concept_feature)
description	product_concept_- feature.description	44		
id	product_concept_- feature.id	44		
name	product_concept_- feature.name	44		
package	IDENTICAL MAPPING			#1: (|product_concept_feature|) #2: (package_product_concept_feature <= product_concept_feature)

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
version_id	identification_- assignment.assigned_id	41	29,207	product_concept_feature identification_item = product_concept_feature identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id
specification to specification_- category (as category)	PATH		32,71	product_concept_feature group_item = product_concept_feature group_item <- applied_group_assignment.items[i] applied_group_assignment <= group_assignment {group_assignment.role ->> object_role object_role.name = 'specification category member'} group_assignment.assigned_group ->> group => product_concept_feature_category #5: (|product_concept_feature_category|) #6: (product_concept_feature_category => exclusive_product_concept_feature_category)
specification to multi_language_- string (as description)	#3: ([product_concept_- feature.description] [PATH]) #4: (PATH)	41	147	product_concept_feature #3: ([product_concept_feature.description] [attribute_language_item = product_concept_feature attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}]) #4: (multi_language_attribute_item = product_concept_feature multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
specification to multi_language_-string (as name)	#3: ([product_concept_-feature.name] [PATH]) #4: (PATH)	44	147	product_concept_feature #3: ([product_concept_feature.name] [attribute_language_item = product_concept_feature attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}]) #4: (multi_language_attribute_item = product_concept_feature multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
SPECIFICATION_-CATEGORY #1: If specification_-category.implicit_-exclusive_condition is FALSE. #2: If specification_-category.implicit_-exclusive_condition is TRUE. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: ([product_concept_-feature_category]) #2: (exclusive_-product_concept_-feature_category)	214 214		#1: (product_concept_feature_category <=) #2: (exclusive_product_concept_feature_category <= product_concept_feature_category <=) group
description	group.description	41		#1: (product_concept_feature_category <=) #2: (exclusive_product_concept_feature_category <= product_concept_feature_category <=) group group.description
id	group.name	41		#1: (product_concept_feature_category <=) #2: (exclusive_product_concept_feature_category <= product_concept_feature_category <=) group group.name

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
implicit_- exclusive_- condition	IDENTICAL MAPPING			
specification_- category to multi_language_- string (as description)	#3: ([group. description] [PATH]) #4: (PATH)	41	136	#1: (product_concept_feature_category) #2: (exclusive_product_concept_feature_category product_concept_feature_category <=) group #3: ([group.description] [attribute_language_item = group attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}]) #4: (multi_language_attribute_item = group multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
SPECIFICATION_- CATEGORY_- HIERARCHY #1: If specification_- category.implicit_- exclusive_condition is FALSE. #2: If specification_- category.implicit_- exclusive_condition is TRUE.	group_relationship	41	103	{group_relationship.name = 'specification category hierarchy'}
specification_- category_- hierarchy to specification_- category (as sub_- category)	PATH			group_relationship group_relationship.related_group->group => product_concept_feature_category #1: (|product_concept_feature_category|) #2: (product_concept_feature_category => exclusive_product_concept_feature_category)

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
specification_- category_- hierarchy to specification_- category (as super_- category)	PATH			group_relationship group_relationship.relating_group->group => product_concept_feature_category #1: (|product_concept_feature_category|) #2: (product_concept_feature_category => exclusive_product_concept_feature_category)
SPECIFICATION_- EXPRESSION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	|conditional_concept_- feature|	44		
description	product_concept_- feature.description	44		conditional_concept_feature <= product_concept_feature product_concept_feature.description
id	product_concept_- feature.id	44		conditional_concept_feature <= product_concept_feature product_concept_feature.id
operation	concept_feature_- relationship_with_- condition.conditional_- operator	44	92	conditional_concept_feature conditional_concept_feature.condition ->concept_feature_relationship_with_condition concept_feature_relationship_with_condition.conditional_operator ->concept_feature_operator {(concept_feature_operator.name = 'and') (concept_feature_operator.name = 'or') (concept_feature_operator.name = 'oneof') (concept_feature_operator.name = 'not')}
specification_- expression to multi_language_- string (as description)	#1: ([product_concept_- feature.description] [PATH]) #2: (PATH)	44	147	conditional_concept_feature <= product_concept_feature #1: (attribute_language_item = product_concept_feature attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_concept_feature multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}) conditional_concept_feature conditional_concept_feature.condition ->) concept_feature_relationship_with_condition <= concept_feature_relationship (concept_feature_relationship.relating_product_concept_feature ->) (concept_feature_relationship.related_product_concept_feature ->)[6] product_concept_feature {(product_concept_feature) (product_concept_feature => conditional_concept_feature conditional_concept_feature.condition ->) concept_feature_relationship_with_condition <= concept_feature_relationship) *[7]}
specification_- expression to specification (as operand)	PATH			
specification_- expression to specification_- expression (as operand)	PATH		92	conditional_concept_feature conditional_concept_feature.condition ->) concept_feature_relationship_with_condition <= concept_feature_relationship (concept_feature_relationship.relating_product_concept_feature ->) (concept_feature_relationship.related_product_concept_feature ->)[8] product_concept_feature => conditional_concept_feature {(conditional_concept_feature) (conditional_concept_feature conditional_concept_feature.condition ->) concept_feature_relationship_with_condition <= concept_feature_relationship) *[9]}

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
SPECIFICATION_- INCLUSION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If specification. package is FALSE. #4: If specification. package is TRUE.	inclusion_product_- concept_feature	214	92	inclusion_product_concept_feature <= conditional_concept_feature {conditional_concept_feature.condition ->> concept_feature_relationship_with_condition concept_feature_relationship_with_condition.conditional_operator ->> concept_feature_operator concept_feature_operator.name = 'implication'}
description	product_concept_- feature.description	44		inclusion_product_concept_feature <= conditional_concept_feature <= product_concept_feature product_concept_feature.description
id	product_concept_- feature.id	44		inclusion_product_concept_feature <= conditional_concept_feature <= product_concept_feature product_concept_feature.id
specification_- inclusion to multi_language_- string (as description)	#1: ([product_concept_- feature.description] [PATH]) #2: (PATH)	44	147	inclusion_product_concept_feature <= conditional_concept_feature <= product_concept_feature #1: ([product_concept_feature.description] [attribute_language_item = product_concept_feature attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}]) #2: (multi_language_attribute_item = product_concept_feature multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
specification_- inclusion to specification (as if_- condition)	PATH			inclusion_product_concept_feature <= conditional_concept_feature conditional_concept_feature.condition ->> concept_feature_relationship_with_condition <= {concept_feature_relationship_with_condition.conditional_operator ->> concept_feature_operator concept_feature_operator.name = 'implication'} concept_feature_relationship concept_feature_relationship.relating_product_concept_feature ->> product_concept_feature #3: (|product_concept_feature|) #4: (product_concept_feature => package_product_concept_feature)
specification_- inclusion to specification_- expression (as if_- condition)	PATH			inclusion_product_concept_feature <= conditional_concept_feature conditional_concept_feature.condition ->> concept_feature_relationship_with_condition <= {concept_feature_relationship_with_condition.conditional_operator ->> concept_feature_operator concept_feature_operator.name = 'implication'} concept_feature_relationship concept_feature_relationship.relating_product_concept_feature ->> product_concept_feature => |conditional_concept_feature|
specification_- inclusion to specification (as included_- specification)	PATH			inclusion_product_concept_feature <= conditional_concept_feature conditional_concept_feature.condition ->> concept_feature_relationship_with_condition <= {concept_feature_relationship_with_condition.conditional_operator ->> concept_feature_operator concept_feature_operator.name = 'implication'} concept_feature_relationship concept_feature_relationship.related_product_concept_feature ->> product_concept_feature #3: (|product_concept_feature|)

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				#4: (product_concept_feature => package_product_concept_feature)
specification_- inclusion to specification_- expression (as included_- specification)	PATH			inclusion_product_concept_feature <= conditional_concept_feature conditional_concept_feature.condition -> concept_feature_relationship_with_condition <= {concept_feature_relationship_with_condition.conditional_operator -> concept_feature_operator concept_feature_operator.name = 'implication'} concept_feature_relationship concept_feature_relationship.related_product_concept_feature -> product_concept_feature => |conditional_concept_feature|
SUPPLIER_- SOLUTION #1: If supplier_solution is not a complex instance. #2: If supplier_solution is also of type technical_- solution. #3: If supplier_solution is also of type final_- solution. #4: If supplier_solution is also of type technical_- solution and final_- solution.	product_definition_- formation	41	77	{product_definition_formation <- product_definition.formation product_definition [#1: (product_definition.name = 'supplier') #2: (product_definition.name = 'technical supplier') #3: (product_definition.name = 'supplier final') #4: (product_definition.name = 'technical supplier final')] [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition']}
probability_rate	measure_representation_- item	45	30	product_definition_formation <- product_definition.formation product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition'} characterized_product_definition = product_definition

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
				characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->> representation {representation.name = 'supplier probability'} representation.items[i] ->> representation_item => {representation_item.name = 'probability rate'} measure_representation_item {measure_representation_item <= measure_with_unit => ratio_measure_with_unit}
supplier_- solution to organization (as supplier)	PATH		33	product_definition_formation organization_item = product_definition_formation organization_item <- applied_organization_assignment.items[i] applied_organization_assignment <= organization_assignment {organization_assignment.role ->> organization_role organization_role.name = 'supplier'} organization_assignment.assigned_organization -> organization

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Table 29 – Mapping table specification_control UoF (S7) (continued)

Application element	AIM element	Source	Rules	Reference path
TECHNICAL_- SOLUTION #1: If technical_solution is not a complex instance. #2: If technical_solution is also of type supplier_- solution. #3: If technical_solution is also of type final_- solution. #4: If technical_solution is also of type final_- solution and supplier_- solution. #5: For the primary_- language_dependent_string. #6: For any additional_- language_dependent_string.	product_definition_- formation	41		{product_definition_formation <- product_definition.formation product_definition [#1: (product_definition.name = 'technical') #2: (product_definition.name = 'technical supplier') #3: (product_definition.name = 'technical final') #4: (product_definition.name = 'technical supplier final')] [product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'alternative definition']}
description	product_definition_- formation.description	41		
technical_- solution to multi_language_- string (as description)	#5: ([product_- definition_formation. description] [PATH]) #6: (PATH)	41	151	product_definition_formation #5: (attribute_language_item = product_definition_formation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #6: (multi_language_attribute_item = product_definition_formation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 29 – Mapping table specification_control UoF (S7) (concluded)

Application element	AIM element	Source	Rules	Reference path

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 If collection_definition is also of type assembly_definition and/or mating_definition, it is assumed, that only one of the attributes collection_definition.purpose, assembly_definition.assembly_type, or mating_definition.mating_type is instantiated.

2 Permissive list value 'version hierarchy' in ARM renamed to 'hierarchy' as product_definition_formation_relationship already implies a relationship between two version objects.

3 Permissive list value 'version sequence' in ARM renamed to 'sequence' as product_definition_formation_relationship already implies a relationship between two version objects.

4 The optional attribute cartesian_transformation_operator.scl is omitted

5 The optional attribute cartesian_transformation_operator.scl is omitted

6 Due to the SET, there is no order or specific semantics related to the usage of relating_product_concept_feature or related_product_concept_feature.

7 In case the SET of operands is greater than two, a tree structure has to be built using the constructs stated in the parentheses. In this case, all concept_feature_relationship_with_condition instances used reference the same concept_feature_operator as the conditional_operator.

8 Due to the SET, there is no order or specific semantics related to the usage of relating_product_concept_feature or related_product_concept_feature.

9 In case the SET of operands is greater than two, a tree structure has to be built using the constructs stated in the parentheses.

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Table 30 – Mapping table process_plan UoF (S8)

Application element	AIM element	Source	Rules	Reference path
DESCRIPTIVE_-SPECIFICATION #1: The general case for the descriptive_-specification. #2: If the descriptive specification is used with a process_operation_-resource_assignment. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: (descriptive_-representation_item) #2: (resource_-requirement_type)	45 49	41	
description	#1: (descriptive_-representation_item.description) #2: (resource_-requirement_type.description)	45 49		
id	#1: (representation_-item.name) #2: (resource_-requirement_type.name)	45 49		#1: (descriptive_representation_item <= representation_item representation_item.name)
descriptive_-specification to multi_language_-string (as description)	#1: (#3: ([descriptive_-representation_item.description] [PATH]) #4: (PATH)) #2: (#3: ([resource_-requirement_type.description] [PATH]) #4: (PATH))	45 49	120,162	#1: (descriptive_representation_item #3: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				{multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})) #2: (resource_requirement_type #3: (attribute_language_item = resource_requirement_type attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = resource_requirement_type multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'}))
MAKE_FROM_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	make_from_usage_option	44		
description	product_definition_-relationship.description	41		make_from_usage_option <= product_definition_usage <= product_definition_relationship product_definition_relationship.description
make_from_-relationship to multi_language_-string (as description)	#1: ([product_-definition_-relationship.description] [PATH]) #2: (PATH)	41	153	make_from_usage_option <= product_definition_usage <= product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment

Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				{attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
MATED_ITEM_-ASSOCIATION #1: If the item_-definition_relationship is used without UoF S7. #2: If the item_-definition_relationship is used with UoF S7.	product_definition_-relationship (see NOTE 1)	41		(see NOTE 1)[1] {product_definition_relationship [product_definition_relationship.name = 'mating membership'] [product_definition_relationship.relating_product_definition -> product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']] [product_definition_relationship.related_product_definition -> product_definition #1: (product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type'])

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence')]}
mated_item_- association to geometric_model_- relationship_- with_- transformation (as placement)	PATH		40	product_definition_relationship {product_definition_relationship.name = 'mating membership' } [product_definition_relationship.relating_product_definition -> product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => [product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep2]

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				[product_definition_relationship.related_product_definition -> product_definition {#1: (product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']) #2: (product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence')} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_1] representation_relationship => representation_relationship_with_transformation

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
mated_item_- association to template_- instance (as placement)	PATH		40	product_definition_relationship {product_definition_relationship.name = 'mating membership' } [product_definition_relationship.relating_product_definition -> product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item = ? [product_definition_relationship.related_product_definition ->

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition {#1: (product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->>] product_definition_context <<= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->>] product_definition_context_role product_definition_context_role.name = 'part definition type']) #2: (product_definition.frame_of_reference ->>] product_definition_context <<= application_context_element application_context_element.name = 'part occurrence')} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <<- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <<- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->> representation <<- {representation => shape_representation} representation_map.mapped_representation representation_map <<-

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				mapped_item.mapping_source] mapped_item
mated_item_- association to mating_- definition (as relating)	PATH		40	product_definition_relationship.relating_product_definition ->product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->product_definition_context_role product_definition_context_role.name = 'part definition type']}
MATED_ITEM_- RELATIONSHIP #1: If item_definition_- instance_relationship is not used in the context of UoF S7. #2: If item_definition_- instance_relationship is used in the context of UoF S7.	product_definition_- relationship	41		{product_definition_relationship product_definition_relationship.name = 'mating material'}
mated_item_- relationship to shape_element_- relationship (as mated_shape)	PATH		40	product_definition_relationship product_definition_relationship.relating_product_definition ->product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->

Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_context_role product_definition_context_role.name = 'part definition type'}} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition => product_definition_shape <- shape_aspect.of_shape shape_aspect {shape_aspect <- [shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'mated shape aspect'} shape_aspect_relationship.related_shape_aspect ->] shape_aspect shape_aspect.of_shape ->] product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'} product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'mating membership'} product_definition_relationship.relating_product_definition -> product_definition} #1: ([shape_aspect_relationship.relating_shape_aspect

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect_relationship {shape_aspect_relationship.name = 'mated shape aspect'} shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition <- {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'} product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'mating membership'} product_definition_relationship.relating_product_definition -> product_definition]) #2: ([shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'mated shape aspect'} shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_aspect.of_shape -> product_definition_shape <= property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition <-

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->>] product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->] product_definition_context_role product_definition_context_role.name = 'part definition type']} product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'mating membership'} product_definition_relationship.relating_product_definition ->] product_definition]}}
mated_item_- relationship to quantified_- instance (as mating_- material)	PATH			product_definition_relationship product_definition_relationship.related_product_definition ->] product_definition {[product_definition.frame_of_reference ->] product_definition_context <= application_context_element application_context_element.name = 'part occurrence'] [name_attribute_select = product_definition name_attribute_select <- name_attribute.named_item name_attribute name_attribute.attribute_value = 'quantified instance']}
mated_item_- relationship to mated_item_- association (as related)	PATH		40	product_definition_relationship product_definition_relationship.relating_product_definition ->] product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->>] product_definition_context <= application_context_element

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']}
mated_item_- relationship to mated_item_- association (as relating)	PATH		40	product_definition_relationship product_definition_relationship.relating_product_definition -> product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']}
MATING_- DEFINITION #1: If the mating_- definition is the topmost node of a mating tree. #2: If the mating_- definition is a subnode of the mating tree.	product_definition	41	182	#1: ({product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role -> product_definition_context_role product_definition_context_role.name = 'part definition type']}) #2: (product_definition <- {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_context_role product_definition_context_role.name = 'part definition type'}} product_definition_relationship.related_product_definition product_definition_relationship {[product_definition_relationship.name = 'mating membership'] [product_definition_relationship *]} product_definition_relationship.relating_product_definition ->product_definition {product_definition <- product_definition_context_association.definition product_definition_context_association [product_definition_context_association.frame_of_reference ->product_definition_context <= application_context_element application_context_element.name = 'mating definition'] [product_definition_context_association.role ->product_definition_context_role product_definition_context_role.name = 'part definition type']})
mating_type	product_definition.name	41		{product_definition (product_definition.name) (product_definition.name = 'bolted joint') (product_definition.name = 'brazing') (product_definition.name = 'clinching') (product_definition.name = 'clipping') (product_definition.name = 'clasping') (product_definition.name = 'doweling') (product_definition.name = 'flanging') (product_definition.name = 'foam injection') (product_definition.name = 'gluing') (product_definition.name = 'laser-welding') (product_definition.name = 'press fit') (product_definition.name = 'riveting') (product_definition.name = 'sewing') (product_definition.name = 'spot welding') (product_definition.name = 'stapling') (product_definition.name = 'welding')}}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_- OPERATION_- DEFINITION #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	process_operation	214		{process_operation <= action_method}
description	action_method. description	41		process_operation <= action_method action_method.description
id	action_method.name	41		process_operation <= action_method action_method.name
name	action_method.purpose	41		process_operation <= action_method action_method.purpose
process_type	action_method. consequence	41		process_operation <= action_method action_method.consequence
version_id	identification_- assignment.assigned_id	41	196	process_operation <= action_method identification_item = action_method identification_item <- applied_identification_assignment.items[1] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'version'} identification_assignment.assigned_id

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
process_- operation_- definition to multi_language_- string (as description)	#1: ([action_method. description] [PATH]) #2: (PATH)	41	104	process_operation <= action_method #1: (attribute_language_item = action_method attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action_method multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
process_- operation_- definition to multi_language_- string (as name)	#1: ([action_method. purpose] [PATH]) #2: (PATH)	41	104	process_operation <= action_method #1: (attribute_language_item = action_method attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = action_method multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_- OPERATION_- DEFINITION_- RELATIONSHIP	action_method_- relationship	41		
relation_type	action_method_- relationship.name	41		{action_method_relationship (action_method_relationship.name) (action_method_relationship.name = 'alternative') (action_method_relationship.name = 'substitution') (action_method_relationship.name = 'version association') (action_method_relationship.name = 'version sequence')}
process_- operation_- definition_- relationship to process_- operation_- definition (as related)	PATH			action_method_relationship action_method_relationship.related_method ->action_method => process_operation
process_- operation_- definition_- relationship to process_- operation_- definition (as relating)	PATH			action_method_relationship action_method_relationship.relating_method ->action_method => process_operation

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_- OPERATION_INPUT_- OR_OUTPUT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the associated element is a mated_item_- association. #4: If the associated element is an assembly_- component_relationship. #5: If item_instance is not used in the context of UoF S7. #6: If the associated element is a design_- disciplin_item_definition. #7: If item_instance is used in the context of UoF S7. #8: The general case. #9: If a process_- operation_resource_- assignment is specified. #10: If the transformation is implicitly defined by two items. #11: If the transformation is explicitly defined. #12: If an item_version is associated. #13: If no item_version	process_product_- association	49	177	

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
is associated.				
description	process_product_-association.description	49		
role	process_product_-association.name	49		{(process_product_association.name = 'input') (process_product_association.name = 'output')}
process_-operation_input_-or_output to shape_element (as concerned_-shape)	PATH			process_product_association process_product_association.process ->product_definition_process <= action => property_process <- process_property_association.process process_property_association {process_property_association.name = 'concerned shape aspect'} process_property_association.property_or_shape ->property_or_shape_select property_or_shape_select = shape_definition shape_definition shape_definition = shape_aspect shape_aspect
process_-operation_input_-or_output to multi_language_-string (as description)	#1: ([process_product_-association.description] [PATH]) #2: (PATH)	49	144	process_product_association #1: (attribute_language_item = process_product_association attribute_language_item <-attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <=attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = process_product_association multi_language_attribute_item <-multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
process_- operation_input_- or_output to assembly_- component_- relationship (as element)	PATH			process_product_association process_product_association.defined_product ->> characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage
process_- operation_input_- or_output to design_- discipline_item_- definition (as element)	PATH			process_product_association process_product_association.defined_product ->> characterized_product_definition characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}
process_- operation_input_- or_output to item_instance (as element)	PATH			process_product_association process_product_association.defined_product ->> characterized_product_definition #7: (characterized_product_definition = product_definition product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}) #5: (characterized_product_definition = product_definition_relationship product_definition_relationship => product_definition_usage => assembly_component_usage)
process_- operation_input_- or_output to mated_item_- association (as element)	PATH			process_product_association process_product_association.defined_product ->> characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship {product_definition_relationship.name = 'mating membership'}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
process_- operation_input_- or_output to process_- operation_- occurrence (as operation)	PATH			process_product_association process_product_association.process ->product_definition_process {product_definition_process <= action <- action_relationship.related_action action_relationship action_relationship.name = 'process operation occurrence'}
process_- operation_input_- or_output to transformation (as placement)	PATH			[process_product_association process_product_association.process ->product_definition_process <= action {action.chosen_method ->action_method <= process_operation} characterized_action_definition = action characterized_action_definition <- #8: (action_property.definition action_property <- action_property_representation.property action_property_representation action_property_representation.representation ->representation <- {representation.name = 'reference system'}) #9: (action_resource_requirement.operations[i] action_resource_requirement => {action_resource_requirement.name = 'reference tool'} requirement_for_action_resource requirement_for_action_resource.resources[i] ->action_resource => product_definition_resource <= product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <-

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <-) representation_relationship.rep_2] [(process_product_association.defined_product -> characterized_product_definition characterized_product_definition = product_definition_relationship product_definition_relationship {#3: (product_definition_relationship.name = 'mating membership') (product_definition_relationship => {#4: (product_definition_relationship.name) #5: ((product_definition_relationship.name = 'quantified instance usage') (product_definition_relationship.name = 'selected instance usage') (product_definition_relationship.name = 'single instance usage'))} product_definition_usage => assembly_component_usage)} characterized_product_definition = product_definition_relationship characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <-) (process_product_association.defined_product -> characterized_product_definition characterized_product_definition = product_definition product_definition

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				{product_definition.frame_of_reference -> product_definition_context <= application_context_element #6: (application_context_element.name = 'part definition') #7: (application_context_element.name = 'part occurrence')} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <-) property_definition.definition property_definition {property_definition => product_definition_shape} represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_1] representation_relationship => representation_relationship_with_transformation representation_relationship_with_transformation.transformation_operator -> transformation #10: (transformation = item_defined_transformation item_defined_transformation) #11: (transformation = functionally_defined_transformation functionally_defined_transformation)

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_- OPERATION_- OCCURRENCE #1: If no item_version is associated. #2: If an item_version is associated. #3: If the process_-operation_occurrence is not refered at least once by a process_operation_-input_or_output as 'operation'. #4: If the process_-operation_occurrence is refered at least once by a process_operation_input_or_-output as 'operation'.	[action_relationship] [action]	41 41		{action_relationship action_relationship.name = 'process operation occurrence' action_relationship.related_action -> #3: (action) #4: (action => product_definition_process)}
id	action.id	41		action action.id
process_- operation_- occurrence to cartesian_- coordinate_space (as is_defined_- in)	PATH	52		action_relationship {action_relationship.name = 'process operation occurrence'} action_relationship.related_action -> action characterized_action_definition = action characterized_action_definition <- action_property.definition action_property <- action_property_representation.property action_property_representation action_property_representation.representation -> representation {[representation.name = 'reference system'] [representation representation.items[i] ->

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => geometric_representation_item => placement => axis2_placement_3d]} representation.context_of_items -> representation_context => geometric_representation_context
process_- operation_- occurrence to process_- operation_- definition (as operation_- definition)	PATH			action action.chosen_method -> action_method => process_operation
process_- operation_- occurrence to process_plan (as plan)	PATH			action_relationship {action_relationship.name = 'process operation occurrence'} action_relationship.relating_action -> action => #1: (process_plan) #2: (product_definition_process => product_process_plan)
PROCESS_- OPERATION_- OCCURRENCE_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	action_relationship	41		{action_relationship [action_relationship.related_action ->] [action_relationship.relating_action ->] action <- action_relationship.related_action action_relationship action_relationship.name = 'process operation occurrence'}
cycle_time	time_measure_with_unit	41	30,47	action_relationship time_interval_item = action_relationship time_interval_item <- applied_time_interval_assignment.items[i] applied_time_interval_assignment <=

Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				time_interval_assignment {time_interval_assignment.role -> time_interval_role time_interval_role.name = 'cycle time'} time_interval_assignment.assigned_time_interval -> time_interval => time_interval_with_bounds {time_interval_with_bounds.primary_bound -> date_time_or_event_occurrence date_time_or_event_occurrence = event_occurrence event_occurrence event_occurrence.name = 'start of interval'} time_interval_with_bounds.duration -> time_measure_with_unit
description	action_relationship. description	41		
relation_type	action_relationship. name	41		action_relationship {(action_relationship.name) (action_relationship.name = 'decomposition') (action_relationship.name = 'exclusiveness') (action_relationship.name = 'sequence') (action_relationship.name = 'simultaneity') (action_relationship.name = 'substitution')}
process_- operation_- occurrence_- relationship to multi_language_- string (as description)	#1: ([action_- relationship. description] [PATH]) #2: (PATH)	41	108	action_relationship #1: (attribute_language_item = action_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
process_- operation_- occurrence_- relationship to process_- operation_- occurrence (as related)	PATH			action_relationship action_relationship.related_action ->action <- action_relationship.related_action action_relationship {action_relationship.name = 'process operation occurrence'}
process_- operation_- occurrence_- relationship to process_- operation_- occurrence (as relating)	PATH			action_relationship action_relationship.relating_action ->action <- action_relationship.related_action action_relationship {action_relationship.name = 'process operation occurrence'}
process_- operation_- occurrence_- relationship to property_value (as waiting_- time)	PATH			action_relationship characterized_action_definition = action_relationship characterized_action_definition <- action_property.definition action_property <- action_property_representation.property action_property_representation action_property_representation.representation ->representation representation.items[i] ->representation_item => (compound_representation_item) (descriptive_representation_item) (measure_representation_item)

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_- OPERATION_- RESOURCE_- ASSIGNMENT #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the resource is used in the role of a reference tool. #4: If the resource is not used in the role of a reference tool. #5: If the transformation is implicitly defined by two items. #6: If the transformation is explicitly defined. #7: If a reference tool is assigned to the specified process operation. #8: If no reference tool is assigned to the specified process operation. #9: If the transformation is used with a template instance.	requirement_for_action_- resource	49		{requirement_for_action_resource <= action_resource_requirement}
reason	action_resource_- requirement. description	49		
reference_tool	action_resource_- requirement.name	49		requirement_for_action_resource <= {#3: ([action_resource_requirement.name = 'reference tool']}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				[action_resource_requirement => requirement_for_action_resource requirement_for_action_resource.resources[i] -> action_resource => product_definition_resource <= product_definition {product_definition.frame_of_reference -> product_definition_context <= application_context_element application_context_element.name = 'part definition'}]) #4: (action_resource_requirement.name = 'non reference tool')}
process_- operation_- resource_- assignment to process_- operation_- occurrence (as operation)	PATH			requirement_for_action_resource <= action_resource_requirement action_resource_requirement.operations[i] -> characterized_action_definition characterized_action_definition = action action {action <- action_relationship.related_action action_relationship action_relationship.name = 'process operation occurrence'}
process_- operation_- resource_- assignment to transformation (as placement)	PATH		10	[requirement_for_action_resource {requirement_for_action_resource <= action_resource_requirement action_resource_requirement.name = 'non reference tool'} requirement_for_action_resource.resources[i] -> action_resource => product_definition_resource <= product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition =>

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_1] [#7: (requirement_for_action_resource {requirement_for_action_resource <= action_resource_requirement action_resource_requirement.name = 'reference tool'} requirement_for_action_resource.resources[i] -> action_resource => product_definition_resource <= product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <-)

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				#8: (action_resource_requirement action_resource_requirement.operations[i] ->) characterized_action_definition characterized_action_definition = action action {action.chosen_method ->) action_method => process_operation} characterized_action_definition = action characterized_action_definition <- action_property.definition action_property <- action_property_representation.property action_property_representation action_property_representation.representation ->) representation <- {representation.name = 'reference system'}) representation_relationship.rep_2] representation_relationship => representation_relationship_with_transformation representation_relationship_with_transformation.transformation_operator ->) transformation #5: (transformation = item_defined_transformation item_defined_transformation) #6: (transformation = functionally_defined_transformation functionally_defined_transformation) #9: ([mapped_item.mapping_target] [representation_map.mapping_origin])

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
process_- operation_- resource_- assignment to multi_language_- string (as reason)	#1: ([action_resource_- requirement. description] [PATH]) #2: (PATH)	49	160	requirement_for_action_resource #1: (attribute_language_item = requirement_for_action_resource attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = requirement_for_action_resource multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
process_- operation_- resource_- assignment to descriptive_- specification (as resource_- definition)	PATH			requirement_for_action_resource <= action_resource_requirement action_resource_requirement.kind ->> resource_requirement_type
process_- operation_- resource_- assignment to design_- discipline_item_- definition (as resource_- definition)	PATH		10	requirement_for_action_resource requirement_for_action_resource.resources[i] ->> action_resource => product_definition_resource <= product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part definition'}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
process_- operation_- resource_- assignment to item_instance (as resource_- definition)	PATH		10	requirement_for_action_resource requirement_for_action_resource.resources[i] ->> action_resource => product_definition_resource <= product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'part occurrence'}
process_- operation_- resource_- assignment to physical_- instance (as resource_- definition)	PATH		10	requirement_for_action_resource requirement_for_action_resource.resources[i] ->> action_resource => product_definition_resource <= product_definition {product_definition.frame_of_reference ->> product_definition_context <= application_context_element application_context_element.name = 'physical occurrence'}
process_- operation_- resource_- assignment to product_- component (as resource_- definition)	PATH			{requirement_for_action_resource requirement_for_action_resource.resources[i] ->> action_resource => product_definition_resource <= product_definition product_definition.formation ->> product_definition_formation}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
PROCESS_PLAN #1: If no item_version is associated. #2: If an item_version is associated. #3: For the primary_-language_dependent_string. #4: For any additional_-language_dependent_string.	#1: (process_plan) #2: (product_process_-plan)	214 214		{#1: (process_plan <= action) #2: (product_process_plan <= product_definition_process <= action)}
description	action.description	41		#1: (process_plan <=) #2: (product_process_plan <= product_definition_process <=) action action.description
name	action.name	41		#1: (process_plan <=) #2: (product_process_plan <= product_definition_process <=) action action.name
plan_id	action.id	41		#1: (process_plan <=) #2: (product_process_plan <= product_definition_process <=) action action.id
process_plan to multi_language_-string (as description)	#3: ([action.description] [PATH]) #4: (PATH)	41	104	#1: (process_plan <= action) #2: (product_process_plan <= product_definition_process <= action) #3: (attribute_language_item = action attribute_language_item <- attribute_language_assignment.items[i]

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #4: (multi_language_attribute_item = action multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
process_plan to multi_language_-string (as name)	#3: ([action.name] [PATH]) #4: (PATH)	41	104	#1: (process_plan <= action) #2: (product_process_plan <= product_definition_process <= action) #3: (attribute_language_item = action attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #4: (multi_language_attribute_item = action multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'name'})
process_plan to item_version (as produced_-output)	#1: (see NOTE 2) #2: (PATH)			#1: (see NOTE 2)[2)] #2: (product_process_plan <= product_definition_process <- process_product_association.process process_product_association {process_product_association.name = 'produced output'}

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				process_product_association.defined_product -> characterized_product_definition characterized_product_definition = product_definition product_definition product_definition.formation -> product_definition_formation)
PROCESS_PLAN_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If no item_version is associated. #4: If an item_version is associated.	action_relationship	41		{action_relationship [action_relationship.relating_action ->] [action_relationship.related_action ->] action => #3: (process_plan) #4: (product_definition_process => product_process_plan)}
description	action_relationship. description	41		
relation_type	action_relationship. name	41		{(action_relationship.name) (action_relationship.name = 'alternative') (action_relationship.name = 'version association') (action_relationship.name = 'version sequence')}
process_plan_- relationship to multi_language_- string (as description)	#1: ([action_- relationship. description] [PATH]) #2: (PATH)	41	108	action_relationship #1: (attribute_language_item = action_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = action_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <=

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
process_plan_- relationship to process_plan (as related)	PATH			action_relationship action_relationship.related_action ->> action => #3: (process_plan) #4: (product_definition_process => product_process_plan)
process_plan_- relationship to process_plan (as relating)	PATH			action_relationship action_relationship.relating_action ->> action => #3: (process_plan) #4: (product_definition_process => product_process_plan)
PROCESS_PLAN_- VERSION #1: If no item_version is associated. #2: If an item_version is associated.	#1: (process_plan) #2: (product_process_- plan)	214 214		{#1: (process_plan <=) #2: (product_process_plan <= product_definition_process <=) action identification_item = action identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment identification_assignment.role -> identification_role identification_role.name = 'version'}
version_id	identification_- assignment.assigned_id	41	29,194	#1: (process_plan <=) #2: (product_process_plan <= product_definition_process <=) action identification_item = action identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <=

Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_assignment {identification_assignment.role ->identification_role identification_role.name = 'version'} identification_assignment.assigned_id
PROCESS_STATE	product_definition	41		{product_definition product_definition.name = 'process state'}
process_state to design_-discipline_item_-definition (as related_item_-definition)	PATH			product_definition <- product_definition_relationship.related_product_definition product_definition_relationship {product_definition_relationship.name = 'process state to related item'} product_definition_relationship.relating_product_definition ->product_definition {product_definition.frame_of_reference ->product_definition_context <=application_context_element application_context_element.name = 'part definition'}
SAME_TIME_-MACHINING_-RELATIONSHIP #1: For the primary_-language_dependent_string. #2: For any additional_-language_dependent_string.	product_definition_-relationship (see NOTE 3)	41		(see NOTE 3)[3)] {product_definition_relationship product_definition_relationship.name = 'same time machining' }
description	product_definition_-relationship.description	41		
same_time_-machining_-relationship to multi_language_-string (as description)	#1: ([product_-definition_-relationship.description][PATH]) #2: (PATH)	41	153	product_definition_relationship #1: (attribute_language_item -> product_definition_relationship attribute_language_item <-attribute_language_assignment.items[i] attribute_language_assignment{attribute_language_assignment <=attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'})

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
same_time_- machining_- relationship to geometric_model_- relationship_- with_- transformation (as placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'same time machining' } [product_definition_relationship.relating_product_definition ->] product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation ->] representation <- representation_relationship.rep_2] [product_definition_relationship.related_product_definition ->] product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition_->] property_definition.definition

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_1] representation_relationship => representation_relationship_with_transformation
same_time_- machining_- relationship to template_- instance (as placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'same time machining' } [product_definition_relationship.relating_product_definition -> product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				{representation => shape_representation} representation.items[i] ->> representation_item =>] [product_definition_relationship.related_product_definition -> product_definition characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_map.mapped_representation representation_map <- mapped_item.mapping_source] mapped_item

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
TOOL_PART_- RELATIONSHIP #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	product_definition_- relationship (see NOTE 4)	41	178	(see NOTE 4)[4)] {product_definition_relationship product_definition_relationship.name = 'tool part relationship' }
used_technology_- description	product_definition_- relationship. description	41		{product_definition_relationship product_definition_relationship.name = 'tool part relationship' }
tool_part_- relationship to geometric_model_- relationship_- with_- transformation (as placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'tool part relationship' } [product_definition_relationship.relating_product_definition -> product_definition {product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'tool'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation =>

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_2] [product_definition_relationship.related_product_definition -> product_definition {product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'part'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- representation_relationship.rep_1] representation_relationship => representation_relationship_with_transformation

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
tool_part_- relationship to template_- instance (as placement)	PATH			product_definition_relationship {product_definition_relationship.name = 'tool part relationship' } [product_definition_relationship.relating_product_definition -> product_definition {product_definition.formation -> product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'tool'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation {representation => shape_representation} representation.items[i] -> representation_item_=>] [product_definition_relationship.related_product_definition -> product_definition {product_definition.formation ->

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Table 30 – Mapping table process_plan UoF (S8) (continued)

Application element	AIM element	Source	Rules	Reference path
				product_definition_formation product_definition_formation.of_product -> product <- product_related_product_category.products[i] product_related_product_category <= product_category product_category.name = 'part'} characterized_product_definition = product_definition characterized_product_definition characterized_definition = characterized_product_definition characterized_definition <- property_definition.definition property_definition {property_definition => product_definition_shape} property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation {property_definition_representation => shape_definition_representation} property_definition_representation.used_representation -> representation <- {representation => shape_representation} representation_map.mapped_representation representation_map <- mapped_item.mapping_source] mapped_item

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Table 30 – Mapping table process_plan UoF (S8) (concluded)

Application element	AIM element	Source	Rules	Reference path
tool_part_- relationship to multi_language_- string (as used_- technology_- description)	#1: ([product_- definition_- relationship. description] [PATH]) #2: (PATH)	142		product_definition_relationship #1: (attribute_language_item = product_definition_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = product_definition_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})

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NOTE - The following note numbers correspond to the footnotemarks listed in the table above:

1 This application object is defined in UoF S8 due to its close relationship to process planning. However it is only available, if the UoF S3 is participating in the same conformance class.

2 The use of this mapping alternative is not applicable.

3 This application object is defined in UoF S8 due to its close relationship to process planning. However it is only available, if the UoF S7 is participating in the same conformance class.

4 This application object is defined in UoF S8 due to its close relationship to process planning. However it is only available, if the UoF S3 is participating in the same conformance class.

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Table 31 – Mapping table dimension_tolerance UoF (T1)

Application element	AIM element	Source	Rules	Reference path
ANGULAR_LOCATION_- DIMENSION #1: If the origin_- determination is 'unchanged'. #2: If the origin_- determination is not 'unchanged'. #3: If the origin_- determination is 'positive normal' or 'negative normal'. #4: If the origin_- determination is 'mirror'. #5: If the origin_- determination is 'positive normal'. #6: If the origin_- determination is 'negative normal'. #7: If the mirror_target is 'false'. #8: If the mirror_target is 'true'.	angular_location	47		
major_angle	angular_location.angle_- selection	47		
mirror_target	#7: (shape_aspect) #8: (shape_aspect_- deriving_relationship)	41 47		angular_location <= dimensional_location <= shape_aspect_relationship #7: (shape_aspect_relationship.related_shape_aspect ->) shape_aspect) #8: (shape_aspect_relationship.related_shape_aspect ->) shape_aspect <= {shape_aspect => derived_shape_aspect =>}

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				extension} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship => {shape_aspect_relationship.name = 'mirroring relationship'} shape_aspect_deriving_relationship)
origin_- determination	#1: (shape_aspect) #2: (shape_aspect_- deriving_relationship)	41 47		angular_location <= dimensional_location <= shape_aspect_relationship #1: (shape_aspect_relationship.relating_shape_aspect ->shape_aspect) #2: (shape_aspect_relationship.relating_shape_aspect ->shape_aspect <- {shape_aspect => derived_shape_aspect => #3: (perpendicular_to) #4: (extension)} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship => {#5: (shape_aspect_relationship.name = 'positive normal relationship') #6: (shape_aspect_relationship.name = 'negative normal relationship') #4: (shape_aspect_relationship.name = 'mirroring relationship')} shape_aspect_deriving_relationship)
ANGULAR_SIZE_- DIMENSION #1: If the angle is established between the two sides of the angular element. #2: If the angle is established between the bisector line and the angular element.	angular_size	47	22	
full	dimensional_size.name	47		angular_size <= dimensional_size {#1: (dimensional_size.name = 'full angle dimension')

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Table 31 - Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (dimensional_size.name = 'half angle dimension')}
major_angle	angular_size.angle_selection	47		
CURVED_DISTANCE_DIMENSION #1: If the with_curve_direction is 'false'. #2: If the with_curve_direction is 'true'.	#1: (dimensional_location_with_path) #2: ([dimensional_location_with_path] [directed_dimensional_location])	47 47 214		#1: (dimensional_location_with_path <=) #2: (directed_dimensional_location <= dimensional_location => dimensional_location_with_path <=) dimensional_location <= shape_aspect_relationship {shape_aspect_relationship.name = 'curved distance'}
with_curve_direction	IDENTICAL MAPPING			
curved_distance_dimension to measurement_path (as used_path)	PATH			dimensional_location_with_path dimensional_location_with_path.path -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition.representation.definition property_definition_representation property_definition_representation.used_representation -> representation

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
DEFAULT_SETTING_-ASSOCIATION #1: If the default_-context is a digital_-document, a digital_file, or an item_shape. #2: If the default_-context is a drawing_sheet or a view_area.	#1: (property_-definition_-representation) #2: (representation_-relationship)	41 43		#1: ({property_definition_representation property_definition_representation.name = 'default setting association'}) #2: ({representation_relationship representation_relationship.name = 'default setting association'})
default_setting_-association to digital_document (as default_-context)	PATH			property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_product_definition characterized_product_definition characterized_product_definition = product_definition product_definition
default_setting_-association to digital_file (as default_-context)	PATH			property_definition_representation property_definition_representation.definition -> represented_definition represented_definition = property_definition property_definition property_definition.definition -> characterized_definition characterized_definition = characterized_object characterized_object=> document_file
default_setting_-association to drawing_sheet (as default_-context)	PATH			representation_relationship representation_relationship.rep_2 -> representation => presentation_representation => presentation_area => drawing_sheet_revision

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
default_setting_- association to item_shape (as default_- context)	PATH			property_definition_representation property_definition_representation.definition ->) represented_definition represented_definition = property_definition property_definition => product_definition_shape
default_setting_- association to view_area (as default_- context)	PATH			representation_relationship representation_relationship.rep_2 ->) representation => presentation_representation => presentation_area
default_setting_- association to default_- thickness (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default thickness'}
default_setting_- association to general_- tolerances (as default_- value)	PATH			#1: (property_definition_representation property_definition_representation.used_representation ->) #2: (representation_relationship representation_relationship.rep_1 ->) representation {representation.name = 'default tolerances'}

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
DEFAULT_- THICKNESS #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string. #3: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #4: If the value_with_- unit is a value_range.	representation	43		{representation [representation.name = 'default thickness'] [representation.context_of_items -> representation_context representation_context.context_type = 'default setting']}
description	representation. description	43		
parameter_name	descriptive_- representation_item. description	45	95	representation representation.items [i] -> representation_item => {representation_item.name = 'parameter name'} descriptive_representation_item descriptive_representation_item.description
default_- thickness to multi_language_- string (as description)	#1: ([representation. description] [PATH]) #2: (PATH)	43	158	representation #1: (attribute_language_item = representation attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = representation multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'description'})
default_- thickness to value_with_unit (as thickness_- value)	PATH			representation representation.items[i] ->> representation_item => {representation_item.name = 'thickness value'} #3: (measure_representation_item) #4: (compound_representation_item => value_range)
DERIVED_GEOMETRY #1: If no specific subtype is available for the derivation. #2: If a specific subtype is available for the derivation.	derived_shape_aspect	47		
role	#1: (shape_aspect. description) #2: (IDENTICAL MAPPING)	41		#1: (derived_shape_aspect <= shape_aspect shape_aspect.description) #2: (derived_shape_aspect => (apex) (centre_of_symmetry) (geometric_alignment) (geometric_intersection) (parallel_offset) (perpendicular_to) (extension) (tangent))
derived_geometry to constructive_- geometric_- element (as geometry)	PATH			derived_shape_aspect <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item
derived_geometry to shape_element (as is_derived_- from)	PATH			derived_shape_aspect <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => shape_aspect_deriving_relationship} shape_aspect_relationship.related_shape_aspect -> shape_aspect
GENERAL_SIZE_- DIMENSION #1: If no measurement_- path is specified. #2: If a measurement_path is specified.	#1: (dimensional_- size) #2: (dimensional_size_- with_path)	47 47	22	
dimension_type	dimensional_size.name	47		#1: (dimensional_size) #2: (dimensional_size_with_path <= dimensional_size) dimensional_size.name
general_size_- dimension to measurement_path (as used_path)	PATH			dimensional_size_with_path dimensional_size_with_path.path -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation
GENERAL_- TOLERANCE_TABLE	default_tolerance_- table	214		default_tolerance_table <= representation
tolerance_type	representation.name	43		default_tolerance_table <= representation representation.name
GENERAL_- TOLERANCES	representation	43	94	{[representation.name = 'default tolerances'] [representation.context_of_items ->representation_context representation_context.context_type = 'default setting']}
tolerance_class	descriptive_- representation_item. description	45		representation representation.items[i] ->representation_item => {representation_item.name = 'tolerance class'} descriptive_representation_item descriptive_representation_item.description
general_- tolerances to document_file (as table_- definition)	PATH			representation document_reference_item = representation document_reference_item <- applied_document_reference.items[i] applied_document_reference <= document_reference {document_reference.role ->object_role object_role.name = 'general tolerance definition'} document_reference.assigned_document ->document => document_file

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
general_- tolerances to general_- tolerance_table (as table_- definition)	PATH			representation representation <- representation_relationship.rep_2 representation_relationship {representation_relationship.name = 'general tolerance definition'} representation_relationship.rep_1 ->> representation => default_tolerance_table
GEOMETRIC_- DIMENSION #1: If the geometric_- dimension is a location_- dimension. #2: If the geometric_- dimension is a size_- dimension. #3: If the value_with_- unit is a numerical_value or a value_limit and the unit is not assigned globally. #4: If the value_with_- unit is a value_range.	#1: (dimensional_- location) #2: (dimensional_- size)	47 47	22	
id	#1: (shape_aspect_- relationship.name) #2: (identification_- assignment.assigned_- id)	41 41	29	#1: (dimensional_location <= shape_aspect_relationship shape_aspect_relationship.name) #2: (dimensional_size identification_item = dimensional_size identification_item <- applied_identification_assignment.items[i] applied_identification_assignment <= identification_assignment {identification_assignment.role ->> identification_role identification_role.name = 'size id'}

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				identification_assignment.assigned_id)
geometric_- dimension to value_with_unit (as dimension_- value)	PATH			#1: (dimensional_location dimensional_characteristic = dimensional_location) #2: (dimensional_size dimensional_characteristic = dimensional_size) dimensional_characteristic <- dimensional_characteristic_representation.dimension dimensional_characteristic_representation dimensional_characteristic_representation.representation ->shape_dimension_representation <= shape_representation <= representation representation.items [i] ->representation_item => #3: (measure_representation_item) #4: (measure_representation_item {measure_representation_item <= representation_item <- set_representation_item [i] set_representation_item compound_item_definition = set_representation_item compound_item_definition <- compound_representation_item.item_element compound_representation_item => value_range})
LIMITS_AND_FITS	limits_and_fits	47		
deviation	limits_and_fits.form_- variance	47		
fitting_type	limits_and_fits.zone_- variance	47		
grade	limits_and_fits.grade	47		

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
LINEAR_DISTANCE_-DIMENSION #1: If the directed is 'false' and the orientation is not specified. #2: If the directed is 'true' and the orientation is not specified. #3: If the directed is 'false' and the orientation is specified. #4: If the directed is 'true' and the orientation is specified.	#1: (dimensional_-location) #2: (directed_-dimensional_location) #3: (dimensional_-location_with_path) #4: ([directed_-dimensional_location] [dimensional_location_-with_path])	47 214 47 214 47		#1: (dimensional_location <=) #2: (directed_dimensional_location <= dimensional_location <=) #3: (dimensional_location_with_path <= dimensional_location <=) #4: (directed_dimensional_location <= dimensional_location => dimensional_location_with_path <= dimensional_location <=) shape_aspect_relationship {shape_aspect_relationship.name = 'linear distance'}
directed	IDENTICAL MAPPING			
orientation	placement	42		dimensional_location_with_path <= dimensional_location <= shape_aspect_relationship shape_definition = shape_aspect_relationship shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> {representation_item representation_item.name = 'orientation'} representation_item => geometric_representation_item => placement

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
LOCATION_- DIMENSION #1: If it is not an angular_location_dimension or if it is an angular_- location_dimension whose origin_determination is 'unchanged'. #2: If it is an angular_- location_dimension whose origin_determination is not 'unchanged'. #3: If it is an angular_- location_dimension whose origin_determination is 'positive normal' or 'negative normal'. #4: If it is an angular_- location_dimension whose origin_determination is 'mirror'. #5: If it is an angular_- location_dimension whose origin_determination is 'positive normal'. #6: If it is an angular_- location_dimension whose origin_determination is 'negative normal'. #7: If it is not an angular_location_dimension or if it is an angular_- location_dimension whose mirror_target is 'false'. #8: If it is an angular_- location_dimension whose	dimensional_location	47		

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
mirror_target is 'true'. #9: For the primary_- language_dependent_string. #10: For any additional_- language_dependent_string.				
description	shape_aspect_- relationship. description	41		dimensional_location <= shape_aspect_relationship shape_aspect_relationship.description
location_- dimension to multi_language_- string (as description)	#9: ([shape_aspect_- relationship. description] [PATH]) #10: (PATH)	41	165	dimensional_location <= shape_aspect_relationship #9: (attribute_language_item = shape_aspect_relationship attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #10: (multi_language_attribute_item = shape_aspect_relationship multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
location_- dimension to annotation_curve (as origin)	PATH			dimensional_location <= shape_aspect_relationship #1: (shape_aspect_relationship.relating_shape_aspect ->) #2: (shape_aspect_relationship.relating_shape_aspect ->) shape_aspect <- {shape_aspect => derived_shape_aspect => #3: (perpendicular_to) #4: (extension)} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				{shape_aspect_relationship => shape_aspect_deriving_relationship} shape_aspect_relationship.related_shape_aspect ->) shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => styled_item => annotation_occurrence => annotation_curve_occurrence
location_- dimension to constructive_- geometric_- element (as origin)	PATH			dimensional_location <= shape_aspect_relationship #1: (shape_aspect_relationship.relating_shape_aspect ->) #2: (shape_aspect_relationship.relating_shape_aspect ->) shape_aspect <- {shape_aspect => derived_shape_aspect => #3: (perpendicular_to) #4: (extension)} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => shape_aspect_deriving_relationship} shape_aspect_relationship.related_shape_aspect ->)

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item
location_- dimension to derived_geometry (as origin)	PATH			dimensional_location <= shape_aspect_relationship #1: (shape_aspect_relationship.relating_shape_aspect ->) #2:(shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect => derived_shape_aspect => #3: (perpendicular_to) #4: (extension)} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => shape_aspect_deriving_relationship} shape_aspect_relationship.related_shape_aspect ->) shape_aspect => derived_shape_aspect

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
location_- dimension to shape_element (as origin)	PATH			dimensional_location <= shape_aspect_relationship #1: (shape_aspect_relationship.relating_shape_aspect ->) #2: (shape_aspect_relationship.relating_shape_aspect -> shape_aspect <- {shape_aspect => derived_shape_aspect => #3: (perpendicular_to) #4: (extension)} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => shape_aspect_deriving_relationship] [#5: (shape_aspect_relationship.name = 'positive normal relationship') #6: (shape_aspect_relationship.name = 'negative normal relationship') #4: (shape_aspect_relationship.name = 'mirroring relationship')]} shape_aspect_relationship.related_shape_aspect ->) shape_aspect
location_- dimension to annotation_curve (as target)	PATH			dimensional_location <= shape_aspect_relationship #7: (shape_aspect_relationship.related_shape_aspect ->) #8: (shape_aspect_relationship.related_shape_aspect -> shape_aspect <- {shape_aspect => derived_shape_aspect => extension} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => shape_aspect_deriving_relationship] [shape_aspect_relationship.name = 'mirroring relationship']} shape_aspect_relationship.related_shape_aspect ->) shape_aspect shape_definition = shape_aspect

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => styled_item => annotation_occurrence => annotation_curve_occurrence
location_- dimension to constructive_- geometric_- element (as target)	PATH			dimensional_location <= shape_aspect_relationship #7: (shape_aspect_relationship.related_shape_aspect ->) #8: (shape_aspect_relationship.related_shape_aspect -> shape_aspect <- {shape_aspect => derived_shape_aspect => extension} shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {[shape_aspect_relationship => shape_aspect_deriving_relationship] [shape_aspect_relationship.name = 'mirroring relationship']} shape_aspect_relationship.related_shape_aspect ->) shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <-

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation representation.items[i] ->representation_item
location_- dimension to derived_geometry (as target)	PATH			dimensional_location <= shape_aspect_relationship #7: (shape_aspect_relationship.related_shape_aspect ->) #8: (shape_aspect_relationship.related_shape_aspect ->shape_aspect <- {shape_aspect => derived_shape_aspect =>extension} shape_aspect_relationship.relating_shape_aspectshape_aspect_relationship {[shape_aspect_relationship => shape_aspect_deriving_relationship] [shape_aspect_relationship.name = 'mirroring relationship']} shape_aspect_relationship.related_shape_aspect ->) shape_aspect => derived_shape_aspect
location_- dimension to shape_element (as target)	PATH			dimensional_location <= shape_aspect_relationship #7: (shape_aspect_relationship.related_shape_aspect ->) #8: (shape_aspect_relationship.related_shape_aspect ->shape_aspect <- {shape_aspect => derived_shape_aspect =>extension} shape_aspect_relationship.relating_shape_aspect

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				shape_aspect_relationship {[shape_aspect_relationship => shape_aspect_deriving_relationship] [shape_aspect_relationship.name = 'mirroring relationship']} shape_aspect_relationship.related_shape_aspect ->) shape_aspect
MEASUREMENT_PATH	representation	43		{representation.name = 'measuring direction'}
measurement_path to curve (as is_defined_- as)	PATH			representation representation.items[i] -> representation_item => geometric_representation_item => curve => (pcurve) (surface_curve)
measurement_path to cartesian_- coordinate_space (as is_defined_- in)	PATH		52	representation representation.context_of_items -> representation_context => geometric_representation_context
PLUS_MINUS_- BOUNDS	tolerance_value	47	48	
lower_bound	tolerance_value.lower_- bound	47		
significant_- digits	precision_qualifier. precision_value	45	38	[tolerance_value tolerance_value.lower_bound -> measure_with_unit <-] [tolerance_value tolerance_value.upper_bound -> measure_with_unit <-] measure_qualification.qualified_measure measure_qualification measure_qualification.qualifiers[i] -> value_qualifier value_qualifier = precision_qualifier precision_qualifier

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				precision_qualifier.precision_value
upper_bound	tolerance_value.upper_-bound	47		
value_-determination	type_qualifier.name	45	49	tolerance_value [tolerance_value.lower_bound ->] [tolerance_value.upper_bound->] measure_with_unit <- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifiers[i] ->value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name) (type_qualifier.name = 'required') (type_qualifier.name = 'designed') (type_qualifier.name = 'calculated') (type_qualifier.name = 'measured') (type_qualifier.name = 'estimated')}
PLUS_MINUS_-TOLERANCED_DATUM	measure_representation_-item	45	30	{measure_representation_item <= representation_item representation_item.name = 'plus minus tolerance value'}
tolerance_value	measure_with_unit.value_component	41		measure_representation_item <= measure_with_unit measure_with_unit.value_component
SIGNIFICANT_-NUMBER_OF_DIGITS	measure_representation_-item	45	30	{measure_representation_item <= representation_item representation_item.name = 'significant number of digits'}
number_of_digits	measure_with_unit.value_component	41		measure_representation_item <= measure_with_unit measure_with_unit.value_component {measure_with_unit.value_component ->measure_value measure_value = count_measure}

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
SIZE_DIMENSION	dimensional_size	47	22	
size_dimension to annotation_-curve (as is_applied_-to)	PATH			dimensional_size dimensional_size.applies_to -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition property_definition.definition property_definition represented_definition = property_definition property_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item => styled_item => annotation_occurrence => annotation_curve_occurrence
size_dimension to shape_element (as is_applied_-to)	PATH			dimensional_size dimensional_size.applies_to -> shape_aspect
THICKNESS_-DIMENSION #1: If no measurement_-path is specified. #2: If a measurement_path is specified.	dimensional_size	47	22	#1: (dimensional_size) #2: (dimensional_size_with_path <= dimensional_size) {dimensional_size.name = 'thickness size'}

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
thickness_- dimension to measurement_path (as used_path)	PATH			dimensional_size_with_path dimensional_size_with_path.path ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation
TOLERANCE_TABLE_- CELL #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	default_tolerance_- table_cell	214		default_tolerance_table_cell <= compound_representation_item
description	descriptive_- representation_item. description	45		default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element ->compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] ->representation_item => {representation_item.name = 'cell description'} descriptive_representation_item descriptive_representation_item.description
tolerance_class	representation_item. name	43		default_tolerance_table_cell <= compound_representation_item <= representation_item

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item.name
tolerance_table_- cell to plus_- minus_toleranced_- datum (as cell_value)	PATH			default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => measure_representation_item
tolerance_table_- cell to upper_- lower_toleranced_- datum (as cell_value)	PATH			default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => measure_representation_item
tolerance_table_- cell to multi_- language_string (as description)	#1: ([descriptive_- representation_item. description] [PATH]) #2: (PATH)	45	120	default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => {representation_item.name = ’cell description’} descriptive_representation_item #1: (attribute_language_item = descriptive_representation_item attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = ’description’})

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				#2: (multi_language_attribute_item = descriptive_representation_item multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
tolerance_table_- cell to significant_- number_of_digits (as limit)	PATH			default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => measure_representation_item
tolerance_table_- cell to upper_- lower_limit (as limit)	PATH			default_tolerance_table_cell <= compound_representation_item compound_representation_item.item_element -> compound_item_definition compound_item_definition = set_representation_item set_representation_item set_representation_item[i] -> representation_item => measure_representation_item
tolerance_table_- cell to general_- tolerance_table (as table)	PATH			default_tolerance_table_cell <= compound_representation_item <= representation_item representation_item <- representation.items[i] representation => default_tolerance_table
UPPER_LOWER_- LIMIT	[measure_- representation_item] [measure_- representation_item]	45 45	30	{[measure_representation_item <= representation_item representation_item.name = 'lower limit'] [measure_representation_item <=

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Table 31 – Mapping table dimension_tolerance UoF (T1) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item representation_item.name = 'upper limit']}
lower_limit	measure_with_unit. value_component	41		measure_representation_item {measure_representation_item <= representation_item representation_item.name = 'lower limit'} measure_representation_item <= measure_with_unit measure_with_unit.value_component
upper_limit	measure_with_unit. value_component	41		measure_representation_item {measure_representation_item <= representation_item representation_item.name = 'upper limit'} measure_representation_item <= measure_with_unit measure_with_unit.value_component
UPPER_LOWER_- TOLERANCED_DATUM	[measure_- representation_item] [measure_- representation_item]	45 45	30	{[measure_representation_item <= representation_item representation_item.name = 'lower tolerance value'] [measure_representation_item <= representation_item representation_item.name = 'upper tolerance value']}
lower_tolerance_- value	measure_with_unit. value_component	41		measure_representation_item {measure_representation_item <= representation_item representation_item.name = 'lower tolerance value'} measure_representation_item <= measure_with_unit measure_with_unit.value_component
upper_tolerance_- value	measure_with_unit. value_component	41		measure_representation_item {measure_representation_item <= representation_item representation_item.name = 'upper tolerance value'} measure_representation_item <= measure_with_unit measure_with_unit.value_component

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Table 31 – Mapping table dimension_tolerance UoF (T1) (concluded)

Application element	AIM element	Source	Rules	Reference path
VALUE_LIMITATION	plus_minus_tolerance	47		
envelope	applied_classification_-assignment	214	13	plus_minus_tolerance classification_item = plus_minus_tolerance classification_item <- applied_classification_assignment.items[i] applied_classification_assignment <= classification_assignment {[classification_assignment.role -> classification_role classification_role.name = 'further tolerance requirement'] [classification_assignment.assigned_class -> group {[group.name = 'E'] [group.description = 'dimensioning principle']}]}
value_limitation to limits_and_-fits (as is_defined_-by)	PATH			plus_minus_tolerance plus_minus_tolerance.range -> tolerance_method_definition tolerance_method_definition = limits_and_fits limits_and_fits
value_limitation to plus_minus_-bounds (as is_defined_-by)	PATH			plus_minus_tolerance plus_minus_tolerance.range -> tolerance_method_definition tolerance_method_definition = tolerance_value tolerance_value
value_limitation to numerical_-value (as limited_-value)	PATH			plus_minus_tolerance plus_minus_tolerance.toleranced_dimension -> dimensional_characteristic dimensional_characteristic = dimensional_size dimensional_size dimensional_characteristic = dimensional_size dimensional_characteristic <- dimensional_characteristic_representation.dimension dimensional_characteristic_representation dimensional_characteristic_representation.representation -> shape_dimension_representation <= shape_representation <= representation representation.items[i] -> representation_item => measure_representation_item

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Table 32 – Mapping table geometric_tolerance UoF (T2)

Application element	AIM element	Source	Rules	Reference path
ANGULARITY_-TOLERANCE	angularity_tolerance	519		angularity_tolerance <= geometric_tolerance_with_datum_reference
angularity_-tolerance to datum (as reference_-datum)	PATH			angularity_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] -> datum_reference
CIRCULAR_RUNOUT_-TOLERANCE	circular_runout_-tolerance	519		circular_runout_tolerance <= geometric_tolerance_with_datum_reference
angle	[measure_with_unit. value_component] [measure_with_unit. unit_component]	41 41	30	circular_runout_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance <- tolerance_zone.defining_tolerance[i] tolerance_zone <- tolerance_zone_definition.zone tolerance_zone_definition => runout_zone_definition runout_zone_definition.orientation -> runout_zone_orientation runout_zone_orientation.angle -> measure_with_unit [measure_with_unit.value_component] [measure_with_unit.unit_component]
circular_runout_-tolerance to datum (as reference_-datum)	PATH			circular_runout_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] -> datum_reference
COAXIALITY_-TOLERANCE	coaxiality_tolerance	519		{coaxiality_tolerance <= geometric_tolerance_with_datum_reference}
coaxiality_-tolerance to datum (as reference_-datum)	PATH			coaxiality_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system [i] -> datum_reference

Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
COMPOUND_DATUM	common_datum	519		{common_datum <= [composite_shape_aspect] [datum]}
compound_datum to single_datum (as is_made_up_- by)	PATH			common_datum <= composite_shape_aspect composite_shape_aspect.component_relationships [i] -> shape_aspect_relationship shape_aspect_relationship.related_shape_aspect -> shape_aspect => datum
CONCENTRICITY_- TOLERANCE	concentricity_- tolerance	519		concentricity_tolerance <= geometric_tolerance_with_datum_reference
concentricity_- tolerance to datum (as reference_- datum)	PATH			concentricity_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] -> datum_reference
CYLINDRICITY_- TOLERANCE	cylindricity_tolerance	519		cylindricity_tolerance <= geometric_tolerance
DATUM	datum_reference	47		
precedence	datum_reference. precedence	47		datum_reference datum_reference.precedence
DATUM_TARGET	datum_target	47		
id	datum_target.target_id	47		
DATUM_TARGET_SET #1: For the primary_- language_dependent_string. #2: For any additional_- language_dependent_string.	datum	47		
rule_description	shape_aspect. description	41		datum <= shape_aspect shape_aspect.description

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
datum_target_set to multi_-language_string (as rule_-description)	#1: ([shape_aspect. description] [PATH]) #2: (PATH)	41	164	datum_target <= shape_aspect #1: (attribute_language_item = shape_aspect attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = shape_aspect multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
datum_target_set to datum_target (as target)	PATH			datum <= shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect => datum_target
DERIVED_GEOMETRY #1: If no specific subtype is available for the derivation. #2: If a specific subtype is available for the derivation.	derived_shape_aspect	47		
role	#1: (shape_aspect. description) #2: (IDENTICAL MAPPING)	41		#1: (derived_shape_aspect <= shape_aspect shape_aspect.description) #2: (derived_shape_aspect => (apex)

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(centre_of_symmetry) (geometric_alignment) (geometric_intersection) (parallel_offset) (perpendicular_to) (extension) (tangent))
derived_geometry to constructive_- geometric_- element (as geometry)	PATH			derived_shape_aspect <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->) representation representation.items[i] ->) representation_item
derived_geometry to shape_element (as is_derived_- from)	PATH			derived_shape_aspect <= shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship => shape_aspect_deriving_relationship} shape_aspect_relationship.related_shape_aspect -> shape_aspect
FLATNESS_- TOLERANCE	flatness_tolerance	519		flatness_tolerance <= geometric_tolerance
GEOMETRIC_- TOLERANCE	geometric_tolerance	47	229,262	

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
name	geometric_tolerance. name	47		
qualifying_note	geometric_tolerance. description	47		
segment_size	[measure_with_unit. value_component] [measure_with_unit. unit_component]	41 41	30	geometric_tolerance => geometric_tolerance_with_defined_unit geometric_tolerance_with_defined_unit.unit_size -> measure_with_unit [measure_with_unit.value_component] [measure_with_unit.unit_component]
significant_- digits	precision_qualifier. precision_value	45	30,38	geometric_tolerance geometric_tolerance.magnitude -> measure_with_unit <- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifiers[i] -> value_qualifier value_qualifier = precision_qualifier precision_qualifier precision_qualifier.precision_value
tolerance_value	[measure_with_unit. value_component] [measure_with_unit. unit_component]	41 41	30	geometric_tolerance geometric_tolerance.magnitude -> measure_with_unit [measure_with_unit.value_component] [measure_with_unit.unit_component]
value_- determination	type_qualifier.name	45	30,49	geometric_tolerance geometric_tolerance.magnitude -> measure_with_unit <- measure_qualification.qualified_measure measure_qualification measure_qualification.qualifiers[i] -> value_qualifier value_qualifier = type_qualifier type_qualifier type_qualifier.name {(type_qualifier.name)

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				(type_qualifier.name = 'required') (type_qualifier.name = 'designed') (type_qualifier.name = 'calculated') (type_qualifier.name = 'measured') (type_qualifier.name = 'estimated')}
geometric_- tolerance to annotation_curve (as is_applied_- to)	PATH			geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation representation.items[i] ->representation_item =>styled_item =>annotation_occurrence =>annotation_curve_occurrence
geometric_- tolerance to constructive_- geometric_- element (as is_applied_- to)	PATH			geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <-

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation representation.items[i] -> representation_item
geometric_- tolerance to derived_geometry (as is_applied_- to)	PATH			geometric_tolerance geometric_tolerance.toleranced_shape_aspect -> shape_aspect shape_aspect => derived_shape_aspect
geometric_- tolerance to shape_element (as is_applied_- to)	PATH			geometric_tolerance geometric_tolerance.toleranced_shape_aspect -> shape_aspect
geometric_- tolerance to tolerance_- condition (as modification)	modified_geometric_- tolerance.modifier	47		geometric_tolerance => modified_geometric_tolerance modified_geometric_tolerance.modifier
geometric_- tolerance to multi_language_- string (as name)	#1: ([geometric_- tolerance.name] [PATH]) #2: (PATH)	47	130	geometric_tolerance #1: (attribute_language_item = geometric_tolerance attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'name'}) #2: (multi_language_attribute_item = geometric_tolerance multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				attribute_value_assignment.attribute_name = 'name'})
geometric_- tolerance to multi_language_- string (as qualifying_- note)	#1: ([geometric_- tolerance.description] [PATH]) #2: (PATH)	47	130	geometric_tolerance #1: (attribute_language_item = geometric_tolerance attribute_language_item <- attribute_language_assignment.items[i] attribute_language_assignment {attribute_language_assignment <= attribute_classification_assignment attribute_classification_assignment.attribute_name = 'description'}) #2: (multi_language_attribute_item = geometric_tolerance multi_language_attribute_item <- multi_language_attribute_assignment.items[i] multi_language_attribute_assignment {multi_language_attribute_assignment <= attribute_value_assignment attribute_value_assignment.attribute_name = 'description'})
GEOMETRIC_- TOLERANCE_- RELATIONSHIP	geometric_tolerance_- relationship	47		
relation_type	geometric_tolerance_- relationship.name	47		geometric_tolerance_relationship geometric_tolerance_relationship.name {(geometric_tolerance_relationship.name) (geometric_tolerance_relationship.name = 'precedence') (geometric_tolerance_relationship.name = 'simultaneity')}
geometric_- tolerance_- relationship to geometric_- tolerance (as related)	PATH			geometric_tolerance_relationship geometric_tolerance_relationship.related_geometric_tolerance ->geometric_tolerance

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
geometric_- tolerance_- relationship to geometric_- tolerance (as relating)	PATH			geometric_tolerance_relationship geometric_tolerance_relationship.relating_geometric_tolerance ->geometric_tolerance
LINE_PROFILE_- TOLERANCE	line_profile_tolerance	519		line_profile_tolerance <= geometric_tolerance
line_profile_- tolerance to reference_plane (as affected_- plane)	PATH			line_profile_tolerance <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation
line_profile_- tolerance to datum (as reference_- datum)	PATH			line_profile_tolerance <= geometric_tolerance => geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] ->datum_reference

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
PARALLELISM_-TOLERANCE	parallelism_tolerance	519		parallelism_tolerance <= geometric_tolerance_with_datum_reference
parallelism_-tolerance to reference_plane (as affected_-plane)	PATH			parallelism_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation
parallelism_-tolerance to datum (as reference_-datum)	PATH			parallelism_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[1] ->datum_reference
PERPENDICULARITY_-TOLERANCE	perpendicularity_-tolerance	519		perpendicularity_tolerance <= geometric_tolerance_with_datum_reference

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
perpendicularity_- tolerance to reference_plane (as affected_- plane)	PATH			perpendicularity_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->>br>shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect ->>br>shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->>br>representation
perpendicularity_- tolerance to datum (as reference_- datum)	PATH			perpendicularity_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] ->>br>datum_reference
PLACED_TARGET	placed_datum_target_- feature	214		placed_datum_target_feature <= datum_target
placed_target to cartesian_- coordinate_space (as is_defined_- in)	PATH			placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <-

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.context_of_items -> representation_context => geometric_representation_context
placed_target to axis_placement (as parameter_ reference)	PATH			placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation.items[i] -> representation_item => {representation_item.name = 'orientation'} geometric_representation_item => placement
POSITION_- TOLERANCE	position_tolerance	519		position_tolerance <= geometric_tolerance_with_datum_reference
position_- tolerance to reference_plane (as affected_- plane)	PATH			position_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect -> shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation -> representation
position_- tolerance to datum (as reference_- datum)	PATH			position_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] -> datum_reference
PROJECTION	projected_zone_- definition	47		

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
projection_- length	[measure_with_unit. value_component] [measure_with_unit. unit_component]	41 41	30	projected_zone_definition projected_zone_definition.projected_length ->measure_with_unit [measure_with_unit.value_component] [measure_with_unit.unit_component]
projection to shape_element (as projection_- end)	PATH			projected_zone_definition projected_zone_definition.projection_end ->shape_aspect
REFERENCE_PLANE	representation	43		
plane_location	placement.location	42		representation representation.items[i] ->representation_item representation_item => geometric_representation_item => placement placement.location
plane_normal	axis2_placement_3d. axis	42		representation representation.items[i] ->representation_item representation_item => geometric_representation_item => placement => axis2_placement_3d axis2_placement_3d.axis
ROUNDNESS_- TOLERANCE	roundness_tolerance	519		roundness_tolerance <= geometric_tolerance
SINGLE_DATUM	datum	47		
datum_name	datum.identification	47		
single_datum to datum_target_set (as is_defined_- by)	IDENTICAL MAPPING			

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
single_datum to derived_geometry (as is_defined_-by)	IDENTICAL MAPPING			datum <= shape_aspect => derived_shape_aspect
single_datum to shape_element (as is_defined_-by)	PATH			datum <= shape_aspect <- shape_aspect_relationship.related_shape_aspect shape_aspect_relationship shape_aspect_relationship.relating_shape_aspect -> shape_aspect {shape_aspect => datum_feature}
single_datum to tolerance_-condition (as modification)	referenced_modified_-datum.modifier	47		datum <- datum_reference.referenced_datum datum_reference datum_reference => referenced_modified_datum referenced_modified_datum.modifier
STRAIGHTNESS_-TOLERANCE	straightness_tolerance	519		straightness_tolerance <= geometric_tolerance
straightness_-tolerance to reference_plane (as affected_-plane)	PATH			straightness_tolerance <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect -> shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect -> shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation
SURFACE_PROFILE_-TOLERANCE	surface_profile_-tolerance	519		surface_profile_tolerance <= geometric_tolerance
surface_profile_-tolerance to datum (as reference_-datum)	PATH			surface_profile_tolerance <= geometric_tolerance => geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] ->datum_reference
SYMMETRY_-TOLERANCE	symmetry_tolerance	519		symmetry_tolerance <= geometric_tolerance_with_datum_reference
symmetry_-tolerance to reference_plane (as affected_-plane)	PATH			symmetry_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance geometric_tolerance.toleranced_shape_aspect ->shape_aspect <- shape_aspect_relationship.relating_shape_aspect shape_aspect_relationship {shape_aspect_relationship.name = 'affected plane association'} shape_aspect_relationship.related_shape_aspect ->shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition property_definition_representation property_definition_representation.used_representation ->representation

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
symmetry_- tolerance to datum (as reference_- datum)	PATH			symmetry_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] ->> datum_reference
TARGET_AREA	datum_target	47		
target_area to shape_element (as is_defined_- by)	IDENTICAL MAPPING			
TARGET_CIRCLE	placed_datum_target_- feature	214		placed_datum_target_feature <= datum_target {datum_target <= shape_aspect shape_aspect.description = 'circle'}
diameter	measure_representation_- item	45	30	placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.items[i] ->

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				representation_item => {representation_item.name = 'target diameter'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}
TARGET_LINE	placed_datum_target_feature	214		placed_datum_target_feature <= datum_target {datum_target <= shape_aspect shape_aspect.description = 'line'}
target_length	measure_representation_item	45	30	placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.items[i] -> representation_item => {representation_item.name = 'target length'} measure_representation_item {measure_representation_item <=

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				measure_with_unit => length_measure_with_unit}
TARGET_POINT	placed_datum_target_-feature	214		placed_datum_target_feature <= datum_target {datum_target <= shape_aspect shape_aspect.description = 'point'}
TARGET_RECTANGLE	placed_datum_target_feature	214		placed_datum_target_feature <= datum_target {datum_target <= shape_aspect shape_aspect.description = 'rectangle'}
target_length	measure_representation_-item	45	30	placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.items[1] -> representation_item => {representation_item.name = 'target_length'} measure_representation_item

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
				{measure_representation_item <= measure_with_unit => length_measure_with_unit}
target_width	measure_representation_item	45	30	placed_datum_target_feature <= datum_target <= shape_aspect shape_definition = shape_aspect shape_definition characterized_definition = shape_definition characterized_definition <- property_definition.definition property_definition represented_definition = property_definition represented_definition <- property_definition_representation.definition {property_definition_representation => shape_definition_representation} property_definition_representation property_definition_representation.used_representation -> {representation => shape_representation => shape_representation_with_parameters} representation representation.items[i] -> representation_item => {representation_item.name = 'target width'} measure_representation_item {measure_representation_item <= measure_with_unit => length_measure_with_unit}

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Table 32 – Mapping table geometric_tolerance UoF (T2) (continued)

Application element	AIM element	Source	Rules	Reference path
TOLERANCE_- CONDITION #1: If the tolerance_- condition is referenced by a geometric_tolerance. #2: If the tolerance_- condition is referenced by a single_datum.	#1: (modified_- geometric_tolerance. modifier) #2: (referenced_- modified_datum. modifier)	47 47		
condition	limit_condition	47		{#1: (modified_geometric_tolerance.modifier ->) #2: (referenced_modified_datum.modifier ->) limit_condition}
TOLERANCE_ZONE	tolerance_zone	47		
form_type	tolerance_zone_form. name	47		tolerance_zone tolerance_zone.form ->> tolerance_zone_form tolerance_zone_form.name
tolerance_zone to geometric_- tolerance (as is_zone_for)	PATH			tolerance_zone tolerance_zone.defining_tolerance[i] ->> geometric_tolerance
TOLERANCE_ZONE_- DEFINITION	tolerance_zone_- definition	47		{(tolerance_zone_definition) (tolerance_zone_definition => runout_zone_definition)}
tolerance_zone_- definition to shape_element (as first_- element)	PATH			tolerance_zone_definition tolerance_zone_definition.boundaries[i] ->> shape_aspect
tolerance_zone_- definition to tolerance_zone (as is_defining)	PATH			tolerance_zone_definition tolerance_zone_definition.zone ->> tolerance_zone

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Table 32 – Mapping table geometric_tolerance UoF (T2) (concluded)

Application element	AIM element	Source	Rules	Reference path
tolerance_zone_- definition to shape_element (as second_- element)	PATH		210	tolerance_zone_definition tolerance_zone_definition.boundaries[i] ->) shape_aspect
TOTAL_RUNOUT_- TOLERANCE	total_runout_tolerance	519		total_runout_tolerance <= geometric_tolerance_with_datum_reference
angle	[measure_with_unit. value_component] [measure_with_unit. unit_component]	41 41	30	total_runout_tolerance <= geometric_tolerance_with_datum_reference <= geometric_tolerance <- tolerance_zone.defining_tolerance[i] tolerance_zone <- tolerance_zone_definition.zone tolerance_zone_definition => runout_zone_definition runout_zone_definition.orientation ->) runout_zone_orientation runout_zone_orientation.angle ->) measure_with_unit [measure_with_unit.value_component] [measure_with_unit.unit_component]
total_runout_- tolerance to datum (as reference_- datum)	PATH			total_runout_tolerance <= geometric_tolerance_with_datum_reference geometric_tolerance_with_datum_reference.datum_system[i] ->) datum_reference

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The following rules are referenced in the preceding table:

1 application_protocol_definition_required

2 approval_person_organization_requires_date_time

3 approval_requires_approval_assignment

4 complex_product_requires_product_definition

5 compound_features_of_equal_type

6 consistent_uncertainty

7 coordinated_assembly_and_shape

8 curve_font_usage

9 dependent_instantiable_action_directive

10 dependent_instantiable_action_resource_type

11 dependent_instantiable_approval_role

12 dependent_instantiable_attribute_value_role

13 dependent_instantiable_classification_role

14 dependent_instantiable_colour_rgb

15 dependent_instantiable_contract_type

16 dependent_instantiable_curve_style

17 dependent_instantiable_date

18 dependent_instantiable_date_and_time

19 dependent_instantiable_date_role

20 dependent_instantiable_date_time_role

21 dependent_instantiable_derived_unit

22 dependent_instantiable_dimensional_size

23 dependent_instantiable_document_usage_role

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24 dependent_instantiable_effectivity_context_role

25 dependent_instantiable_event_occurrence_role

26 dependent_instantiable_externally_defined_symbol

27 dependent_instantiable_fill_area_style

28 dependent_instantiable_fill_area_style_colour

29 dependent_instantiable_identification_role

30 dependent_instantiable_measure_with_unit

31 dependent_instantiable_named_unit

32 dependent_instantiable_object_role

33 dependent_instantiable_organization_role

34 dependent_instantiable_organizational_project_role

35 dependent_instantiable_person_and_organization_role

36 dependent_instantiable_pre_defined_colour

37 dependent_instantiable_pre_defined_symbol

38 dependent_instantiable_precision_qualifier

39 dependent_instantiable_presentation_style_by_context

40 dependent_instantiable_product_definition_context_role

41 dependent_instantiable_resource_requirement_type

42 dependent_instantiable_retention

43 dependent_instantiable_standard_uncertainty

44 dependent_instantiable_symbol_colour

45 dependent_instantiable_text_style

46 dependent_instantiable_text_style_for_defined_font

47 dependent_instantiable_time_interval_role

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48 dependent_instantiable_tolerance_value

49 dependent_instantiable_type_qualifier

50 dependent_instantiable_uncertainty_qualifier

51 design_constraint_requires_product_definition

52 dimensionality_is_two_or_three

53 draughting_subfigure_representation_layers

54 drawing_sheet_annotation_layers

55 drawing_sheet_layout_usage

56 drawing_view_annotation_layers

57 event_occurrence_requires_event_occurrence_assignment

58 executed_action_requires_action_status

59 externally_defined_class_with_known_source_requirement

60 fill_area_style_tile_symbol_constraint

61 full_model_change_completeness_for_action_property

62 full_model_change_completeness_for_property_definition

63 global_length_and_angle_units_2d_or_3d

64 person_requires_person_and_organization

65 physical_instance_requires_product_definition

66 plib_class_reference_requires_version

67 plib_property_reference_requires_name_scope

68 plib_property_reference_requires_version

69 presentation_layer_assignment_constraint_2d_or_3d

70 presentation_view_presented_once

71 product_concept_feature_requires_category

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72 product_definition_replacement_requires_effectivity_assignment

73 product_requires_category

74 product_requires_person_organization

75 product_requires_version

76 restrict_action_resource_requirement_for_process_operation

77 restrict_alternative_definition

78 restrict_applied_action_assignment

79 restrict_applied_action_request_assignment

80 restrict_applied_classification_assignment_role

81 restrict_applied_event_occurrence_assignment

82 restrict_applied_organizational_project_assignment

83 restrict_approval

84 restrict_camera_image_in_view

85 restrict_centre_of_mass_representation

86 restrict_class_system_assignment_for_approval_status

87 restrict_class_system_assignment_for_class

88 restrict_class_system_assignment_for_descriptive_representation_item

89 restrict_class_system_assignment_for_document_type

90 restrict_class_system_assignment_for_planar_extent

91 restrict_class_system_assignment_for_security_classification_level

92 restrict_concept_feature_operator

93 restrict_configuration_design_for_product_class

94 restrict_default_settings

95 restrict_default_thickness

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96 restrict_drawing

97 restrict_effectivity_assignment_for_class_category_usage

98 restrict_effectivity_for_effectivity_relationship

99 restrict_effectivity_usage

100 restrict_externally_defined_item_relationship

101 restrict_general_property_association_for_externally_defined_general_property

102 restrict_group_relationship_for_general_classification_hierarchy

103 restrict_group_relationship_for_specification_category

104 restrict_multi_language_for_action

105 restrict_multi_language_for_action_directive

106 restrict_multi_language_for_action_method

107 restrict_multi_language_for_action_property

108 restrict_multi_language_for_action_relationship

109 restrict_multi_language_for_alternate_product_relationship

110 restrict_multi_language_for_application_context

111 restrict_multi_language_for_approval_relationship

112 restrict_multi_language_for_assembly_component_usage_substitute

113 restrict_multi_language_for_certification

114 restrict_multi_language_for_configuration_design

115 restrict_multi_language_for_configuration_item

116 restrict_multi_language_for_contract

117 restrict_multi_language_for_data_environment

118 restrict_multi_language_for_date_role

119 restrict_multi_language_for_date_time_role

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120 restrict_multi_language_for_descriptive_representation_item

121 restrict_multi_language_for_document_relationship

122 restrict_multi_language_for_draughting_title

123 restrict_multi_language_for_effectivity

124 restrict_multi_language_for_effectivity_relationship

125 restrict_multi_language_for_event_occurrence

126 restrict_multi_language_for_external_source

127 restrict_multi_language_for_general_property

128 restrict_multi_language_for_general_property_relationship

129 restrict_multi_language_for_geometric_representation_item

130 restrict_multi_language_for_geometric_tolerance

131 restrict_multi_language_for_group

132 restrict_multi_language_for_group_relationship

133 restrict_multi_language_for_identification_role

134 restrict_multi_language_for_kinematic_pair

135 restrict_multi_language_for_mapped_item

136 restrict_multi_language_for_name_assignment

137 restrict_multi_language_for_organization_relationship

138 restrict_multi_language_for_organization_role

139 restrict_multi_language_for_organizational_project

140 restrict_multi_language_for_organizational_project_relationship

141 restrict_multi_language_for_pair_actuator

142 restrict_multi_language_for_person_and_organization_role

143 restrict_multi_language_for_presentation_layer_assignment

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144 restrict_multi_language_for_process_product_association

145 restrict_multi_language_for_product

146 restrict_multi_language_for_product_concept

147 restrict_multi_language_for_product_concept_feature

148 restrict_multi_language_for_product_concept_feature_association

149 restrict_multi_language_for_product_concept_relationship

150 restrict_multi_language_for_product_definition

151 restrict_multi_language_for_product_definition_formation

152 restrict_multi_language_for_product_definition_formation_relationship

153 restrict_multi_language_for_product_definition_relationship

154 restrict_multi_language_for_product_definition_substitute

155 restrict_multi_language_for_product_related_product_category

156 restrict_multi_language_for_property_definition

157 restrict_multi_language_for_property_definition_relationship

158 restrict_multi_language_for_representation

159 restrict_multi_language_for_representation_relationship

160 restrict_multi_language_for_requirement_for_action_resource

161 restrict_multi_language_for_resource_property

162 restrict_multi_language_for_resource_requirement_type

163 restrict_multi_language_for_security_classification

164 restrict_multi_language_for_shape_aspect

165 restrict_multi_language_for_shape_aspect_relationship

166 restrict_multi_language_for_styled_item

167 restrict_multi_language_for_time_interval_role

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168 restrict_multi_language_for_topological_representation_item

169 restrict_multi_language_for_uncertainty_measure_with_unit

170 restrict_multi_language_for_uncertainty_qualifier

171 restrict_multi_language_for_versioned_action_request

172 restrict_name_assignment_for_kinematic_joint

173 restrict_name_assignment_for_kinematic_link

174 restrict_name_assignment_for_kinematic_structure

175 restrict_name_for_known_source

176 restrict_part_occurrence

177 restrict_process_product_association

178 restrict_product_categories_for_tool_part_relationship

179 restrict_product_category_for_product

180 restrict_product_definition_context_for_external_properties

181 restrict_product_definition_context_for_product

182 restrict_product_definition_for_mating_tree

183 restrict_product_definition_substitute

184 restrict_product_definitions_for_product_definition_relationship

185 restrict_properties_of_document_file

186 restrict_properties_of_document_representation

187 restrict_representation_for_document_content_property

188 restrict_representation_for_document_creation_property

189 restrict_representation_for_document_format_property

190 restrict_representation_for_document_properties

191 restrict_representation_for_document_size_property

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192 restrict_representation_item_for_hybrid_geometric_model_3d

193 restrict_treatment_result

194 restrict_version_assignment_for_action

195 restrict_version_assignment_for_action_directive

196 restrict_version_assignment_for_action_method

197 restrict_version_assignment_for_applied_identification_assignment

198 restrict_version_assignment_for_class

199 restrict_version_assignment_for_configuration_item

200 restrict_version_assignment_for_document_file

201 restrict_version_assignment_for_draughting_model

202 restrict_version_assignment_for_effectivity

203 restrict_version_assignment_for_general_property

204 restrict_version_assignment_for_m_d_g_p_r

205 restrict_version_assignment_for_presentation_area

206 restrict_version_assignment_for_product_concept

207 restrict_version_assignment_for_product_concept_feature

208 restrict_version_assignment_for_shape_representation

209 restrict_viewing_plane_usage

210 restrict_zone_boundary

211 retention_requires_retention_assignment

212 security_classification_requires_security_classification_assignment

213 selected_instance_usage_requires_representation

214 sheets_belong_to_one_drawing

215 styled_curve

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216 subtype_exclusiveness_action

217 subtype_exclusiveness_characterized_object

218 subtype_exclusiveness_classification_assignment

219 subtype_exclusiveness_colour

220 subtype_exclusiveness_compound_representation_item

221 subtype_exclusiveness_document_reference

222 subtype_exclusiveness_effectivity

223 subtype_exclusiveness_effectivity_assignment

224 subtype_exclusiveness_effectivity_context_assignment

225 subtype_exclusiveness_externally_defined_item

226 subtype_exclusiveness_feature_component_relationship

227 subtype_exclusiveness_feature_definition

228 subtype_exclusiveness_founded_item

229 subtype_exclusiveness_geometric_tolerance

230 subtype_exclusiveness_group

231 subtype_exclusiveness_group_assignment

232 subtype_exclusiveness_identification_assignment

233 subtype_exclusiveness_mapped_item

234 subtype_exclusiveness_pre_defined_item

235 subtype_exclusiveness_pre_defined_symbol

236 subtype_exclusiveness_presentation_area

237 subtype_exclusiveness_presentation_representation

238 subtype_exclusiveness_property_definition

239 subtype_exclusiveness_property_definition_representation

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240 subtype_exclusiveness_replicate_feature

241 subtype_exclusiveness_representation

242 subtype_exclusiveness_representation_item

243 subtype_exclusiveness_representation_map

244 subtype_exclusiveness_representation_relationship

245 subtype_exclusiveness_representation_relationship_with_transformation

246 subtype_exclusiveness_shape_aspect

247 subtype_exclusiveness_shape_aspect_relationship

248 subtype_exclusiveness_shape_representation_feature_geometry

249 subtype_exclusiveness_shape_representation_geometry

250 subtype_exclusiveness_symbol_representation

251 subtype_exclusiveness_transition_feature

252 subtype_mandatory_address

253 subtype_mandatory_annotation_occurrence

254 subtype_mandatory_camera_image

255 subtype_mandatory_camera_model

256 subtype_mandatory_colour_specification

257 subtype_mandatory_configurable_item

258 subtype_mandatory_document_product_association

259 subtype_mandatory_draughting_callout

260 subtype_mandatory_externally_defined_item

261 subtype_mandatory_founded_item

262 subtype_mandatory_geometric_tolerance

263 subtype_mandatory_pre_defined_colour

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264 subtype_mandatory_pre_defined_curve_font

265 subtype_mandatory_pre_defined_item

266 subtype_mandatory_pre_defined_symbol

267 subtype_mandatory_pre_defined_text_font

268 terminator_symbol_constraint

269 text_font_usage

270 versioned_action_request_requires_date_and_person_or_organization

271 versioned_action_request_requires_status

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5.2 AIM EXPRESS short listing

This clause specifies the EXPRESS schema that uses elements from the integrated resources (and the AICs) and contains the types, entity specializations, rules, and functions that are specific to this part of ISO 10303. This clause also specifies modifications to the text for constructs that are imported from the integrated resources (and the AICs). The definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes that are not imported into the AIM. Requirements stated in the integrated resources that refer to such items and subtypes apply exclusively to those items that are imported into the AIM.

NOTE - The following conventions apply for the definition text:

— Terms written in boldface refer to the AIM objects, i.e., '**circle**' refers to the entity as defined in ISO 10303-42;

— Terms written in normal face refer to the concept, i.e., 'circle' refers to the concept of a round plane figure whose circumference is everywhere equidistant from its centre.

EXPRESS specification:

```
*)
SCHEMA automotive_design;
USE FROM ISO13584_expressions_schema  -- ISO 13584-20
  (abs_function,
   acos_function,
   and_expression,
   asin_function,
   atan_function,
   binary_boolean_expression,
   binary_function_call,
   binary_numeric_expression,
   boolean_expression,
   boolean_literal,
   boolean_variable,
   comparison_equal,
   comparison_expression,
   comparison_greater,
   comparison_greater_equal,
   comparison_less,
   comparison_less_equal,
   comparison_not_equal,
   concat_expression,
   cos_function,
   div_expression,
   equals_expression,
   exp_function,
   expression,
   format_function,
   index_expression,
```

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```
   int_literal,
   int_numeric_variable,
   int_value_function,
   interval_expression,
   length_function,
   like_expression,
   literal_number,
   log10_function,
   log2_function,
   log_function,
   maximum_function,
   minimum_function,
   minus_expression,
   minus_function,
   mod_expression,
   mult_expression,
   multiple_arity_boolean_expression,
   multiple_arity_function_call,
   multiple_arity_numeric_expression,
   not_expression,
   numeric_expression,
   numeric_variable,
   odd_function,
   or_expression,
   plus_expression,
   power_expression,
   real_literal,
   real_numeric_variable,
   simple_boolean_expression,
   simple_numeric_expression,
   simple_string_expression,
   sin_function,
   slash_expression,
   square_root_function,
   string_expression,
   string_literal,
   string_variable,
   substring_expression,
   tan_function,
   unary_boolean_expression,
   unary_function_call,
   unary_numeric_expression,
   value_function,
   variable,
   xor_expression);


REFERENCE FROM ISO13584_expressions_schema   -- ISO 13584-20
 (is_SQL_mappable,
  is_int_expr,
  used_functions);
```

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```
USE FROM action_schema   -- ISO 10303-41
  (action,
   action_directive,
   action_method,
   action_method_relationship,
   action_relationship,
   action_request_solution,
   action_request_status,
   action_resource,
   action_resource_type,
   action_status,
   directed_action,
   executed_action,
   versioned_action_request);

USE FROM application_context_schema   -- ISO 10303-41
  (application_context,
   application_context_element,
   application_context_relationship,
   application_protocol_definition,
   product_definition_context);

USE FROM approval_schema   -- ISO 10303-41
  (approval,
   approval_date_time,
   approval_person_organization,
   approval_relationship,
   approval_role,
   approval_status);

USE FROM basic_attribute_schema   -- ISO 10303-41
  (description_attribute,
   description_attribute_select,
   id_attribute,
   id_attribute_select,
   name_attribute,
   name_attribute_select,
   object_role,
   role_association,
   role_select);

USE FROM certification_schema   -- ISO 10303-41
  (certification,
   certification_type);

USE FROM configuration_management_schema   -- ISO 10303-44
  (configurable_item,
   configuration_design,
   configuration_effectivity,
   configuration_item);

USE FROM contract_schema   -- ISO 10303-41
```

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```
  (contract,
   contract_type);

USE FROM date_time_schema   -- ISO 10303-41
  (calendar_date,
   date,
   date_and_time,
   date_role,
   date_time_role,
   event_occurrence,
   event_occurrence_context_role,
   event_occurrence_role,
   local_time,
   relative_event_occurrence,
   time_interval,
   time_interval_role,
   time_interval_with_bounds);

USE FROM document_schema   -- ISO 10303-41
  (document,
   document_product_association,
   document_relationship,
   document_representation_type,
   document_type,
   document_usage_constraint);

USE FROM draughting_element_schema   -- ISO 10303-101
  (dimension_curve,
   dimension_curve_directed_callout,
   dimension_curve_terminator,
   draughting_callout,
   draughting_callout_relationship,
   leader_curve,
   leader_directed_callout,
   leader_terminator,
   projection_curve,
   projection_directed_callout,
   terminator_symbol);

USE FROM drawing_definition_schema   -- ISO 10303-101
  (draughting_title,
   drawing_definition,
   drawing_revision,
   drawing_revision_sequence,
   drawing_sheet_revision,
   drawing_sheet_revision_usage);

USE FROM effectivity_schema   -- ISO 10303-41
  (dated_effectivity,
   effectivity,
   effectivity_relationship,
   lot_effectivity,
```

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```
    serial_numbered_effectivity,
    time_interval_based_effectivity);

USE FROM external_reference_schema   -- ISO 10303-41
  (external_source,
    externally_defined_item,
    externally_defined_item_relationship,
    pre_defined_item);

USE FROM geometric_model_schema   -- ISO 10303-42
  (block,
    boolean_result,
    brep_with_voids,
    csg_solid,
    edge_based_wireframe_model,
    extruded_face_solid,
    face_based_surface_model,
    faceted_brep,
    geometric_curve_set,
    geometric_set,
    half_space_solid,
    manifold_solid_brep,
    revolved_face_solid,
    right_angular_wedge,
    right_circular_cone,
    right_circular_cylinder,
    shell_based_surface_model,
    solid_model,
    solid_replica,
    sphere,
    swept_face_solid,
    torus);

USE FROM geometry_schema   -- ISO 10303-42
  (axis1_placement,
    axis2_placement_2d,
    axis2_placement_3d,
    b_spline_curve,
    b_spline_surface,
    bounded_curve,
    bounded_surface,
    cartesian_point,
    cartesian_transformation_operator,
    cartesian_transformation_operator_2d,
    cartesian_transformation_operator_3d,
    circle,
    composite_curve,
    conic,
    conical_surface,
    curve,
    curve_bounded_surface,
    cylindrical_surface,
```

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```
    degenerate_pcurve,
    degenerate_toroidal_surface,
    direction,
    elementary_surface,
    ellipse,
    geometric_representation_context,
    geometric_representation_item,
    hyperbola,
    line,
    offset_curve_2d,
    offset_curve_3d,
    offset_surface,
    oriented_surface,
    parabola,
    pcurve,
    placement,
    plane,
    point,
    point_on_curve,
    point_on_surface,
    point_replica,
    polyline,
    rectangular_composite_surface,
    rectangular_trimmed_surface,
    spherical_surface,
    surface,
    surface_curve,
    surface_of_linear_extrusion,
    surface_of_revolution,
    toroidal_surface,
    trimmed_curve);

USE FROM group_schema  -- ISO 10303-41
  (group,
   group_relationship);

USE FROM kinematic_analysis_control_and_result_schema   -- ISO 10303-105
  (configuration_definition,
   configuration_interpolation,
   interpolated_configuration_sequence,
   kinematic_analysis_consistency,
   kinematic_analysis_result,
   kinematic_control,
   resulting_path);

USE FROM kinematic_structure_schema   -- ISO 10303-105
  (cylindrical_pair,
   cylindrical_pair_range,
   cylindrical_pair_value,
   fully_constrained_pair,
   gear_pair,
   gear_pair_range,
```

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```
gear_pair_value,
initial_state,
kinematic_ground_representation,
kinematic_joint,
kinematic_link,
kinematic_link_representation,
kinematic_link_representation_association,
kinematic_link_representation_relation,
kinematic_pair,
kinematic_property_definition,
kinematic_property_representation_relation,
kinematic_structure,
mechanism,
mechanism_base_placement,
pair_actuator,
pair_value,
planar_curve_pair,
planar_curve_pair_range,
planar_pair,
planar_pair_range,
planar_pair_value,
point_on_planar_curve_pair,
point_on_planar_curve_pair_range,
point_on_planar_curve_pair_value,
point_on_surface_pair,
point_on_surface_pair_range,
point_on_surface_pair_value,
prismatic_pair,
prismatic_pair_range,
prismatic_pair_value,
rack_and_pinion_pair,
rack_and_pinion_pair_range,
rack_and_pinion_pair_value,
revolute_pair,
revolute_pair_range,
revolute_pair_value,
rolling_curve_pair,
rolling_curve_pair_value,
rolling_surface_pair,
rolling_surface_pair_value,
screw_pair,
screw_pair_range,
screw_pair_value,
simple_pair_range,
sliding_curve_pair,
sliding_curve_pair_value,
sliding_surface_pair,
sliding_surface_pair_value,
spherical_pair,
spherical_pair_range,
spherical_pair_value,
surface_pair,
```

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```
    surface_pair_range,
    unconstrained_pair,
    unconstrained_pair_value,
    universal_pair,
    universal_pair_range,
    universal_pair_value,
    unlimited_range);

USE FROM management_resources_schema   -- ISO 10303-41
  (action_assignment,
    action_request_assignment,
    approval_assignment,
    attribute_classification_assignment,
    attribute_value_assignment,
    attribute_value_role,
    certification_assignment,
    classification_assignment,
    classification_role,
    contract_assignment,
    date_and_time_assignment,
    date_assignment,
    document_reference,
    document_usage_constraint_assignment,
    document_usage_role,
    effectivity_assignment,
    effectivity_context_assignment,
    effectivity_context_role,
    event_occurrence_assignment,
    event_occurrence_context_assignment,
    external_identification_assignment,
    group_assignment,
    identification_assignment,
    identification_role,
    name_assignment,
    organization_assignment,
    organizational_project_assignment,
    organizational_project_role,
    person_and_organization_assignment,
    security_classification_assignment,
    time_interval_assignment);

USE FROM material_property_definition_schema   -- ISO 10303-45
  (material_designation,
    material_designation_characterization,
    material_property,
    property_definition_relationship);

USE FROM material_property_representation_schema   -- ISO 10303-45
  (data_environment,
    material_property_representation);

USE FROM measure_schema   -- ISO 10303-41
```

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```
(amount_of_substance_measure,
 amount_of_substance_measure_with_unit,
 amount_of_substance_unit,
 area_measure,
 area_measure_with_unit,
 area_unit,
 celsius_temperature_measure,
 celsius_temperature_measure_with_unit,
 context_dependent_measure,
 context_dependent_unit,
 conversion_based_unit,
 count_measure,
 derived_unit,
 descriptive_measure,
 electric_current_measure,
 electric_current_measure_with_unit,
 electric_current_unit,
 global_unit_assigned_context,
 length_measure,
 length_measure_with_unit,
 length_unit,
 luminous_intensity_measure,
 luminous_intensity_measure_with_unit,
 luminous_intensity_unit,
 mass_measure,
 mass_measure_with_unit,
 mass_unit,
 measure_with_unit,
 named_unit,
 numeric_measure,
 parameter_value,
 plane_angle_measure,
 plane_angle_measure_with_unit,
 plane_angle_unit,
 positive_length_measure,
 positive_plane_angle_measure,
 positive_ratio_measure,
 ratio_measure,
 ratio_measure_with_unit,
 ratio_unit,
 si_unit,
 solid_angle_measure,
 solid_angle_measure_with_unit,
 solid_angle_unit,
 thermodynamic_temperature_measure,
 thermodynamic_temperature_measure_with_unit,
 thermodynamic_temperature_unit,
 time_measure,
 time_measure_with_unit,
 time_unit,
 volume_measure,
 volume_measure_with_unit,
```

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```
   volume_unit);

USE FROM person_organization_schema   -- ISO 10303-41
  (address,
   organization,
   organization_relationship,
   organization_role,
   organizational_address,
   organizational_project,
   organizational_project_relationship,
   person,
   person_and_organization,
   person_and_organization_role,
   personal_address);

USE FROM presentation_appearance_schema   -- ISO 10303-46
  (approximation_tolerance,
   approximation_tolerance_deviation,
   approximation_tolerance_parameter,
   context_dependent_over_riding_styled_item,
   curve_style,
   curve_style_font,
   curve_style_rendering,
   curve_tolerance_deviation,
   curve_tolerance_parameter,
   externally_defined_curve_font,
   externally_defined_hatch_style,
   externally_defined_style,
   externally_defined_tile_style,
   fill_area_style,
   fill_area_style_colour,
   fill_area_style_hatching,
   fill_area_style_tiles,
   invisibility,
   null_style,
   over_riding_styled_item,
   point_style,
   pre_defined_curve_font,
   pre_defined_marker,
   pre_defined_presentation_style,
   presentation_style_assignment,
   presentation_style_by_context,
   styled_item,
   surface_side_style,
   surface_style_boundary,
   surface_style_control_grid,
   surface_style_fill_area,
   surface_style_parameter_line,
   surface_style_reflectance_ambient,
   surface_style_reflectance_ambient_diffuse,
   surface_style_reflectance_ambient_diffuse_specular,
   surface_style_rendering,
```

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```
    surface_style_rendering_with_properties,
    surface_style_segmentation_curve,
    surface_style_silhouette,
    surface_style_transparent,
    surface_style_usage,
    symbol_style,
    text_style,
    text_style_with_box_characteristics,
    text_style_with_mirror,
    surface_tolerance_deviation,
    surface_tolerance_parameter,
    u_direction_count,
    v_direction_count);

USE FROM presentation_definition_schema   -- ISO 10303-46
  (annotation_curve_occurrence,
    annotation_fill_area,
    annotation_fill_area_occurrence,
    annotation_occurrence,
    annotation_occurrence_relationship,
    annotation_symbol,
    annotation_symbol_occurrence,
    annotation_text,
    annotation_text_character,
    annotation_text_occurrence,
    composite_text,
    composite_text_with_associated_curves,
    composite_text_with_blanking_box,
    composite_text_with_extent,
    defined_character_glyph,
    defined_symbol,
    externally_defined_character_glyph,
    externally_defined_symbol,
    pre_defined_symbol,
    symbol_representation,
    symbol_representation_map,
    text_literal,
    text_literal_with_associated_curves,
    text_literal_with_blanking_box,
    text_literal_with_delineation,
    text_literal_with_extent,
    text_string_representation);

USE FROM presentation_organization_schema   -- ISO 10303-46
  (area_in_set,
    camera_image,
    camera_model,
    camera_model_d2,
    camera_model_d3,
    camera_model_d3_with_hlhsr,
    camera_usage,
    light_source,
```

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```
    light_source_ambient,
    light_source_directional,
    light_source_positional,
    light_source_spot,
    presentation_area,
    presentation_layer_assignment,
    presentation_representation,
    presentation_set,
    presentation_size,
    presentation_view,
    presented_item,
    presented_item_representation,
    view_volume);

USE FROM presentation_resource_schema   -- ISO 10303-46
  (character_glyph_symbol,
    colour,
    colour_rgb,
    colour_specification,
    externally_defined_text_font,
    planar_box,
    planar_extent,
    pre_defined_colour,
    pre_defined_text_font);

USE FROM process_property_representation_schema   -- ISO 10303-49
  (action_property_representation,
    resource_property_representation);

USE FROM process_property_schema   -- ISO 10303-49
  (action_property,
    action_resource_requirement,
    process_product_association,
    process_property_association,
    product_definition_process,
    property_process,
    requirement_for_action_resource,
    resource_property,
    resource_requirement_type);

USE FROM product_concept_schema   -- ISO 10303-44
  (concept_feature_operator,
    concept_feature_relationship,
    concept_feature_relationship_with_condition,
    conditional_concept_feature,
    product_concept,
    product_concept_feature,
    product_concept_feature_association,
    product_concept_relationship);

USE FROM product_definition_schema   -- ISO 10303-41
  (product,
```

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```
    product_category,
    product_category_relationship,
    product_definition,
    product_definition_context_association,
    product_definition_context_role,
    product_definition_effectivity,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_formation_with_specified_source,
    product_definition_relationship,
    product_definition_substitute,
    product_definition_with_associated_documents,
    product_related_product_category);

USE FROM product_property_definition_schema   -- ISO 10303-41
  (characterized_object,
    general_property,
    general_property_association,
    general_property_relationship,
    product_definition_shape,
    property_definition,
    shape_aspect,
    shape_aspect_relationship);

REFERENCE FROM product_property_definition_schema   -- ISO 10303-41
  (get_shape_aspects);

USE FROM product_property_representation_schema   -- ISO 10303-41
  (context_dependent_shape_representation,
    property_definition_representation,
    shape_definition_representation,
    shape_representation,
    shape_representation_relationship);

REFERENCE FROM product_property_representation_schema   -- ISO 10303-41
  (get_property_definition_representations);

USE FROM product_structure_schema   -- ISO 10303-44
  (alternate_product_relationship,
    assembly_component_usage,
    assembly_component_usage_substitute,
    make_from_usage_option,
    next_assembly_usage_occurrence,
    product_definition_occurrence_relationship,
    product_definition_usage,
    promissory_usage_occurrence,
    quantified_assembly_component_usage,
    specified_higher_usage_occurrence);

USE FROM qualified_measure_schema   -- ISO 10303-45
  (descriptive_representation_item,
    measure_qualification,
```

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```
   measure_representation_item,
   precision_qualifier,
   qualified_representation_item,
   standard_uncertainty,
   type_qualifier,
   uncertainty_qualifier);

USE FROM representation_schema   -- ISO 10303-43
  (compound_representation_item,
   founded_item,
   functionally_defined_transformation,
   global_uncertainty_assigned_context,
   item_defined_transformation,
   list_representation_item,
   mapped_item,
   representation,
   representation_context,
   representation_item,
   representation_map,
   representation_relationship,
   representation_relationship_with_transformation,
   set_representation_item,
   uncertainty_assigned_representation,
   uncertainty_measure_with_unit,
   value_representation_item);

REFERENCE FROM representation_schema   -- ISO 10303-43
  (using_representations);

USE FROM security_classification_schema   -- ISO 10303-41
  (security_classification,
   security_classification_level);

USE FROM shape_aspect_definition_schema   -- ISO 10303-47
  (apex,
   centre_of_symmetry,
   composite_shape_aspect,
   datum,
   datum_feature,
   datum_reference,
   datum_target,
   derived_shape_aspect,
   extension,
   geometric_alignment,
   geometric_intersection,
   limit_condition,
   parallel_offset,
   perpendicular_to,
   referenced_modified_datum,
   shape_aspect_deriving_relationship,
   tangent);
```

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```
USE FROM shape_dimension_schema   -- ISO 10303-47
  (angular_location,
   angular_size,
   dimensional_characteristic_representation,
   dimensional_location,
   dimensional_location_with_path,
   dimensional_size,
   dimensional_size_with_path,
   shape_dimension_representation);

USE FROM shape_tolerance_schema   -- ISO 10303-47
  (geometric_tolerance,
   geometric_tolerance_relationship,
   geometric_tolerance_with_datum_reference,
   geometric_tolerance_with_defined_unit,
   limits_and_fits,
   modified_geometric_tolerance,
   plus_minus_tolerance,
   projected_zone_definition,
   runout_zone_definition,
   runout_zone_orientation,
   tolerance_value,
   tolerance_zone,
   tolerance_zone_definition,
   tolerance_zone_form);

USE FROM support_resource_schema   -- ISO 10303-41
  (label,
   identifier);

REFERENCE FROM support_resource_schema   -- ISO 10303-41
  (bag_to_set,
   type_check_function);

USE FROM topology_schema   -- ISO 10303-42
  (closed_shell,
   connected_edge_set,
   connected_face_set,
   connected_face_sub_set,
   edge,
   edge_curve,
   edge_loop,
   face,
   face_bound,
   face_outer_bound,
   face_surface,
   loop,
   open_shell,
   oriented_closed_shell,
   oriented_edge,
   oriented_face,
   path,
```

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```
   poly_loop,
   seam_edge,
   subedge,
   subface,
   topological_representation_item,
   vertex,
   vertex_loop,
   vertex_point);

USE FROM ISO13584_generic_expressions_schema;   -- ISO 13584-20

USE FROM aic_advanced_brep;   -- ISO 10303-514

USE FROM aic_associative_draughting_elements;   -- ISO 10303-520

USE FROM aic_csg;   -- ISO 10303-515

USE FROM aic_draughting_annotation;   -- ISO 10303-504

USE FROM aic_draughting_elements;   -- ISO 10303-506

USE FROM aic_edge_based_wireframe;   -- ISO 10303-501

USE FROM aic_faceted_brep;   -- ISO 10303-512

USE FROM aic_geometric_tolerances;   -- ISO 10303-519

USE FROM aic_geometrically_bounded_2d_wireframe;   -- ISO 10303-503

USE FROM aic_geometrically_bounded_surface;   -- ISO 10303-507

USE FROM aic_geometrically_bounded_wireframe;   -- ISO 10303-510

USE FROM aic_manifold_surface;   -- ISO 10303-509

USE FROM aic_mechanical_design_geometric_presentation;   -- ISO 10303-517

USE FROM aic_non_manifold_surface;   -- ISO 10303-508

USE FROM aic_topologically_bounded_surface;   -- ISO 10303-511

(*
```

NOTE 1 - The schemas referenced above can be found in the following parts of ISO 10303:

ISO13584_expressions_schema	ISO 13584-20
ISO13584_generic_expressions_schema	ISO 13584-20
action_schema	ISO 10303-41
aic_advanced_brep	ISO 10303-514
aic_associative_draughting_elements	ISO 10303-520
aic_csg	ISO 10303-515
aic_draughting_annotation	ISO 10303-504

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aic_draughting_elements	ISO 10303-506
aic_edge_based_wireframe	ISO 10303-501
aic_faceted_brep	ISO 10303-512
aic_geometric_tolerances	ISO 10303-519
aic_geometrically_bounded_2d_wireframe	ISO 10303-503
aic_geometrically_bounded_surface	ISO 10303-507
aic_geometrically_bounded_wireframe	ISO 10303-510
aic_manifold_surface	ISO 10303-509
aic_mechanical_design_geometric_presentation	ISO 10303-517
aic_non_manifold_surface	ISO 10303-508
aic_topologically_bounded_surface	ISO 10303-511
application_context_schema	ISO 10303-41
approval_schema	ISO 10303-41
basic_attribute_schema	ISO 10303-41
certification_schema	ISO 10303-41
configuration_management_schema	ISO 10303-44
contract_schema	ISO 10303-41
date_time_schema	ISO 10303-41
document_schema	ISO 10303-41
draughting_element_schema	ISO 10303-101
drawing_definition_schema	ISO 10303-101
effectivity_schema	ISO 10303-41
external_reference_schema	ISO 10303-41
geometric_model_schema	ISO 10303-42
geometry_schema	ISO 10303-42
group_schema	ISO 10303-41
kinematic_analysis_control_and_result_schema	ISO 10303-105
kinematic_structure_schema	ISO 10303-105
management_resources_schema	ISO 10303-41
material_property_definition_schema	ISO 10303-45
material_property_representation_schema	ISO 10303-45
measure_schema	ISO 10303-41
person_organization_schema	ISO 10303-41
presentation_appearance_schema	ISO 10303-46
presentation_definition_schema	ISO 10303-46
presentation_organization_schema	ISO 10303-46
presentation_resource_schema	ISO 10303-46
process_property_representation_schema	ISO 10303-49
process_property_schema	ISO 10303-49
product_concept_schema	ISO 10303-44
product_definition_schema	ISO 10303-41
product_property_definition_schema	ISO 10303-41
product_property_representation_schema	ISO 10303-41
product_structure_schema	ISO 10303-44
qualified_measure_schema	ISO 10303-45
representation_schema	ISO 10303-43
security_classification_schema	ISO 10303-41
shape_aspect_definition_schema	ISO 10303-47
shape_dimension_schema	ISO 10303-47
shape_tolerance_schema	ISO 10303-47
support_resource_schema	ISO 10303-41
topology_schema	ISO 10303-42

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5.2.1 Fundamental concepts and assumptions

This subclause describes fundamental concepts and assumptions related to the data structure defined within this part of ISO 10303.

ISO 10303-214 is designed to be used for data exchange, sharing, modeling, and storage in the design phase.

The intention is to gather information on a technical **product** related to various applications of product data.

5.2.1.1 Usage of global rules

Many of the relationships among different entities in the integrated resource parts of ISO 10303 are specified using the most generic cardinality of zero or more between two related entities. This cardinality means that the relationship is optional or there may be one or more instances of a related entity that is related to a single instance of the relating entity or vice versa.

This part of ISO 10303 uses global rules to constrain these cardinalities. Examples of these rules include **product_requires_category** and **restrict_effectivity_for_effectivity_relationship**.

Global rules are also used to restrict values of STRING type attributes to be only those that are applicable within the context of ISO 10303-214.

5.2.1.2 Product, Product Versions, and Views on Product Versions

Every **product** has to be related with one or more instances of **product_definition_formation**, each representing a version of the **product**.

A **product_definition_formation** may be represented by different instances of **representation** such as various kinds of geometric representations, kinematic structures, drawings, i.e., different kinds of data for a **product**.

Product_definition represents a view onto the data of a **product_definition_formation** and establishes the relationship to the various **representation**s. Note that **representation**s may be shared by serveral **product_definition**s (views). Also a **product_definition** may have several alternative **representation**s of the same kind, e.g. **shape_representation**s of a wireframe and a surface model, attached to it.

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5.2.1.3 Context information

5.2.1.3.1 application_context

The **application_context** entity identifies the application domain that defined the data. The **application_context** entity may have an identifier associated with it through the entity **id_attribute** and its **attribute_value** attribute. The **application_context** entity may have a description associated with it through the entity **description_attribute** via the attribute **attribute_value**. The **application** attribute identifies the name of the general application domain that defined the data.

This entity should be instantiated once in the data set for each relevant application domain. Where appropriate, the value 'assembly study', 'digital mock up', 'process planning', 'electrical design', or 'mechanical design' should be used. Note that 'electrical design' and 'mechanical design' are not understood to mean the design life cycle - e.g., within the application domain 'mechanical design', you may have concurrent 'manufacturing' and 'design' life-cycle view definitions.

5.2.1.3.2 product_context

The **product_context** entity is a subtype of **application_context_element**. All STEP products must be founded in a **product_context** to specify the point of view on the application. The **product_context** entity identifies the engineering discipline's point of view from which the data is being presented. This entity will establish the context perspective and source of requirements for product entities. The **discipline_type** attribute contains a description of the discipline point of view for a product. It is recommended to instantiate this entity exactly once in the data set.

5.2.1.3.3 product_definition_context

The **product_definition_context** entity is a subtype of **application_context_element**. All STEP **product_definition**s must be founded in a **product_definition_context** to identify the product definition type and life-cycle stage from which the data is viewed.

There are two ways to implement the **product_definition_context**:

— association of a single primary context with a **product_definition**;

— assignment of more than one (additional) context to a **product_definition**.

The value of the attribute **product_definition.frame_of_reference** is a **product_definition_context** that represents the 'primary' defining context for a view. In general this defining context is qualified both by type (**product_definition_context.name**) and by life-cycle (**product_definition_context.life_cycle_stage**) information. The primary context also has associated application domain information. The inherited **name** attribute provides a distinction on the type of view on a part version ('part definition') from one of a document version ('digital document definition', 'physical document definition'). This attribute may also indicate other types of definitions: e.g., 'functional definition', 'conceptual definition',

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or 'spatial' and/or 'zonal'. The **life_cycle_stage** attribute identifies the life-cycle view on the associated **product_definition**. Recommended values include 'design' and 'manufacturing'.

The **product_definition_context_association** entity allows for multiple additional contexts to be associated with a single **product_definition**. There is always one required 'primary' context that identifies the defining application domain and life-cycle information. Additional **product_definition_context** entities identify additional concurrent relevant views on the **product_definition**. These **product_definition_contexts** are related to the product definition by **product_definition_context_association**.

5.2.1.4 Shape of a product

5.2.1.4.1 Relating the shape of a product to administrative product data

The shape of a **product** is represented by **shape_representation**. This entity and its subtypes are defining valid combinations of entities of type **geometric_representation_item** and **topological_representation_item** to describe the shape of the **product**.

Shape_representation is related to **product_definition** by **shape_definition_representation** and **product_definition_shape**, which points to **product_definition** via two select types: **characterized_definition** and **characterized_product_definition**. Due to the global rule **shape_representation_subtype_exclusiveness**, **shape_representation** shall be an instance of at most one of its subtypes.

5.2.1.4.2 Identification of a portion of the shape of a product

A portion of the whole shape of a **product** may be identified by a **shape_aspect** that points to a **product_definition_shape**. The **shape_aspect** may be related via **shape_definition_representation** to **shape_representation**, representing the portion of shape.

5.2.1.4.3 Types of shape representation

By this part of ISO 10303 nine model types for representation of the shape of a **product** are defined:

— geometrically bounded 2D wireframe model represented by **geometrically_bounded_2d_wireframe_representation** (represented in the ARM by UoF G1);

— geometrically bounded 3D wireframe model represented by **geometrically_bounded_wireframe_shape_representation** (represented in the ARM by UoF G2);

— geometrically bounded surface model represented by **geometrically_bounded_surface_shape_representation** (represented in the ARM by UoF G8);

— connected surface model represented by **manifold_surface_shape_representation** (represented in the ARM by UoF G3);

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— faceted Brep model represented by **faceted_brep_shape_representation** (represented in the ARM by UoF G4);

— Brep model represented by **advanced_brep_shape_representation** (represented in the ARM by UoF G5);

— compound Brep model represented by **compound_shape_representation** and as special cases **edge_-based_wireframe_shape_representation**, and **non_manifold_surface_shape_representation** (represented in the ARM by UoF G6);

— CSG model represented by **csg_shape_representation** (represented in the ARM by UoF G7);

— hybrid model represented by **shape_representation** with a **name** of 'hybrid 3D shape representation' (included in the ARM in UoF S2).

All these except for the last are subtypes of **shape_representation**. Each type is self contained, meaning that one type may not contain another, enforced by the global rule **shape_representation_subtype_-exclusiveness**. Local rules, defined for every subtype, describe restrictions on geometric and topological entities, as applicable, that may be referenced by the respective **shape_representation** subtype. The local rules in the subtypes of **shape_representation** uniformly allow for instances of **axis2_placement**, **mapped_item**, and one or more specific subtypes of **geometric_representation_item** according to the subtype of **shape_representation**. In the case of a **mapped_item**, the mapped_representation of the associated instance of **representation_map** is restricted to the same subtype of **shape_representation** in order to avoid mixed shape representation types.

The **shape_representation** with a **name** of 'hybrid 3D shape representation' is an exception of this rule. It is especially created to allow for a mix of different kinds of **shape_representation** as it usually occurs in CAD systems. Therefore the allowed types of instances of **geometric_representation_item** are not further constrained, and the type the **mapped_representation** for a **mapped_item** instance is restricted to **shape_representation** only, but not to a specific subtype.

5.2.1.4.4 Relation of units, coordinate space, and accuracy information to shape information

Information on units related to the shape of a **product** as well as information on the coordinate space and the accuracy (uncertainty) of the shape information is assigned to instances of **shape_representation** by subtypes of **representation_context**, i.e. **global_unit_assigned_context**, **geometric_representation_-context**, and **global_uncertainty_assigned_context**, respectively.

These subtypes allow for definition of a set of units, of the coordinate space dimension, and of one to three accuracy values for distance, angular, and curvature accuracy to be assigned to a **shape_representation**.

In the case where an instance of **representation_context** shall be shared by two or more **shape_representation** instances with different accuracy values, complex instances of **shape_representation** and **uncertainty_assigned_representation** shall be used to assign the various accuracy values through the **uncertainty_assigned_representation** instances independent from the **representation_context**. The

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accuracy information defined by the **uncertainty_assigned_representation** takes precedence over any **global_uncertainty_assigned_context** that is referenced by the **shape_representation**.

5.2.1.5 Product structure

This clause describes the AIM entities used by this part of ISO 10303 that provide the capability to describe explicit hierarchical product structures representing assemblies and the constituents of those assemblies. These explicit part structures can be used to define the traditional engineering and manufacturing bill of material indentured parts list. Each assembly and constituent part within an explicit hierarchical product structure is defined by a **product** that is element in the set of **products** of a **product_related_product_category** with a name of 'part'. A **product** that is categorized as part may be a single piece part or an assembly of arbitrary complexity. Associated **product_definition_formation**s represent specific versions of the base product. **Product_definition**s attached to these **product_definition_formation**s represent particular views on a **product_definition_formation** that may only be relevant for the requirements of particular life-cycle stages (e.g., design, manufacturing) and application domains. There may be more than one **product_definition** associated with a particular **product_definition_formation**.

— A **product_definition** that has a **product_definition_context** with the atribute name set to 'part definition' represents a definitional view on the part, collecting data, e.g., from a particular application domain or life-cycle, about the part independently of its usage, e.g., as constituent of some other part.

Relationships between **product_definition**s that have an associated **product_definition_context** with a name of 'part definition' are the principle elements used to define explicit hierarchical product structures.

— An **assembly_component_usage** relationship represents the general assembly relationship between two parts by associating two **product_definition**s. The **related_product_definition** defines a view on the component, the **relating_product_definition** defines a view of the assembly part. Both **product_definition**s are definitional views, i.e., they have an associated **product_definition_context** with a name of 'part definition'.

In order to define different types of assembly relationships, **assembly_component_usage** has various subtypes:

— The **next_assembly_usage_occurrence** relationship represents a specific usage, i.e., an ocurrence of a component definition in the next higher parent assembly.

If a **next_assembly_usage_occurrence** is not instantiated in combination with a **quantified_assembly_component_usage**, it is used to represent a single occurrence of the component part in the context of the immediate next higher assembly part.

— The **promissory_usage_occurrence** relationship represents the usage of a component within a higher-level assembly that must not be the immediate parent, e.g., in the case where the detailed assembly structure between the component and the higher-level assembly is not represented. It specifies the intention to use the constituent in an assembly.

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A **promissory_usage_occurrence** may be instantiated in combination with a **quantified_assembly_component_usage**.

— The **quantified_assembly_component_usage** relationship is an **assembly_component_usage** that associates a quantity with the component usage. It can be used to describe that a component is used multiple times, e.g. **quantity** is set to '5 each' for five wheel fixture bolts, in the context of the assembly, but does not allow independent identification of individual occurrences of this component usage. Another usage of the **quantity** is for material like components, e.g. '0.5 ml' of oil.

If the **quantity**, in which the component part is used in the assembly can not be expressed as a particular value, but depends on certain constraints, an **assembly_component_usage** relationship with a name of 'selected instance usage' shall be used instead of the **quantified_assembly_component_usage** subtype with an associated **property_definition** and an associated **representation** with a **name** of 'selection criteria' that defines the quantity by a **representation_item** with **name** 'selection quantity' of type **measure_representation_item** or **value_range**.

— In order to identify a specific occurrence of a component in an assembly which is not the immediate parent assembly, the **specified_higher_usage_occurrence** entity is used, because the path from the higher-level parent assembly to the lower-level component may be ambigous. The **specified_higher_usage_occurrence** relationship represents an individual occurrence of the component part within a higher-level parent assembly. It shall not be instantiated in combination with a **next_assembly_usage_occurrence** or a **promissory_usage_occurrence**.

The **specified_higher_usage_occurrence** identifies with its inherited attribute **related_product_definition** the component in the assembly structure, with its inherited attribute **relating_product_definition** the higher-level parent assembly, with the **next_usage** attribute the component usage within the immediate parent assembly, and with its **upper_usage** attribute the usage between the higher-level parent assembly and the immediate parent identified by **next_usage**. In case the higher-level parent assembly to the component has more than one intermediate assembly level the **upper_usage** attribute refers to another **specified_higher_usage_occurrence** (recursive use). See Figure 79 for an example instantiation.

The **assembly_component_usage** and its subtypes described above represent individual usages, i.e., occurrences, of either a single or multiple instances of a component part in the context of an assembly part, i.e., within an explicit hierarchical part structure. In order to be able to use and represent these individual occurrences in the context of specification control (UoF S7), e.g., to configure them for the usage in the context of a **product_class**, or to use them in the context of variational bills of material as product constituents in conceptual or functional definitions or in alternative solution definitions of those, a separate **product_definition** has to be created describing an individual occurrence view of the component part.

When moving from an explicit part structure to a variational product structure, individual usages of a component part in the context of an assembly part that are described as part of an explicit hierarchical part structure by **assembly_component_usage** relationships or its subtypes, have to be related to a corresponding **product_definition** with an associated **product_definition_context** with a **name** of 'part occurrence' through a **product_definition_occurrence_relationship**.

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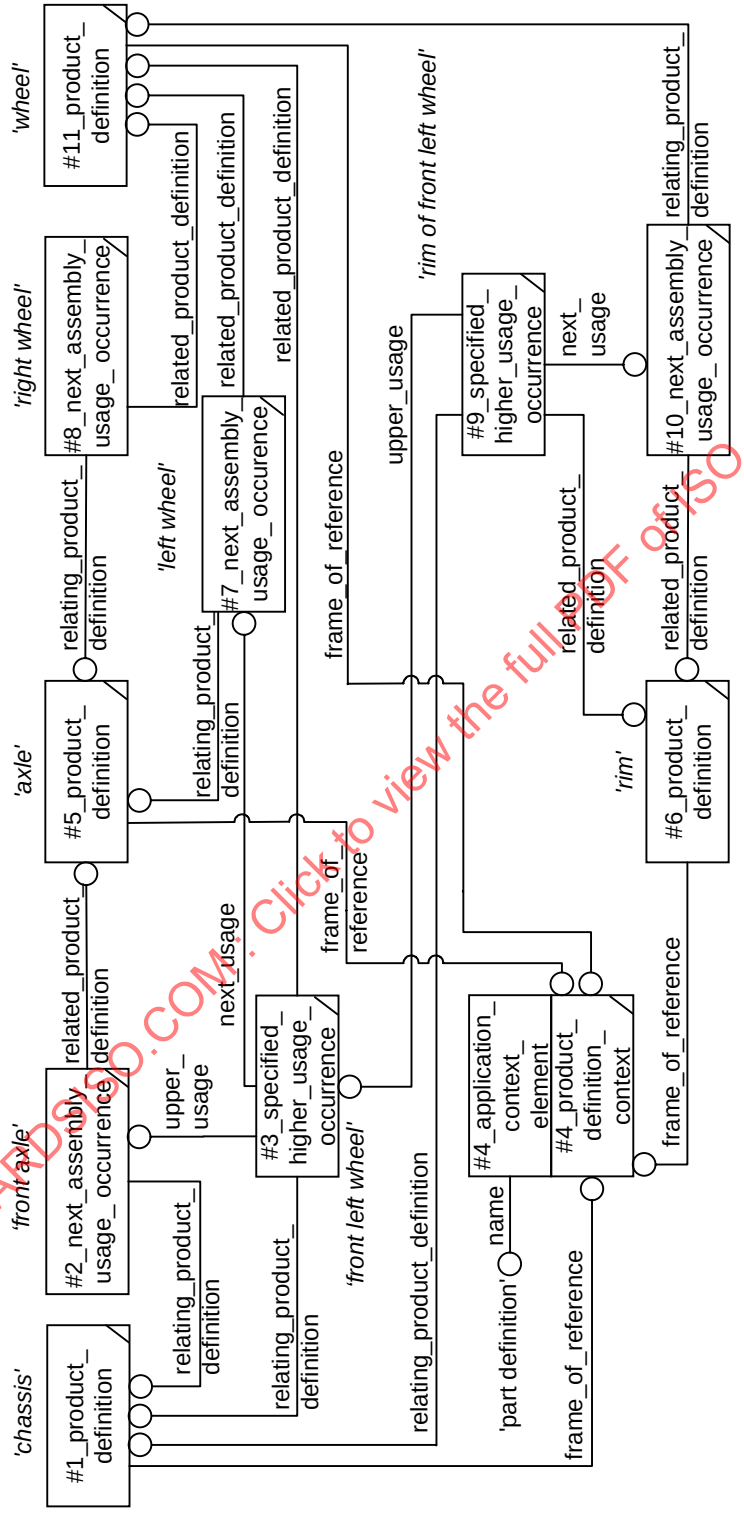


Figure 79 – example instantiation for specified_higher_usage_occurrence

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The **product_definition_occurrence_relationship** associates this **product_definition** and the **assembly_component_usage**. The **product_definition** referenced by the **occurrence** attribute has an associated **product_definition_context** with a **name** of 'part occurrence'. It represents explicitly an occurrence of the component that is also implicitly defined by the associated **assembly_component_usage**. The definitional **product_definition** of the component (with **product_definition_context** with **name** 'part definition') is referred to by the inherited **related_product_definition** attribute of the **assembly_component_usage** as well as associated to the **product_definition** representing explicitly the occurrence through a **product_definition_relationship** with a **name** of 'definition usage' (see Figure 80 for an example instantiation).

Thus, the **product_definition_occurrence_relationship** allows the association of an individual occurrence of a constituent part definition in an explicit part structure, represented by **assembly_component_usage** relationships, to a specific **product_definition** describing explicitly the individual occurrence of the component part in the context of specification control (UoF S7). See Specification control in clause 5.2.1.8 for further details about the usage of those **product_definition**s for specification control.

5.2.1.6 Shape of an assembly

5.2.1.6.1 Relating the shape of a component to the shape of its assembly

In order to build assembly structures, relationships between the assembly and component(s) have to be defined.

Two alternatives for the implementation of assembly structure representations are recommended:

— one alternative describes the assembly with the shape of the components built in. With this approach the shape of the component is mapped into the shape of the assembly via **mapped_item**;

— the other alternative describes the components and the assembly with their own shape information together with the transformation information between the assembly and the component. This approach uses the **representation_relationship_with_transformation**.

Both mechanisms make sense even in mixed combinations. The product structure, i.e. **next_assembly_usage_occurrence** is identical and is required for both approaches.

5.2.1.6.2 mapped_item approach

This approach represents the assembled model completely. It is appropriate for explicit representation of assemblies. It uses **mapped_item** in combination with **representation_map** which takes a **representation**, i.e. the **shape_representation** of the component and turns it into an item in a second **representation**, i.e. a **mapped_item** included in the **shape_representation** of the assembly. The transformation to be applied is determined from the mapping origin and the mapping target, which are items of the two instances of **representation** and therefore founded in the two contexts. **Mapped_item** is constrained such that:

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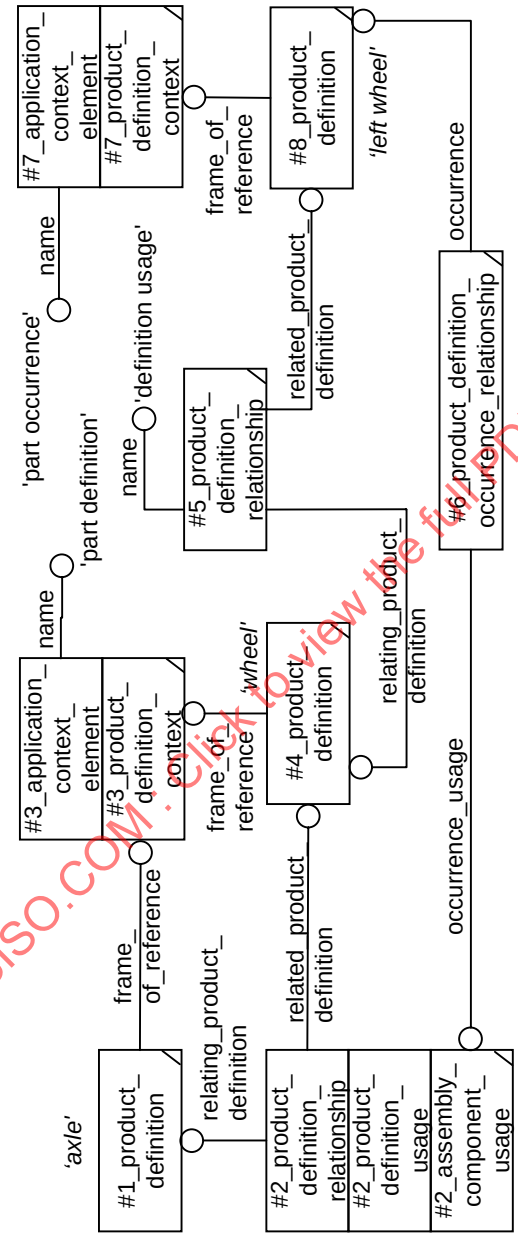


Figure 80 – example for usage of product_definition_occurrence_relationship

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— no **mapped_item** shall be dependent on itself to define the **representation** being mapped (acyclic);

— the **mapping_origin** shall be in the context of the **representation** referenced by **mapped_item. mapping_source. mapped_representation**;

— the **mapping_target** shall be in the context of the **representation** including the **mapped_item**.

There is no constraint to prevent both instances of **representation** having the same context (i.e. the new item is shifted in position but does not change spaces). This allows the use of **mapped_item** to position sub-models in a single coordinate space. It is even possible to define an identity matrix transformation by referring to the same entity instance as both **mapping_origin** and **mapping_target**. This represents the case where a component is defined in (one of) its final positions. Until it is mapped into the second **representation**, it is not included in the **representation** even though defined in the same space.

The mapping of the Assembly_component_relationship implies that the relationships between the assembly and the component on the **product_definition** level and the **mapped_item** for the **shape_representation** level have to be linked through an additional separate **shape_representation** containing, only the **mapped_item**and a **shape_definition_representation** and a **product_definition_shape**. This is necessary to distinguish between several occurrences of the same component within an assembly.

5.2.1.6.3 representation_relationship_with_transformation approach

This approach represents the components and the set of instructions how to build the assembly. This approach is adequate for the implicit representation of assemblies.

Thus, **representation_relationship_with_transformation** is used to define the relative positions within an assembly. It does not allow for:

— inclusion: The decision to create a **representation** that brings all the components together, is left to the receiving system;

— the ability to define a component in one position and then to replicate it in the same space.

The **shape_representation** may be defined explicitly and completely for the assembly and the **representation_relationship_with_transformation** gives just the additional information how an instance of **shape_representation** for a component geometrically relates to the shape of the assembly.

The rule **coordinated_assembly_and_shape** implies that the relationships between the assembly and the component on the **product_definition** level and the **shape_representation** level have to be linked through a **context_dependent_shape_representation**. This is necessary to distinguish between several occurrences of the same component within an assembly.

According to ISO 10303-43 the attributes **rep_1** and **rep_2** of **representation_relationship_with_-transformation** are determined as follows:

— **rep_1** is defined as the **representation** with a context to which the transformation applies;

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— **rep_2** is the **representation** with a context which is the result of the transformation.

Based on this definition, the attributes of **representation_relationship_with_transformation** should be instantiated as follows:

— **rep_1** references the **shape_representation** for the **product_definition** that is the **related_product_definition** (identifying the component) of the **assembly_component_usage**;

— **rep_2** references the **shape_representation** for the **product_definition** that is the **relating_product_definition** (identifying the assembly) of the **assembly_component_usage**.

Further restrictions are implied by the informal proposition on **representation_relationship_with_transformation**, defined in ISO 10303-43: If the transformation is an **item_defined_transformation**, the ordering of the instances of **representation** given for the inherited attributes of **representation_relationship** shall be consistent with the ordering of the two instances of **representation_item** given as attributes of **item_defined_transformation**.

Therefore the inherited attributes **relating_representation_item** and **related_representation_item** of **item_defined_transformation** shall be used as follows:

— **related_representation_item** references the **representation_item**, e.g., **axis2_placement_3d**, in a representation for the **product_definition** that is the **related_product_definition** of the **assembly_component_usage**, identifying the component;

— **relating_representation_item** references the **representation_item**, e.g., **axis2_placement_3d**, in a representation for the **product_definition** that is the **relating_product_definition** of the **assembly_component_usage**, identifying the assembly.

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5.2.1.6.4 Representation of transformations

Transformation information is represented for an **item_defined_transformation** using the inherited attributes **relating_representation_item** and **related_representation_item**, and for a **mapped_item** using attribute **mapping_target** of **mapped_item** and attribute **mapping_origin** of the referenced **representation_map** as a combination of two instances of **representation_item**.

The allowed combinations for these two instances of **representation_item** are as follows:

— **axis2_placement_3d** for the **related_representation_item** or **mapping_origin** attribute and another instance of **axis2_placement_3d** for the **relating_representation_item** or **mapping_target** attribute;

— **axis2_placement_3d** for the **related_representation_item** or **mapping_origin** attribute and an instance of **cartesian_transformation_operator_3d** for the **relating_representation_item** or **mapping_target attribute**;

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— **axis2_placement_2d** for the **related_representation_item** or **mapping_origin** attribute and another instance of **axis2_placement_2d** for the **relating_representation_item** or **mapping_target** attribute;

— **axis2_placement_2d** for the **related_representation_item** or **mapping_origin** attribute and an instance of **cartesian_transformation_operator_2d** for the **relating_representation_item** or **mapping_target** attribute.

For a **representation_relationship_with_transformation** there may be also an instance of **functionally_defined_transformation** used that is a **cartesian_transformation_operator**.

For any usage of an instance of **cartesian_transformation_operator** to define the transformation information of an instance of **assembly_component_usage** the derived attribute **scl** shall be 1.0, since scaling is not allowed for components within an assembly.

5.2.1.7 Document management

5.2.1.7.1 Document identification

This standard deals with documents as products, according to an interpretation of 'Document as Product'. As with 'Part as Product', there are three basic concepts central to document identification:

— product, product versions, and views on product versions;

— context information;

— type classification.

These fundamental concepts are described for 'Part as Product' also in clause 5.2.1.2. The following provides specifics on the distinction and additions for the 'Document as Product' approach.

'Document as Product' identifies a managed document object in a PDM system. A managed document is under revision control, and may distinguish various representation definitions of a document version. The document version represents the minimum identification of a managed document under revision control. A document representation definition may optionally be associated with one or more constituent external files that make it up.

EXAMPLE 1 A configuration controlled managed paper document like a drawing would generally be represented by the entity **product**, with version identification and a (physical) representation/view definition according to the 'Document as Product' approach.

External files in the PDM schema represent a simple external reference to a named file. An external file is not managed independently by the system - there is usually no revision control or any representation definitions of external files. Version identification may optionally be associated with an external file, but this is for information only and is not used for managed revision control.

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If a file is under configuration control, it should be represented as a constituent of a document definition. In this case it is actually the managed document that is under direct configuration control, the file is in this way indirectly under configuration control. A change to the file results in a change to the managed document (i.e., a new version) - the changed file is a constituent of a document definition of the new document version. A simple external reference alone is not configuration controlled, it is just an external file reference to product data.

Documents may be associated with product data in a specified role, to represent some relationship between a document and other elements of product data. Constraints may also be specified on this association, in order to distinguish an applicable portion of an entire document or file in the association. With 'Document as Product', additional entities are required to relate a managed document to other product data. Included among these is the entity **document**. The **document.id** should not be used as valid user data - the **document** entity does not always need to be instantiated using 'Document as Product', it is done only to assign the **document** to other product data via **applied_document_reference**.

5.2.1.7.2 Document as product

The interpretation of 'Document as Product' uses basic product master identification for the fundamental requirements of document identification, versioning, and representation definition. 'Document as Product' is distinguished from 'Part as Product' in each of the three basic elements of product identification:

— product, product versions, and views on product versions - document identification has specific requirements to assign documents to other product data, and to optionally associate with the constituent external file(s) that make up a specific document definition;

— context information - document identification has different context information than part identification;

— type classification - document identification has a different type classification than part identification.

Document, Document versions, and Document definitions

As with 'Part as Product', the concepts of base identification, version identification, and view definition are structurally the same as in 'Document as Product'.

Base document identification is represented by the entity **product** referred to by a **product_related_product_category** with a **name** of 'document' (to make the destinction to 'Part as Product') and is always associated with at least one document version represented by the entity **product_definition_formation**. Multiple document versions of a base document identification may be related together by **product_definition_formation_relationship** to represent document version history.

Context information

Context information provides a scope and necessary circumstance for product identification information. It consists of two separate and related areas:

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— Application Protocol Identification;

— Product_definition_context.

Application protocol identification and general context information are handled structurally the same for 'Document as Product' as for 'Part as Product'. A single instance of the entity **application_context** should be referenced by all **product_context** entities, for both parts and documents. This **application_context** should be referenced by the single instance of the entity **application_protocol_definition**.

The application context information is managed differently to distinguish documents from parts:

— Life-cycle information is not maintained for 'Document as Product', as it is for 'Part as Product' to identify the development life-cycle stages by the **life_cycle_stage** attribute of **product_definition_context**. When a managed document is assigned to a part master, the life-cycle stage of the part master identification may be extrapolated as relevant to the document;

— to distinguish a document definition, the inherited **name** attribute of **product_definition_context** is set to 'digital document definition' or 'physical document definition' to distinguish from the value 'part definition' used in 'Part as Product'. A 'digital document definition' represents an electronic document while a 'physical document definition' stands for a 'hardcopy', typically a paper document.

5.2.1.7.3 Document definition

The **product_definition** entity denotes the definition of a particular view of a representation of a document version. There may be more than one document definition associated with a single document version. The document definition of a document version is used for association of document properties, to build document structures, or to associate a document with the set of constituent external files that make it up. The entity **product_definition** supports property association and document structure by **product_definition_relationship**. The subtype **product_definition_with_associated_documents** is used to associate a representation of a document version with the set of constituent files that make it up. The **id** attribute indicates the unique identifier of the document definition. The value shall be unique relative to other **product_definition** entities related to the same **product_definition_formation**. The **description** attribute provides optional additional words describing the document definition; the **formation** attribute references the document version of which this is a document definition; the **frame_of_reference** attribute references the context information related to this document definition.

5.2.1.7.4 Document type classification

Following the 'document as product' approach the type classification of managed documents is done in symmetry to the specific type classification for parts.

There are two classification mechanisms that can be used when exchanging classification information with this Standard. One type of classification works by assigning categories to product data items. These categories are identified by name labels that define the related classification. This type of classification is

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referred to as specific classification in the ARM. It provides the basic capability to distinguish **product** entities interpreted to represent documents from those interpreted as parts by **product_related_product_category** referring to the product and with the inherited **name** attribute set to 'document' for the 'Document as Product' case or to 'part', 'tool', or 'raw material' for the 'Part as Product' case. Other values for the **name** attribute may be used additionally for a more specific classification of **documents**.

The specific classification capability relies exclusively on the name labels of the categories for the interpretation of the category semantics. Exchanges of specific classification information are only meaningful when the category names are agreed upon between the exchange partners.

All the categories used for the specific document type classification of managed documents should be defined in a single taxonomy. The category hierarchy is defined via relating the categories as super/subcategories by a **product_category_relationship**.

To fulfil advanced requirement there is the possibility to classify product data items according to a classification system with explicit reference to the classification criteria and related properties of the product data items. This classification mechanism is called General_classification in the ARM. The class or **externally_defined_class** entity identifies the classification information. This information can be associated to product, **product_definition_formation**, **product_definition** and **document_file** by **applied_classification_assignment**. It allows for the classification of documents, document versions, document representations and document files in the ARM.

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5.2.1.7.5 External files

External files represent a simple external reference to a named file. The external file may identify a digital file or a physical, 'hardcopy' file. As opposed to a managed 'Document as Product', an external file is not managed by the system - there is no capability for managed revision control or any document representation definitions for an external file. An external file is simply an external reference that may be associated with other product data. **Document_file** properties may be associated with an external file as with an identified managed document. In the case where properties differ with different versions, the managed 'Document as Product' approach shall be used.

If a file is under configuration control, it should be represented as a constituent of a document definition view/representation according to 'Document as Product'. In this case, it is actually the managed document that is under direct configuration control; the file is, in this way, indirectly under configuration control. A change to the file results in a change to the managed document (i.e., a new version) - the changed file would be mapped as a constituent of a view/representation definition of the new document version. A simple external reference alone is not configuration controlled, it is just an external file reference to product data.

While managed revision control representing multiple versions and version history is not available for external files, external files may have an optional version identification providing a string labelling the version of the file. Identification of an external file is done using the entity **document_file**. The **document_file** entity is a defined subtype of the entity **document**. It is also a subtype of the entity **characterized_object**, which allows association of properties to the identification of an external file.

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A simple one-level type classification can be applied to external files. A **document_file** provides in its attribute kind a pointer to the entity **document_type**. **Document_type.product_data_type** can be used for the classification of the type of the **document_file**. This simple classification shall only be used, if the 'Document as Product' approach is not used.

5.2.1.8 Specification control

This clause describes the AIM entities used by this part of ISO 10303 that provide the capability to describe automotive products with a large number of variants.

EXAMPLE 1 Examples for automotive products are passenger cars, trucks, busses, engines, or components of these products.

Because of the large number of variants there is no explicit representation for each of the variants that could be produced. The main concepts that are used to handle this large number of variants are illustrated in Figure 81.

These main concepts are the following:

— **product_class** is used to identify a set of similar products to be offered to the market;

A **product_class** is a **product_concept** and a **characterized_object**. The **characterized_object** may have **property_definition** entities associated to it through **property_definition.definition** and the select type **characterized_definition**. The instances of **product_class** may build a hierarchical tree-like structure through instances of **product_concept_relationship** that have the attribute **name** set to 'hierarchy' and that reference with the attribute **related_product_concept** the **product_class** that is a subclass of the **product_class** referenced by the attribute **relating_product_concept**.

— **product_concept_feature** is used to describe a characteristic of the products within a **product_class**;

The **product_concept_feature** is associated to a **product_class** through a **product_concept_feature_association** with the attribute name set to 'replaceable standard', 'non replaceable standard', 'availability', 'identification', 'option', 'part usage', or any other non standardized value. For a definition of the meaning of the standardized values see ARM definition for Class_specification_association in clause 4.2.67.3 for the permissive list definition. A **package_product_concept_feature** is a subtype of **product_concept_feature** that is used when the characteristic is in fact a set of other characteristics, e.g., a package of several options for a passenger car. In this case there is an **inclusion_product_concept_feature**, a subtype of **conditional_concept_feature**, with the inherited attribute **condition** referencing a **concept_feature_relationship_with_condition** with the attribute **conditional_operator** set to 'implication'. The inherited attribute **relating_product_concept_feature** of the **concept_feature_relationship_with_condition** references the **package_product_concept_feature**, and the inherited attribute **related_product_concept_feature** references either the one **product_concept_feature** that belongs to the package or another **conditional_concept_feature** that references the **product_concept_feature** instances of the package through an 'and' operation (for an example of package with two **product_concept_feature** see figure 82).

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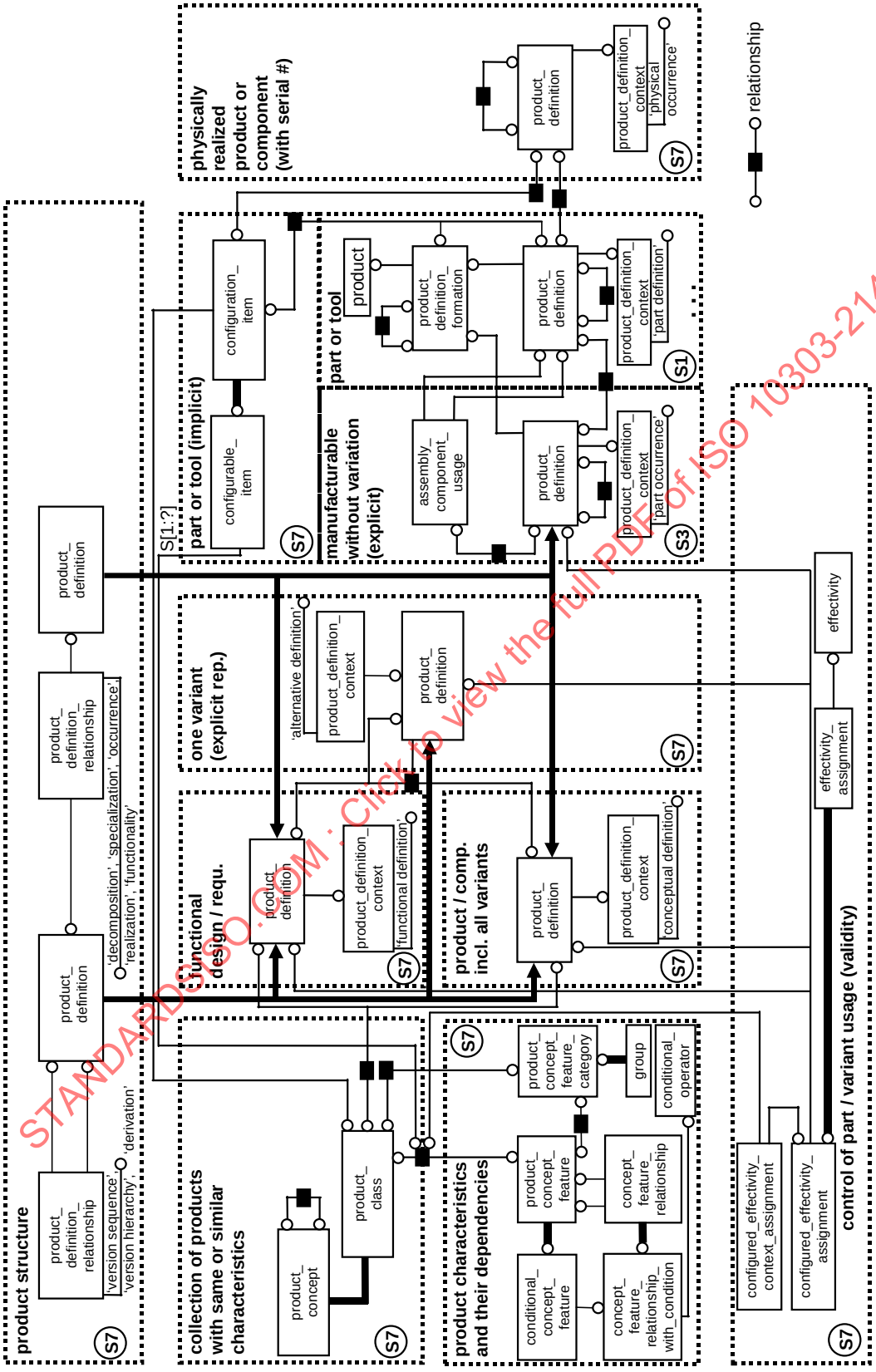


Figure 81 – Main concepts of specification control

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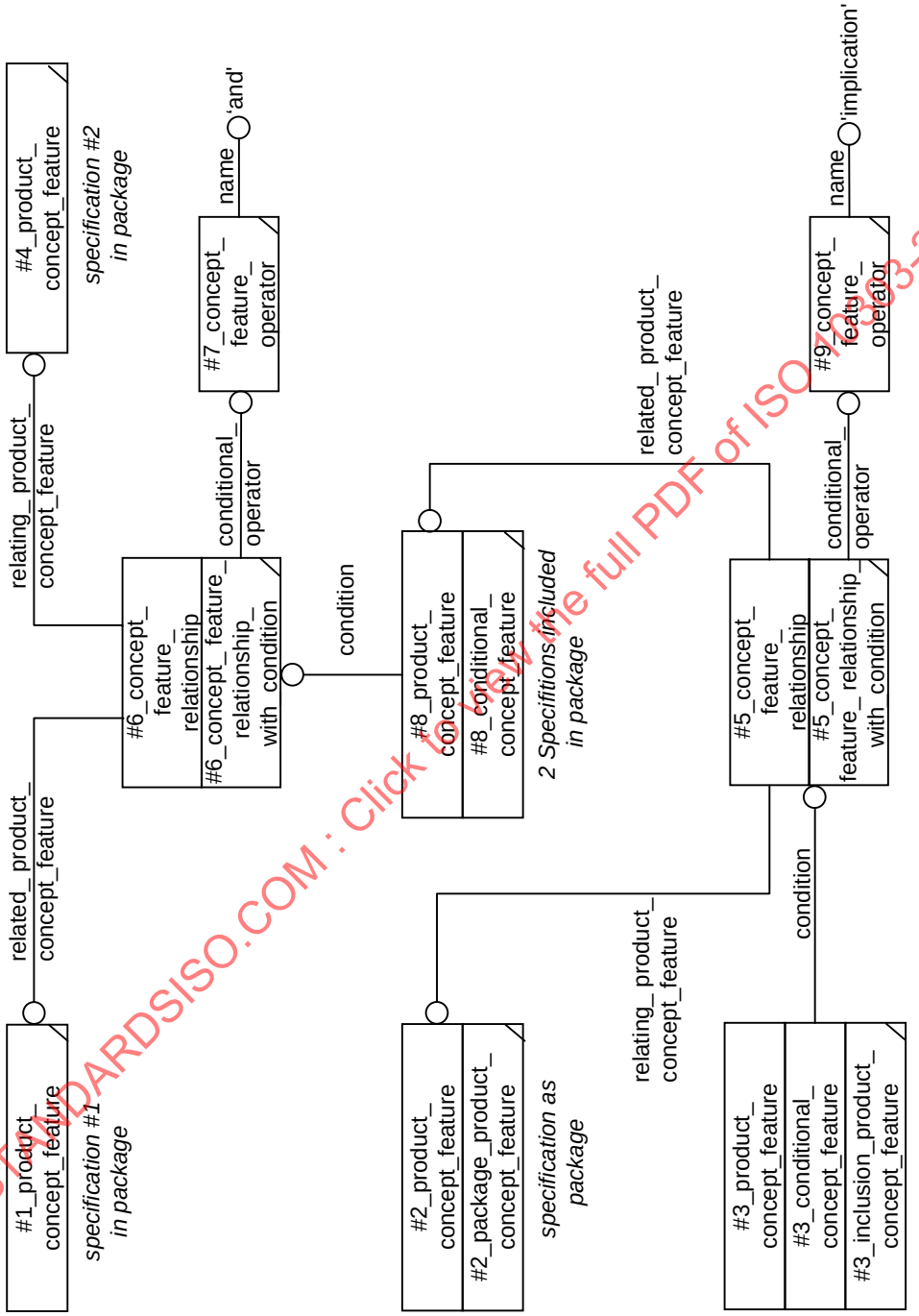


Figure 82 – example instantiation package_product_concept_feature

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— **product_concept_feature_category** is used to group similar instances of **product_concept_feature**, e.g., the different outside colour characteristics of the products;

A **product_concept_feature_category** is a **group** that groups instances of **product_concept_feature**. Instances of **product_concept_feature** are assigned to **product_concept_feature_category** through **applied_group_assignment** that is a subtype of **group_assignment**. For this **group_assignment** the attribute **items** references, through the select type **group_item**, instances of **product_concept_feature** or **package_product_concept_feature**, the attribute **assigned_group** references **product_concept_feature_category** or **exclusive_product_concept_feature_category**, the attribute **role** references **object_role** with the attribute **name** set to 'specification category member'.

Exclusive_product_concept_feature_category is a subtype of **product_concept_feature_category** that is used when the members of the **group** are mutually exclusive in their usage within a product, e.g., there is exactly one outside colour that can be choosen for a particular product. **Product_concept_feature_category** is associated to **product_class** through **product_concept_feature_category_usage** that is subtype of **group_assignment**. For this **group_assignment** the attribute **items** references, through the select type **category_usage_item**, an instance of **product_class**, the attribute **assigned_group** references **product_concept_feature_category** or **exclusive_product_concept_feature_category**, the attribute **role** references **object_role** with the attribute **name** set to 'mandatory category usage' or 'optional category usage'. For a definition of the meaning of the two values see ARM definition for Class_category_association in clause 4.2.64.3.

— **conditional_concept_feature** is used to control the usage of a product classified as 'part' or 'tool' (by **product_related_product_category**) within the products of a **product_class** and to represent global conditions for instances of a **product_class**;

The **conditional_concept_feature** is subtype of **product_concept_feature**. The **conditional_concept_feature** is used to build up boolean conditions for instances of **product_concept_feature**. The **conditional_concept_feature** references with its attribute **condition** a **concept_feature_relationship_with_condition** that represents a binary boolean operation. A **concept_feature_relationship_with_condition** is subtype of **concept_feature_relationship** with the attribute **conditional_operator** pointing to a **concept_feature_operator** with the attribute **name** set to 'and', 'or', 'oneof', 'not', or 'implication'. The intended usage of the unary 'not' operation is that the inherited attributes **relating_product_concept_feature** and **related_product_concept_feature** reference the same instance of **product_concept_feature**. The value 'implication' is only allowed, if a suptype of **conditional_concept_feature** is used, i.e., **inclusion_product_concept_feature**. This is ensured by the rule **restrict_concept_feature_operator**. For a definition of the meaning of the other values see ARM definition for Specification_expression in clause 4.2.470.4.

Conditional_concept_feature may be associated to a **product_class** through **product_concept_feature_association** with the attribute **name** set to 'part usage', 'identification', 'validity', 'design case', or any other non standardized value. For a definition of the meaning of the standardized values see ARM definition of Class_condition_association in clause 4.2.65.3. The value 'part usage', which is also applicable for the association of a **product_concept_feature** to a **product_class**, see above, indicates that the **conditional_concept_feature** (or **product_concept_feature**) controls the usage of a part within a product of the associated **product_class**. In this case the **product_concept_feature_association** is

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referenced by a **configured_effectivity_context_assignment** that is a subtype of **effectivity_context_assignment** through the select type **configured_effectivity_context_item**.

— **product_definition** that has a **product_definition_context** with the inherited attribute **name** set to 'functional definition' is used to describe the functional requirements for the products or the components of the products of a **product_class**;

Such instances of **product_definition** for functional requirements may be related to instances of **product_class** through an instance of **configuration_design** and **configuration_item**. In this case the attribute **name** of **configuration_design** is set to 'functionality'. For a definition of the meaning of the standardized value see ARM definition of Class_structure_relationship in clause 4.2.68.4.

— **product_definition** that has a **product_definition_context** with the inherited attribute **name** set to 'conceptual definition' is used to describe the common decomposition structure of all products of a **product_class**;

Such instances of **product_definition** for a common decomposition structure may be related to instances of **product_class** through an instance of **configuration_design** and **configuration_item**. In this case the attribute name of **configuration_design** is set to 'realization'. For a definition of the meaning of the standardized value see ARM definition of Class_structure_relationship in clause 4.2.68.4.

— **product_definition** that has a **product_definition_context** with the inherited attribute **name** set to 'alternative definition' is used to describe the variants for a **product_definition** with contect 'functional definition' or 'conceptual definition';

An instance of **product_definition** with context 'alternative definition' shall be associated to another product definition where it is a variant of through an instance of **product_definition_relationship** with the attribute **name** set to 'solution alternative definition'. The **related_product_definition** points to the variant (with context 'alternative definition') and the **relating_product_definition** references a **product_definition** with context 'functional definition', 'conceptual definition', or 'alternative definition'. In the latter case the **product_definition** instance with context 'alternative solution' defines a variant of another instance of **product_definition** with context 'alternative solution', e.g., where the first level defines technically different solutions and the second level defines different suppliers for the same technical solution.

All instances of **product_definition** with context 'alternative definition' that are defined through this path as variant of the same instance of **product_definition** are the mutually exclusive alternate solutions, i.e., variants.

— **product_definition** that has a **product_definition_context** with the inherited attribute **name** set to 'part occurrence' is used to identify an occurrence of a component in an assembly structure, e.g., to identify the component occurrences of a **product_definition** with context 'alternative definition';

A **product_definition** with context 'part occurrence' defines exactly one occurrence of a part within a given assembly structure. An instance of **product_definition** with context 'part occurrence' may be defined as an element, i.e., as **related_product_definition**, of a **product_definition** instance with context

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'alternative solution', i.e., as **relating_product_definition**, through a **product_defininition_relationship** with the attribute **name** set to 'realization'.

A **product_definition** with context 'part occurrence' may also represent a component occurrence in an explicit product structure defined by **assembly_component_usage**. In this case it is linked to the **assembly_component_usage** by a **product_definition_occurrence_relationship**, see clause 5.2.1.5.

— **product_definition_usage** with the attribute **name** set to 'decomposition', 'occurrence', 'realization', 'functionality', or 'specializaton' is used to define the structure for **product_definition** instances with context 'functional definition', 'conceptual definition', or 'alternative definition' as **relating_product_definition**;

The **related_product_definition** is an instance of **product_definition** with context 'functional definition', 'conceptual definition', or 'part occurrence'. With this tree-like decomposition structures for **product_definition** instances with the same context, attribute **name** set to 'decomposition', 'specialization', or 'occurrence' as well as relationships between **product_definition_instances** with different context, attribute **name** set to 'realization' or 'functionality', can be defined. For a detailed definition of the meaning of the standardized values for the attribute **name** of **product_definition_relationship** see ARM definition of Product_structure_relationship in clause 4.2.400.4.

— **configured_effectivity_context_assignment** and **configured_effectivity_assignment** are used to link a **product_definition** instance with context 'part occurrence', 'alternative definition', 'conceptual definition', or 'functional definition' with its usage case, i.e., the condition under which it is used;

The **configured_effectivity_context_assignment** is a subtype of **effectivity_context_assignment** that references with its attribute **items**, through the select type **configured_effectivity_context_item**, the **product_concept_feature_association** that defines the usage case or condition. The inherited attribute **assigned_effectivity_assignment** references the **configured_effectivity_assignment** instance.

Configured_effectivity_assignment is a subtype of **effectivity_assignment** that references with its attribute **items**, through the select type **configured_effectivity_item**, the **product_definition** with context 'part occurrence', 'alternative definition', 'conceptual definition', or 'functional definition' to which the usage case or condition applies, e.g., the variant to be controlled. The attribute **role** references an **object_role** instance with the attribute **name** set to 'design' or 'usage' and with the attribute **description** set to 'inherited', 'local', or 'exception'. For a definition of the meaning of the standardized values for the **name** attribute and for the **description** attribute see ARM definition of Configuration in class 4.2.94.1 and clause 4.2.94.3 respectively.

Configured_effectivity_assignment references with its inherited attribute **assigned_effectivity** an instance of **effectivity** that is instantiated solely as the supertype **effectivity** (i.e. not as one of the **effectivity** subtypes) with an **id** of 'configuration validity' to indicate the valid use of the item contained in the **items** attribute. **Dated_effectivity** or **time_interval_based_effectivity** instances may additionally be assigned to a **configured_effectivity_assignment** through **applied_effectivity_assignment** instances to indicate the time range for which the configuration is valid.

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— **configurable_item** is used to identify a manufacturable product out of a **product_class** by its specific characteristics (**product_concept_feature** instances), e.g., a customer order for a passenger car;

Configurable_item is a subtype of **configuration_item** that references with its inherited attribute **item_concept** the **product_class** of the manufacturable product. The attribute **item_concept_feature** points to a set of **product_concept_feature_association** instances that define the specified characteristics of the manufacturable product.

— **product_definition** that has a **product_definition_context** with the inherited attribute **name** set to 'physical occurrence' is used to identify actually manufactured physical parts or products by their serial number, lot id, or inventory number.

The attribute **id** of the **product_definition** instance represents the serial number, the lot id and/or inventory number may be associated to this instance additionally through **applied_identification_assignment** with the attribute **role** referencing an instance of **identification_role** with the attribute **name** set to 'lot context' and/or 'inventory number', respectively. If none of these ids are defined, then **product_definition** with context 'physical occurrence' shall be linked to a **product_definition** with context 'part definition' through a **product_definition_relationship** with name 'physical realization'.

5.2.1.9 Form Features

This clause describes the concept concerning the definition and application of form features in this part of ISO 10303. This standard includes the definition of various form features for the application in panel like parts, i.e., with negligible thickness, and for the application in solid volume parts. Also included is a concept for so-called general features whose semantics and parameters are not predefined as well as for transition features and for threads. This standard distinguishes between the definition of the features that is realized by the entity **feature_definition** which is a subtype of **characterized_object** and their occurrence on a part. Predefined form features specified for an application in panels are **bead**, **joggle**, **hole_in_panel**, **barring_hole**, **locator**, and **feature_in_panel** that has either the shape of a boss, a pocket, or a stairstep. These features are provided with a set of parameters, profiles, or paths that are sufficient to determine the shape of a part after the feature is applied. Predefined form features specified for an application in solid parts are **boss**, **pocket**, **rib**, **round_hole**, and **slot**. These features are specified by a volume that is defined by a set of parameters, a profile, and by a path along which the profile is swept. The feature itself is created by adding or subtracting this volume from the shape of the part. All additional parameters are provided in an implicit representation that is of type **shape_representation_with_parameters**. For the definition of predefined features a set of predefined profiles, i.e. **circular_closed_profile**, **ngon_closed_profile**, **rectangular_closed_profile**, **partial_circular_profile**, **rounded_u_profile**, **square_u_profile**, **tee_profile**, and **vee_profile**, as well as two general profiles, **closed_path_profile** and **open_path_profile**, are included. The paths that may be used to define form features are represented by the entity **path_feature_component**. This is either a predefined type of path, if **path_feature_component.name** is set to 'linear', 'partial circular', or 'complete circular', that is specified by a set of parameters or a general type of path, if the **path_feature_component.name** is set to 'complex'. In the latter case the path is specified by a **curve**. Paths and profiles are specified as instances of **shape_aspect**. Here, a distinction is made between the definition of such feature components and their occurrence. The definitions of paths and profiles are subtypes of **shape_aspect** that reference a **fea-**

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ture_component_definition which is a subtype of **characterized_object** as **of_shape**. This definition of a feature component is associated with its occurrence which is a **shape_aspect** of a **feature_definition** through a subtype of **shape_aspect_relationship** named **shape_defining_relationship**. For the application of form feature definitions this standard supports two approaches:

— by the entity **instanced_feature** that is a **shape_aspect** of the **product_definition_shape** and at the same time a subtype of **feature_definition**;

— by the entity **placed_feature** that is also a **shape_aspect** of the **product_definition_shape** and related to the **feature_definition** by an instance of **mapped_item** and **representation_map**.

The approach using **instanced_feature** supports the identification of 'areas of interest' on an already designed shape that are of a certain meaning to the user, e.g., that correspond to a process operation. The identification of parameters on these features does not mean that a variation of the parameter values results in an automatic update of the shape but is only meant to support the specification of these areas in a more appropriate way, e.g., to support process planning. In the case of the application of a feature as an **instanced_feature** the feature itself as well as all of its components, paths or profiles, are defined in the part coordinate system. The approach using **placed_feature** supports the definition of the feature independent of its application in its own coordinate system and a placement of the **representation** of the **feature_definition** into the **representation** of the **placed_feature** using a **mapped_item** and a **representation_map**. The shape of the feature need not be represented since a receiving system is supposed to be able to create the shape that results from the application of the **feature_definition** on a base shape interpreting the values of the feature parameters and the semantics included in the type of feature. In the case of the application of a feature as a **placed_feature** the feature itself and possibly a path used for the feature definition are defined in one coordinate system, a profile that is used is defined in its own coordinate system. Profiles are placed in the feature coordinate system using a **mapped_item** and a **representation_map**. This standard supports the application of surface conditions and tolerances to form features only implicitly by applying surface conditions and tolerances to elements of the shape representation of the form feature. An exception are tolerances applied to the location and orientation of the features that may be realized by using **axis2_placement** entities representing the feature coordinate system. Thread features are available as **instanced_feature**s only. The identification of a thread is splitted in two parts. First, a type of thread is specified. This specification may represent all necessary parameters either explicitly, if a **thread** is used, or by an **externally_defined_feature_definition** that refers to an external specification. The type of thread is applied to the shape of a part by an **applied_area** that identifies the effective length ant the placement of the thread onto the part. Two mechanisms of creating complex features using the flat **feature_definition**s as base features are supported, the **compound_feature** and the **replicate_feature**. The **compound_feature** allows to create hierarchies of either solid features or panel features.

EXAMPLE 1 In order to create a fixture point on a solid piece part, a **compound_feature** is created that consists of a **boss** and a **thread_feature**.

A special case of a **compound_feature** is the **composite_hole**, which is the definition of two commonly used types of **compound_feature**s, the countersunk and the counterbore hole. The other mechanism is the **replicate_feature** that supports the repretative use of a base feature in order to create patterns on the surface of a piece part. Three types of patterns are supported. The **circular_pattern** and the

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rectangular_pattern define the layout of the resulting pattern by parameters. The resulting pattern lies in a plane. The ommission and offsetting of elements of the pattern are supported by the use of **pattern_omit_membership** and **pattern_offset_membership**, which identify **shape_aspect**s of **feature_component_definition**s that represent the omitted or offsetted elements of a pattern. The layout resulting from such an operation is identified as a **modified_pattern**. The **feature_pattern** is the third mechanism for creating patterns. It supports the definition of an arbitrary layout that is not restricted to lying in a plane. Such a pattern is defined by a set of **axis2_placement**s that participate in the implicit representation of the **feature_pattern**. Compound features and patterns of features may be nested within each other and are applicable for both the **instanced_feature** and the **placed_feature** approach.

EXAMPLE 2 A flange is created by means of a **compound_feature** that consists of a **round_hole** and a **thread** applied to it, and a **circular_pattern** that distributes the compound along the flange.

5.2.1.10 Process planning

This clause describes the concept concerning the definition and application of process plans and the included process operations in this part of ISO10303. This standard includes the definition of reusable process operations and occurrences of process operations in specific process plans. This standard defines the relation from a process operation to the concerned product description as input or output to that process operation. This standard also defines the relation from a process operation to the concerned tool or manufacturing resource as the resource used to perform the process operation. The manufacturing planning information is defined by a **process_plan**, which is a subtype of **action**. If the manufacturing planning information is directly concerned with a specific product version, **product_definition_formation**, as output from the process plan definition the manufacturing planning information is defined by **product_process_plan** which is subtype of **product_definition_process**. A version of the **process_plan** is defined by associating the supertype **action** with **identification_item**, **identification_assignment**and **identification_role** with the name value 'version'. Multiple **process_plan** objects can be related to each other using **action_relationship**. This relation is used to handle multiple versions of the same **process_plan** concerning the same product. The definition of a process step within a **process_plan** is described by **process_operation** which is a subtype of **action_method**. The **process_operation** defines a general process step and can be associated to multiple and different process plans, in this way reuse of generically defined process steps is allowed. When a process step is used in a process plan, the association is considered to define an occurrence of the **process_operation** in the **process_plan**. This association, occurrence, is defined by **action** and **action_relationship** linking the two by **action_relationship.related_action**. The relation to the concerned process step description is **action.choosen_method** which relates to the **process_operation** via its supertype **action_method**. The relation to the concerned process plan is **action_relationship.relating_action** which relates to the **process_plan**, or the **product_process_plan** and **product_definition_process** if a **product_definition_formation** is defined as output, via its supertype **action**. Two occurrences of a process step can be related to each other with **action_relationship**. The general use of this relationship is to build structures of occurrences, e.g. process operation lists. This relationship can express different semantics depending on the value assigned in **action_relationship.name**:

— 'alternative': This value gives that the action given by the **action_relationship.related** can be used as an alternative to the **action** given by the **action_relationship.relating**. This value can be used for two purposes, one where the related **action** performs the same result, e.g. a hole, as the relating

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and the other where the related and relating represents two different paths in the process plan, for example running products through a storage area or not.

— 'decomposition': Provides an ability to describe hierarchical structure within a process plan. Can be used to define more detailed levels of a process. For example a milling process consists of rouge and fine operations. In this case **action_relationship.relating** shall give the action which is on a higher level and **action_relationship.related** shall give the action which is on the lower level in the hierarchy.

— 'exclusiveness': This value gives that the two associated action's may not have an overlap in time of execution. However the sequence is not relevant in this relationship.

— 'sequence': This value gives that the action given by the **action_relationship.relating** shall be completed before the **action_relationship.related** is allowed to start.

— 'simultaneity': This value gives that the two associated action's are carried out simultaneously. The time interval within which both action's have to take place to be considered simultaneous is defined by **applied_time_interval_assignment**.

The 'decomposition' and 'alternative' values give a structural meaning to the relationship whereas the 'sequence', 'exclusiveness' and 'simultaneity' values add the meaning on the time of execution to the relationship.

In order to express the refinement of parts or material into products by the process plan, relevant parts of the product structure or descriptions can be associated to a particular occurrence of a process step in the process plan. Association of the relevant product description is made by **product_process_association** where the value of **product_process_association.name** defines whether the associated product description appears as an input or an output to the occurrence of the process step. Values used are 'input' or 'output'. This assures that the input and output is relevant only for the occurrence of a particular process step within a particular process plan enabling the reuse of generically defined process steps.

To each occurrence of a process step the manufacturing resource(s) used to perform the operation can be associated using **requirement_for_action_resource** which is subtype from **action_resource_requirement**. The concerned occurrence of a process step is defined by **action_resource_requirement.operations** and the performing resource by **action_resource_requirement.resources**. The performing manufacturing resource is defined by **product_defintion_resource** which is subtype of **action_resource** and **product_definition** where the value of the associated **application_context_element.name** gives semantically different meaning to the use of the resource:

— **Product_definition** with **application_context_element.name** 'conceptual definition' and **product_definition.formation** associated to **product_definition_formation** with **product_category.name** 'conceptual product': This represents a conceptually defined manufacturing resource;

— **Product_definition** with **application_context_element.name** 'part definition': This represents a definition of a unique manufacturing resource of a certain type;

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— **Product_definition** with **application_context_element.name** 'part occurrence': This represents a definition of a unique manufacturing resource, which occurs at a certain place in a manufacturing system structure.

Product_definition with **application_context_element.name** 'physical occurrence': This represents a physical manufacturing resource in an existing manufacturing system.

In the general case a textual description can be used to define a manufacturing resource. This definition is given in the **resource_requirement_type** by the **action_resource_requirement.kind**.

5.2.1.11 Dimensioning and Tolerances

This standard supports dimensioning with respect to size and location. The dimensions may be tolerated by individual tolerances or by provision of general tolerances. Default values may be assigned for thickness and dimensions through a **representation** that has a **representation_context** with a **context_type** of 'default setting' and a **name** of 'default thickness' for characterization of piece parts with an evenly shaped cross section or for sheet metal, and a **name** of 'default setting' for general tolerances that apply to all dimensions of a work piece. The concept of **limits_and_fits** and plus minus bounds by specification of a **tolerance_value** with **upper_bound** and **lower_bound** are supported. A tolerance table may be provided using a **default_tolerance_table** that consists of a set of **default_tolerance_table_cell**s which provide a relationship between ranges of dimensions and the applicable tolerance values. Geometric tolerances are supported as defined in ISO 10303-519 and are in accordance with ISO 1101. Location of parts in in datum reference frame is accomplished by use of **datum_target**s. These may be defined either explicitly by identification of a **shape_aspect** that refers to an area with a closed boundary, or implicitly using **placed_datum_target_feature**, by which points, lines, circles, and rectangles may be defined by specification of an **axis2_placement** and the necessary parameters. Compound datums that consist of two **datum** objects may be created using the **common_datum**. The usage of **common_datum** is shown in Figure 83.

The geometric tolerances support the concept of viewing planes, i.e., if a viewing plane is specified, the geometric tolerance applies in a tolerance zone that is bounded by two planes a distance apart as specified by the tolerance value, and with infinite extent normal to the viewing plane. This capability is provided for **line_profile_tolerance**, **parallelism_tolerance**, **perpendicularity_tolerance**, **position_tolerance**, **straightness_tolerance**, and **symmetry_tolerance**. A viewing plane is specified by a **shape_aspect_relationship** with a **name** of 'affected plane association' that associates the toleranced **shape_aspect** and another **shape_aspect** that identifies a plane, see Figure 84. In the case of using viewing planes, the **tolerance_zone** is made up by the superposition of all boundaries defined by the viewing planes. The necessity to associate viewing planes and the tolerance objects they apply to requires the instantiation of a **shape_aspect** of the tolerated item for each use case.

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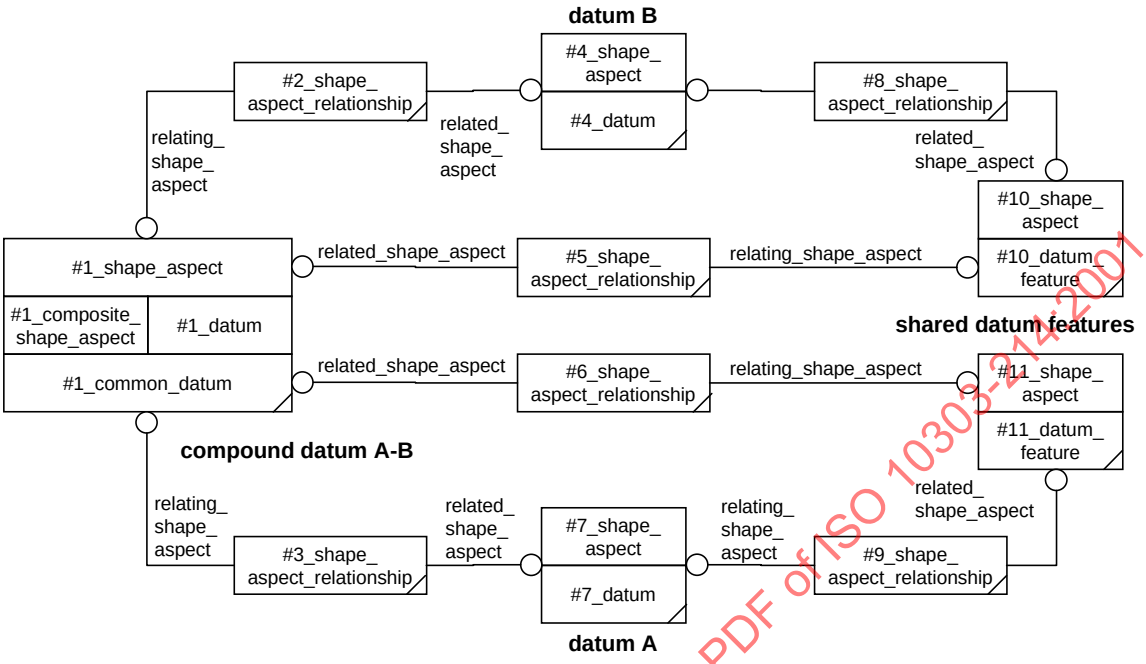


Figure 83 – Use of common_datum

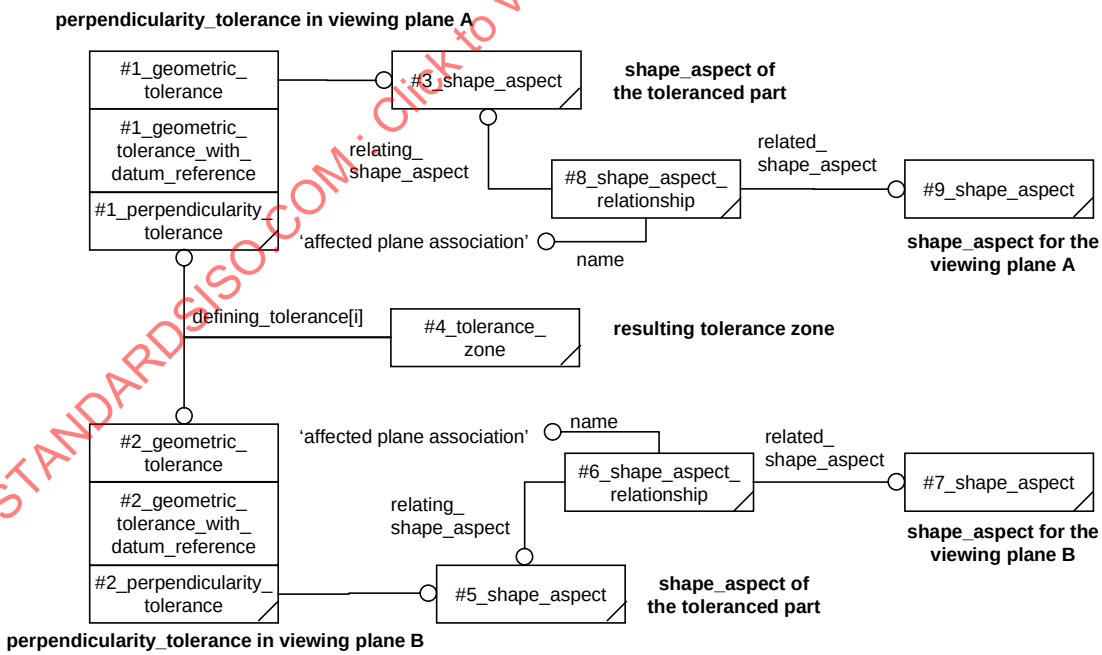


Figure 84 – Use of viewing planes

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5.2.2 automotive_design types

5.2.2.1 action_item

An **action_item** type specifies those objects to which an **action** may be assigned through an **applied_action_assignment**.

EXPRESS specification:

```
*)
TYPE action_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_person_and_organization_assignment,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
```

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```
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_aspect,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.2 action_request_item

An **action_request_item** type specifies those objects to which a **versioned_action_request** may be assigned through an **applied_action_request_assignment**.

EXPRESS specification:

```
*)
TYPE action_request_item = SELECT
  (action,
   action_method,
   action_property,
   action_relationship,
   alternate_product_relationship,
   assembly_component_usage_substitute,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   document_file,
   draughting_model,
   drawing_revision,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
```

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```
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   resource_property,
   shape_aspect,
   shape_representation);
END_TYPE;
(*
```

5.2.2.3 approval_item

An **approval_item** type specifies those objects to which an **approval** may be assigned through an **applied_approval_assignment**.

EXPRESS specification:

```
*)
TYPE approval_item = SELECT
  (action,
   action_directive,
   action_property,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organizational_project,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
```

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```
   product_definition_formation,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   resource_property,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.4 attribute_language_item

An **attribute_language_item** type specifies those objects to which a **language** may be assigned through an **attribute_language_assignment**.

EXPRESS specification:

```
*)
TYPE attribute_language_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   alternate_product_relationship,
   application_context,
   approval_relationship,
   assembly_component_usage_substitute,
   attribute_value_assignment,
   certification,
   configuration_design,
   configuration_item,
   contract,
   data_environment,
   date_role,
   date_time_role,
   descriptive_representation_item,
   document_relationship,
   draughting_title,
   effectivity,
   effectivity_relationship,
   event_occurrence,
   external_source,
   general_property,
   general_property_relationship,
   geometric_representation_item,
   geometric_tolerance,
   group,
   group_relationship,
```

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```
   identification_role,
   kinematic_pair,
   mapped_item,
   name_assignment,
   organization_relationship,
   organization_role,
   organizational_project,
   organizational_project_relationship,
   pair_actuator,
   person_and_organization_role,
   presentation_layer_assignment,
   process_product_association,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_relationship,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   product_related_product_category,
   property_definition,
   property_definition_relationship,
   representation,
   representation_relationship,
   requirement_for_action_resource,
   resource_property,
   resource_requirement_type,
   security_classification,
   shape_aspect,
   shape_aspect_relationship,
   styled_item,
   time_interval_role,
   topological_representation_item,
   uncertainty_measure_with_unit,
   uncertainty_qualifier,
   versioned_action_request);
END_TYPE;
(*
```

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5.2.2.5 category_usage_item

A **category_usage_item** type specifies those objects to which a **product_concept_feature_category** may be assigned through a **product_concept_feature_category_usage**.

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EXPRESS specification:

```
*)
TYPE category_usage_item = SELECT
  (product_class);
END_TYPE;
(*
```

5.2.2.6 certification_item

A **certification_item** type specifies those objects to which a **certification** may be assigned through an **applied_certification_assignment**.

EXPRESS specification:

```
*)
TYPE certification_item = SELECT
  (product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship);
END_TYPE;
(*
```

5.2.2.7 classification_item

A **classification_item** type specifies those objects to which a **class** or a **class_system** may be assigned through an **applied_classification_assignment**.

EXPRESS specification:

```
*)
TYPE classification_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   approval_status,
   class,
   configuration_item,
   contract,
   document_file,
   document_type,
   executed_action,
```

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```
   feature_definition,
   general_feature,
   general_property,
   material_designation,
   organizational_project,
   planar_extent,
   plus_minus_tolerance,
   process_operation,
   product,
   product_concept,
   product_concept_feature_category,
   product_definition,
   product_definition_formation,
   product_definition_relationship,
   property_definition,
   resource_property,
   security_classification_level,
   shape_aspect,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.8 class_usage_effectivity_context_item

A **class_usage_effectivity_context_item** type specifies those objects to which an **effectivity_assignment** may be assigned through a **class_usage_effectivity_context_assignment**.

EXPRESS specification:

```
*)
TYPE class_usage_effectivity_context_item = SELECT
  (product_definition);
END_TYPE;
(*
```

5.2.2.9 configured_effectivity_context_item

A **configured_effectivity_context_item** type specifies those objects to which a configured element may be assigned through a **configured_effectivity_context_assignment** as solution.

EXPRESS specification:

```
*)
TYPE configured_effectivity_context_item = SELECT
  (product_concept_feature_association);
END_TYPE;
```

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```
(*
```

5.2.2.10 configured_effectivity_item

A **configured_effectivity_item** type specifies those objects to which a set of conditions or specifications may be assigned through a **configured_effectivity_assignment**.

EXPRESS specification:

```
*)
TYPE configured_effectivity_item = SELECT
  (action_relationship,
   process_plan,
   product_definition,
   product_process_plan);
END_TYPE;
(*
```

5.2.2.11 contract_item

A **contract_item** type specifies those objects to which a **contract** may be assigned through an **applied_contract_assignment**.

EXPRESS specification:

```
*)
TYPE contract_item = SELECT
  (drawing_revision,
   executed_action,
   product_definition_formation);
END_TYPE;
(*
```

5.2.2.12 date_and_time_item

A **date_and_time_item** type specifies those objects to which a **date_and_time** may be assigned through an **applied_date_and_time_assignment**.

EXPRESS specification:

```
*)
TYPE date_and_time_item = SELECT
  (action,
```

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```
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_organization_assignment,
   applied_person_and_organization_assignment,
   approval_person_organization,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   effectivity,
   event_occurrence,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
```

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```
(*
```

5.2.2.13 date_item

A **date_item** type specifies those objects to which a **date** may be assigned through an **applied_date_assignment**.

EXPRESS specification:

```
*)
TYPE date_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_organization_assignment,
   applied_person_and_organization_assignment,
   approval_person_organization,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   effectivity,
   event_occurrence,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
```

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```
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.14 document_reference_item

A **document_reference_item** type specifies those objects to which a **document_reference** or a **document_usage_constraint** may be assigned through an **applied_document_reference** or **applied_document_usage_constraint_assignment** respectively.

EXPRESS specification:

```
*)
TYPE document_reference_item = SELECT
  (action_directive,
   action_method,
   action_relationship,
   applied_action_assignment,
   approval,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_item,
   contract,
   descriptive_representation_item,
   executed_action,
   feature_definition,
   general_property,
   material_designation,
   organization,
   organizational_project,
   person,
   presentation_area,
   process_plan,
   product,
```

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```
   product_concept,
   product_concept_feature,
   product_concept_feature_category,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_process,
   product_definition_relationship,
   product_definition_substitute,
   product_related_product_category,
   property_definition,
   representation,
   resource_requirement_type,
   retention,
   security_classification,
   shape_aspect,
   shape_aspect_relationship,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.15 effectivity_item

An **effectivity_item** type specifies those objects to which an **effectivity** may be assigned through an **applied_effectivity_assignment**.

EXPRESS specification:

```
*)
TYPE effectivity_item = SELECT
  (action,
   action_method,
   action_method_relationship,
   action_property,
   action_relationship,
   assembly_component_usage_substitute,
   class_system,
   configuration_design,
   configuration_item,
   configured_effectivity_assignment,
   document_file,
   draughting_model,
   drawing_revision,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   presentation_area,
   product,
   product_concept,
```

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```
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   shape_aspect,
   shape_representation);
END_TYPE;
(*
```

5.2.2.16 event_occurrence_item

An **event_occurrence_item** type specifies those objects to which an **event_occurrence** may be assigned through an **applied_event_occurrence_assignment**.

EXPRESS specification:

```
*)
TYPE event_occurrence_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_person_and_organization_assignment,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
```

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```
   drawing_revision,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.17 external_identification_item

An **external_identification_item** type specifies those objects to which an external identifier and an external source may be assigned through an **applied_external_identification_assignment**.

EXPRESS specification:

```
*)
TYPE external_identification_item = SELECT
  (document_file,
   externally_defined_class,
   externally_defined_general_property,
   product_definition);
END_TYPE;
(*
```

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5.2.2.18 group_item

A **group_item** type specifies those objects to which a **group** and a common characteristic may be assigned through an **applied_group_assignment**.

EXPRESS specification:

```
*)
TYPE group_item = SELECT
  (geometric_representation_item,
   mapped_item,
   product_concept_feature,
   shape_aspect,
   styled_item,
   topological_representation_item);
END_TYPE;
(*
```

5.2.2.19 identification_item

An **identification_item** type specifies those objects to which an **identifier** and its usage may be assigned through an **applied_identification_assignment**.

EXPRESS specification:

```
*)
TYPE identification_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   applied_identification_assignment,
   approval_status,
   class,
   class_system,
   configuration_item,
   dimensional_size,
   document_file,
   document_type,
   draughting_model,
   effectivity,
   general_property,
   measure_representation_item,
   mechanical_design_geometric_presentation_representation,
   organization,
   person_and_organization,
   presentation_area,
```

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```
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_category,
   product_definition,
   product_definition_formation,
   product_definition_relationship,
   property_definition,
   property_definition_relationship,
   security_classification_level,
   shape_aspect_relationship,
   shape_representation);
END_TYPE;
(*
```

5.2.2.20 language_item

A **language_item** type specifies those objects to which a classification of a language may be assigned through a **language_assignment**.

EXPRESS specification:

```
*)
TYPE language_item = SELECT
  (representation);
END_TYPE;
(*
```

5.2.2.21 multi_language_attribute_item

A **multi_language_attribute_item** type specifies those objects to which a label in an alternate language for an existing attribute may be assigned through a **multi_language_attribute_assignment**.

EXPRESS specification:

```
*)
TYPE multi_language_attribute_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   alternate_product_relationship,
   application_context,
   approval_relationship,
   assembly_component_usage_substitute,
```

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```
certification,
configuration_design,
configuration_item,
contract,
data_environment,
date_role,
date_time_role,
descriptive_representation_item,
document_relationship,
draughting_title,
effectivity,
effectivity_relationship,
event_occurrence,
external_source,
general_property,
general_property_relationship,
geometric_representation_item,
geometric_tolerance,
group,
group_relationship,
identification_role,
kinematic_pair,
mapped_item,
name_assignment,
organization_relationship,
organization_role,
organizational_project,
organizational_project_relationship,
pair_actuator,
person_and_organization_role,
presentation_layer_assignment,
process_product_association,
product,
product_concept,
product_concept_feature,
product_concept_feature_association,
product_concept_relationship,
product_definition,
product_definition_formation,
product_definition_formation_relationship,
product_definition_relationship,
product_definition_substitute,
product_related_product_category,
property_definition,
property_definition_relationship,
representation,
representation_relationship,
requirement_for_action_resource,
resource_property,
resource_requirement_type,
security_classification,
shape_aspect,
```

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```
   shape_aspect_relationship,
   styled_item,
   time_interval_role,
   topological_representation_item,
   uncertainty_measure_with_unit,
   uncertainty_qualifier,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.22 name_item

A **name_item** type specifies those objects to which a name may be assigned through an **applied_name_assignment**.

EXPRESS specification:

```
*)
TYPE name_item = SELECT
  (kinematic_joint,
   kinematic_link,
   kinematic_structure);
END_TYPE;
(*
```

5.2.2.23 organizational_project_item

An **organizational_project_item** type specifies those objects to which an **organizational_project** may be assigned through an **applied_organizational_project_assignment**.

EXPRESS specification:

```
*)
TYPE organizational_project_item = SELECT
  (executed_action,
   product_concept);
END_TYPE;
(*
```

5.2.2.24 organization_item

An **organization_item** type specifies those objects to which an **organization** may be assigned through an **applied_organization_assignment**.

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EXPRESS specification:

```
*)
TYPE organization_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_identification_assignment,
   applied_organization_assignment,
   applied_person_and_organization_assignment,
   approval,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   effectivity,
   event_occurrence,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
```

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```
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.25 person_and_organization_item

A **person_and_organization_item** type specifies those objects to which a **person_and_organization** may be assigned through an **applied_person_and_organization_assignment**.

EXPRESS specification:

```
*)
TYPE person_and_organization_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_organization_assignment,
   applied_person_and_organization_assignment,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   event_occurrence,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
```

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```
   organizational_project,
   person_and_organization,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.2.26 presented_item_select

A **presented_item_select** type specifies those objects to which a **presentation_representation** or a **presentation_set** may be assigned through an **applied_presented_item**.

EXPRESS specification:

```
*)
TYPE presented_item_select = SELECT
  (action,
   action_method,
   action_relationship,
   product_concept,
   product_concept_feature,
   product_concept_feature_category,
   product_definition,
   product_definition_formation,
   product_definition_relationship);
END_TYPE;
(*
```

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5.2.2.27 security_classification_item

A **security_classification_item** type specifies those objects to which a **security_classification** may be assigned through an **applied_security_classification_assignment**.

EXPRESS specification:

```
*)
TYPE security_classification_item = SELECT
  (action,
   action_directive,
   action_property,
   applied_action_assignment,
   assembly_component_usage_substitute,
   class_system,
   configuration_design,
   configuration_effectivity,
   configured_effectivity_assignment,
   document_file,
   draughting_model,
   drawing_revision,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organizational_project,
   presentation_area,
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_category,
   product_definition,
   product_definition_formation,
   product_definition_relationship,
   property_definition,
   resource_property,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

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5.2.2.28 specified_item

A **specified_item** type specifies those objects to which a **document** representing a draughting specification may be assigned through a **draughting_specification_reference**.

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EXPRESS specification:

```
*)
TYPE specified_item = SELECT
  (drawing_revision);
END_TYPE;
(*
```

5.2.2.29 time_interval_item

A **time_interval_item** type specifies those objects to which a **time_interval** may be assigned through an **applied_time_interval_assignment**.

EXPRESS specification:

```
*)
TYPE time_interval_item = SELECT
  (action,
   action_directive,
   action_method,
   action_property,
   action_relationship,
   action_request_solution,
   alternate_product_relationship,
   applied_action_assignment,
   applied_classification_assignment,
   applied_person_and_organization_assignment,
   approval_status,
   assembly_component_usage_substitute,
   certification,
   class,
   class_system,
   configuration_design,
   configuration_effectivity,
   configuration_item,
   configured_effectivity_assignment,
   contract,
   document_file,
   draughting_model,
   drawing_revision,
   executed_action,
   general_property,
   material_designation,
   mechanical_design_geometric_presentation_representation,
   organization_relationship,
   organizational_project,
   person_and_organization,
   presentation_area,
```

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```
   product,
   product_concept,
   product_concept_feature,
   product_concept_feature_association,
   product_concept_feature_category,
   product_concept_feature_category_usage,
   product_definition,
   product_definition_formation,
   product_definition_formation_relationship,
   product_definition_relationship,
   product_definition_substitute,
   property_definition,
   requirement_for_action_resource,
   resource_property,
   security_classification,
   security_classification_level,
   shape_representation,
   versioned_action_request);
END_TYPE;
(*
```

5.2.3 automotive_design entities

5.2.3.1 automotive_design entity definitions

5.2.3.1.1 applied_action_assignment

An **applied_action_assignment** is a type of **action_assignment** that assigns an **action** to an **action_item**.

EXPRESS specification:

```
*)
ENTITY applied_action_assignment
  SUBTYPE OF (action_assignment);
  items : SET [1:?] OF action_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **action** is assigned.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **applied_action_assignment** entity:

– restrict_applied_action_assignment (see 5.2.4.78).

5.2.3.1.2 applied_action_request_assignment

An **applied_action_request_assignment** is a type of **action_request_assignment** that assigns an **versioned_action_request** to an **action_request_item**.

EXPRESS specification:

```
*)
ENTITY applied_action_request_assignment
  SUBTYPE OF (action_request_assignment);
  items : SET [1:?] OF action_request_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **versioned_action_request** is assigned.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **applied_action_request_assignment** entity:

– restrict_applied_action_request_assignment (see 5.2.4.79).

5.2.3.1.3 applied_approval_assignment

An **applied_approval_assignment** is a type of **approval_assignment** that assigns an **approval** to an **approval_item**.

EXPRESS specification:

```
*)
ENTITY applied_approval_assignment
  SUBTYPE OF (approval_assignment);
  items : SET [1:?] OF approval_item;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **items** to which the **approval** is assigned.

5.2.3.1.4 applied_area

An **applied_area** is a type of **shape_aspect** that is the representation of the bounded enclosed area used for the definition of an occurrence of a **thread** or a **externally_defined_feature_definition**. See ARM definition for Thread_feature in paragraph 4.2.517, for Thread_specification in paragraph 4.2.518, and for Catalogue_thread in paragraph 4.2.48 for more information.

EXPRESS specification:

```
*)
ENTITY applied_area
  SUBTYPE OF (shape_aspect);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {2<= SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'effective length' , 'maximum length' ] ) ) ) >0 ) ) )
     =0;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
```

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```
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'effective length' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) =1 ) )
      ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'effective length' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) =1 ) )
      ) =1;
 WR7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      sar. description = 'applied area usage' ) AND ( (
      'AUTOMOTIVE_DESIGN.'+ 'THREAD' IN TYPEOF ( sar.
      relating_shape_aspect.of_shape. definition ) ) OR ( (
      'AUTOMOTIVE_DESIGN.'+
      'EXTERNALLY_DEFINED_FEATURE_DEFINITION' IN TYPEOF ( sar.
      relating_shape_aspect.of_shape. definition ) ) AND ( sar.
      relating_shape_aspect.of_shape.
      definition\externally_defined_item. item_id =
      'external thread' ) AND ( sar.
      relating_shape_aspect.of_shape.
      definition\externally_defined_item. source.source_id =
      'external thread specification' ) ) ) AND ( sar.
      relating_shape_aspect.of_shape. definition.description =
      'partial area occurrence' ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **applied_area** shall have exactly one **shape_representation_with_parameters**. It serves as the implicit representation of the **applied_area**.

WR2: The implicit representation of the **applied_area** shall contain between two and three **representation_item**s.

WR3: Each **representation_item** contained in the implicit representation shall have a name of either 'orientation', 'effective legth', or 'maximum length'.

WR4: Exactly one **representation_item** in the implicit representation shall have a **name** of 'orientation' and shall be of type **placement**.

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WR5: Exactly one **representation_item** in the implicit representation shall have a **name** of 'effective length' and shall be of type **length_measure_with_unit**.

WR6: At most one **representation_item** in the implicit representation shall have a **name** of 'maximum length'. If present, it shall be of type **length_measure_with_unit**.

WR7: Each **applied_area** shall be the **relating_shape_aspect** of a **shape_defining_relationship** with a **description** of 'applied area usage' and a **related_shape_aspect** that is the basis shape of a **thread** or of an **externally_defined_feature_definition** with a **item_id** of 'external thread' and a **source** of 'external thread specification'. That basis shape shall have a **description** of 'partial area occurrence'.

5.2.3.1.5 applied_certification_assignment

An **applied_certification_assignment** is a type of **certification_assignment** that assigns a **certification** to a **certification_item**.

EXPRESS specification:

```
*)
ENTITY applied_certification_assignment
  SUBTYPE OF (certification_assignment);
  items : SET [1:?] OF certification_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **certification** is assigned.

5.2.3.1.6 applied_classification_assignment

An **applied_classification_assignment** is a type of **classification_assignment** that assigns a **class** or a **class_system** to a **classification_item**.

EXPRESS specification:

```
*)
ENTITY applied_classification_assignment
  SUBTYPE OF (classification_assignment);
  items : SET [1:?] OF classification_item;
WHERE
 WR1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CLASS' IN TYPEOF (
     SELF.assigned_class ) ) OR ( SIZEOF ( QUERY ( i <*
     SELF.items | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'ACTION' ,
```

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```
      'AUTOMOTIVE_DESIGN.'+ 'ACTION_DIRECTIVE' ,
      'AUTOMOTIVE_DESIGN.'+ 'ACTION_METHOD' ,
      'AUTOMOTIVE_DESIGN.'+ 'ACTION_PROPERTY' ,
      'AUTOMOTIVE_DESIGN.'+ 'APPLICATION_CONTEXT' ,
      'AUTOMOTIVE_DESIGN.'+ 'APPROVAL_STATUS' ,
      'AUTOMOTIVE_DESIGN.'+ 'ASSEMBLY_COMPONENT_USAGE' ,
      'AUTOMOTIVE_DESIGN.'+ 'CONFIGURATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.'+ 'CONTRACT' , 'AUTOMOTIVE_DESIGN.'+
      'DOCUMENT_TYPE' , 'AUTOMOTIVE_DESIGN.'+
      'FEATURE_DEFINITION' , 'AUTOMOTIVE_DESIGN.'+
      'GENERAL_PROPERTY' , 'AUTOMOTIVE_DESIGN.'+
      'MATERIAL_DESIGNATION' , 'AUTOMOTIVE_DESIGN.'+
      'ORGANIZATIONAL_PROJECT' , 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT'
      , 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT' ,
      'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY',
      'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' ,
      'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_FORMATION',
      'AUTOMOTIVE_DESIGN.'+ 'PROPERTY_DEFINITION' ,
      'AUTOMOTIVE_DESIGN.'+ 'RESOURCE_PROPERTY' ,
      'AUTOMOTIVE_DESIGN.'+ 'SECURITY_CLASSIFICATION_LEVEL' ,
      'AUTOMOTIVE_DESIGN.'+ 'SHAPE_ASPECT' ,
      'AUTOMOTIVE_DESIGN.'+ 'VERSIONED_ACTION_REQUEST']* TYPEOF (
      i ) ) <>1 ) ) =0 ) ;
  WR2: NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'GROUP' IN TYPEOF (
      SELF.assigned_class ) ) AND ( SELF.assigned_class\
      group.name ='E' ) AND ( SELF.assigned_class\
      group.description = 'dimensioning principle' ) ) OR (
      SIZEOF ( QUERY ( i <* SELF.items | NOT (
      'AUTOMOTIVE_DESIGN.'+ 'PLUS_MINUS_TOLERANCE' IN TYPEOF ( i
      ) ) ) ) =0 ) ;
  WR3: NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'CLASS_SYSTEM' IN TYPEOF (
      SELF.assigned_class ) ) AND ( SELF.role. name =
      'class system membership' ) ) OR ( SIZEOF ( QUERY ( i <*
      SELF.items | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'APPROVAL_STATUS' , 'AUTOMOTIVE_DESIGN.'+ 'CLASS' ,
      'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.'+ 'DOCUMENT_TYPE' ,
      'AUTOMOTIVE_DESIGN.'+ 'SECURITY_CLASSIFICATION_LEVEL' ,
      'AUTOMOTIVE_DESIGN.'+ 'APPROVAL_STATUS']* TYPEOF ( i ) )
      <>1 ) ) =0 ) ;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **items** to which the **class** or **class_system** is assigned.

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Formal propositions:

WR1: If the **assigned_class** is of type **class**, only items of type **action**, **action_directive**, **action_method**, **action_property**, **application_context**, **approval_status**, **assembly_component_usage**, **configuration_item**, **contract**, **document_type**, **feature_definition**, **general_property**, **material_designation**, **organizational_project**, **product**, **product_concept**, **product_concept_feature_category**, **product_definition**, **product_definition_formation**, **property_definition**, **resource_property**, **security_classification_level**, **shape_aspect**, or **versioned_action_request** shall be in the set of **items**.

WR2: If the **assigned_class** is of type **group** with **name** 'E' and a **description** 'dimensioning principle', only items of type **plus_minus_tolerance** shall be in the set of **items**.

WR3: If the **assigned_class** is of type **class_system** and the **role** has a **name** of 'class system membership', only items of type **approval_status**, **class**, **descriptive_representation_item**, **document_type**, or **security_classification_level** shall be in the set of **items**.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **applied_classification_assignment** entity:

– restrict_applied_classification_assignment_role (see 5.2.4.80);

– restrict_class_system_assignment_for_approval_status (see 5.2.4.86);

– restrict_class_system_assignment_for_class (see 5.2.4.87);

– restrict_class_system_assignment_for_descriptive_representation_item (see 5.2.4.88);

– restrict_class_system_assignment_for_document_type (see 5.2.4.89);

– restrict_class_system_assignment_for_planar_extent (see 5.2.4.90);

– restrict_class_system_assignment_for_security_classification_level (see 5.2.4.91).

5.2.3.1.7 applied_contract_assignment

An **applied_contract_assignment** is a type of **contract_assignment** that assigns a **contract** to a **contract_item**.

EXPRESS specification:

```
*)
ENTITY applied_contract_assignment
  SUBTYPE OF (contract_assignment);
  items : SET [1:?] OF contract_item;
```

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```
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **contract** is assigned.

5.2.3.1.8 applied_date_and_time_assignment

An **applied_date_and_time_assignment** is a type of **date_and_time_assignment** that assigns a **date_and_time** to a **date_and_time_item**.

EXPRESS specification:

```
*)
ENTITY applied_date_and_time_assignment
  SUBTYPE OF (date_and_time_assignment);
  items : SET [1:?] OF date_and_time_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **date_and_time** is assigned.

5.2.3.1.9 applied_date_assignment

An **applied_date_assignment** is a type of **date_assignment** that assigns a **date** to a **date_item**.

EXPRESS specification:

```
*)
ENTITY applied_date_assignment
  SUBTYPE OF (date_assignment);
  items : SET [1:?] OF date_item;
WHERE
 WR1: ( NOT ( SELF.role. name = 'actual end' ) ) OR
     item_correlation ( SELF.items , ['ACTION' ,
     'ORGANIZATIONAL_PROJECT' , 'EFFECTIVITY'] ) ;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **items** to which the **date** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'actual end', only items of type **action**, **organizational_project**, or **effectivity** shall be in the set of **items**.

5.2.3.1.10 applied_document_reference

An **applied_document_reference** is a type of **document_reference** that assigns a **document** to a **document_reference_item**.

EXPRESS specification:

```
*)
ENTITY applied_document_reference
  SUBTYPE OF (document_reference);
  items : SET [1:?] OF document_reference_item;
WHERE
 WR1: ( NOT ( SELF.role. name = 'general tolerance definition' )
     ) OR item_correlation ( SELF.items , ['REPRESENTATION'] ) ;
 WR2: ( SELF.role. name = 'general tolerance definition' ) OR
     item_correlation ( SELF.items , ['ACTION' ,
     'ACTION_DIRECTIVE' , 'ACTION_METHOD' ,
     'ACTION_RELATIONSHIP', 'APPLIED_ACTION_ASSIGNMENT' ,
     'APPROVAL' , 'CERTIFICATION' , 'CLASS' , 'CLASS_SYSTEM' ,
     'CONFIGURATION_DESIGN' , 'CONFIGURATION_ITEM' , 'CONTRACT'
     , 'FEATURE_DEFINITION' , 'GENERAL_PROPERTY' ,
     'MATERIAL_DESIGNATION' , 'ORGANIZATION' ,
     'ORGANIZATIONAL_PROJECT' , 'PERSON' , 'PRODUCT_CONCEPT' ,
     'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' , 'PRODUCT_DEFINITION' ,
     'PRODUCT_DEFINITION_FORMATION' ,
     'PRODUCT_DEFINITION_FORMATION_RELATIONSHIP' ,
     'PRODUCT_DEFINITION_RELATIONSHIP' ,
     'PRODUCT_DEFINITION_SUBSTITUTE' ,
     'PRODUCT_RELATED_PRODUCT_CATEGORY' , 'PROPERTY_DEFINITION'
     , 'REPRESENTATION' , 'RESOURCE_REQUIREMENT_TYPE' ,
     'SECURITY_CLASSIFICATION' , 'SHAPE_ASPECT' ,
     'SHAPE_ASPECT_RELATIONSHIP' , 'VERSIONED_ACTION_REQUEST'] )
     ;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of **items** to which the **document** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'general tolerance definition', only items of type **representation** shall be in the set of **items**.

WR2: If the **name** of the **role** is not 'general tolerance definition', only items of type **action**, **action_directive**, **action_method**, **action_relationship**, **applied_action_assignment**, **approval**, **certification**, **class**, **class_system**, **configuration_design**, **configuration_item**, **contract**, **feature_definition**, **general_property**, **material_designation**, **organization**, **organizational_project**, **person**, **product_concept**, **product_concept_feature**, **product_concept_feature_category**, **product_definition**, **product_definition_formation**, **product_definition_formation_relationship**, **product_definition_relationship**, **product_definition_substitute**, **product_related_product_category**, **property_definition**, **representation**, **resource_requirement_type**, **security_classification**, **shape_aspect**, **shape_aspect_relationship**, or **versioned_action_request** shall be in the set of **items**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **applied_document_reference** entity:

– restrict_default_settings (see 5.2.4.94).

5.2.3.1.11 applied_document_usage_constraint_assignment

An **applied_document_usage_constraint_assignment** is a type of **document_usage_constraint_assignment** that assigns a **document_usage_constraint** to a **document_reference_item**.

EXPRESS specification:

```
*)
ENTITY applied_document_usage_constraint_assignment
  SUBTYPE OF (document_usage_constraint_assignment);
  items : SET [1:?] OF document_reference_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **document_usage_constraint** is assigned.

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5.2.3.1.12 applied_effectivity_assignment

An **applied_effectivity_assignment** is a type of **effectivity_assignment** that assigns an **effectivity** to an **effectivity_item**.

EXPRESS specification:

```
*)
ENTITY applied_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET [1:?] OF effectivity_item;
WHERE
 WR1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'SERIAL_NUMBERED_EFFECTIVITY',
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( SELF.assigned_effectivity ) ) =0;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **effectivity** is assigned.

Formal propositions:

WR1: An **applied_effectivity_assignment** shall have an **assigned_effectivity** which is not of type **lot_effectivity**, **serial_numbered_effectivity**, or **product_definition_effectivity**.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **applied_effectivity_assignment** entity:

– product_definition_replacement_requires_effectivity_assignment (see 5.2.4.72);

– restrict_effectivity_assignment_for_class_category_usage (see 5.2.4.97).

5.2.3.1.13 applied_event_occurrence_assignment

An **applied_event_occurrence_assignment** is a type of **event_occurrence_assignment** that assigns an **event_occurrence** to an **event_occurrence_item**.

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EXPRESS specification:

```
*)
ENTITY applied_event_occurrence_assignment
  SUBTYPE OF (event_occurrence_assignment);
  items : SET [1:?] OF event_occurrence_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **event_occurrence** is assigned.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **applied_event_occurrence_-assignment** entity:

– restrict_applied_event_occurrence_assignment (see 5.2.4.81).

5.2.3.1.14 applied_external_identification_assignment

An **applied_external_identification_assignment** is a type of **external_identification_assignment** that assigns an external identifier and an external source to an **external_identification_item**.

EXPRESS specification:

```
*)
ENTITY applied_external_identification_assignment
  SUBTYPE OF (external_identification_assignment);
  items : SET [1:?] OF external_identification_item;
WHERE
 WR1: ( NOT ( SELF.role. name =
      'alternative document id and location' ) ) OR
      item_correlation ( SELF.items , ['DOCUMENT_FILE'] ) ;
 WR2: ( NOT ( SELF.role. name ='version' ) ) OR item_correlation
      ( SELF.items , ['EXTERNALLY_DEFINED_CLASS' ,
      'EXTERNALLY_DEFINED_GENERAL_PROPERTY'] ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **identifier** is assigned.

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Formal propositions:

WR1: If the **role** has a **name** of 'alternative document id and location', only items of type **document_file** shall be in the set of **items**.

WR2: If the **role** has a **name** of 'version', only items of type **externally_defined_class**, or **externally_defined_general_property** shall be in the set of **items**.

5.2.3.1.15 applied_group_assignment

An **applied_group_assignment** is a type of **group_assignment** that assigns a **group** to a **group_item**.

EXPRESS specification:

```
*)
ENTITY applied_group_assignment
  SUBTYPE OF (group_assignment);
  items : SET [1:?] OF group_item;
WHERE
 WR1: ( NOT ( SELF.role. name ='exclusiveness' ) ) OR
     item_correlation ( SELF.items , ['ACTION'] ) ;
 WR2: ( NOT ( SELF.role. name ='simultaneity' ) ) OR
     item_correlation ( SELF.items , ['ACTION'] ) ;
 WR3: ( NOT ( SELF.role. name = 'specification category member'
     ) ) OR item_correlation ( SELF.items ,
     ['PRODUCT_CONCEPT_FEATURE'] ) ;
 WR4: ( NOT ( SELF.role. name = 'group membership' ) ) OR
     item_correlation ( SELF.items ,
     ['GEOMETRIC_REPRESENTATION_ITEM' , 'SHAPE_ASPECT'] ) ;
 WR5: ( NOT ( SELF.role. name = 'group membership' ) ) OR ( (
     SIZEOF ( SELF.items ) = SIZEOF ( QUERY ( i <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) ) ) OR ( SIZEOF ( SELF.items ) = SIZEOF (
     QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_ASPECT' IN TYPEOF ( i ) ) ) ) ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **group** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'exclusiveness', only items of type **action** shall be in the set of **items**.

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WR2: If the **role** has a **name** of 'simultaneity', only items of type **action** shall be in the set of **items**.

WR3: If the **role** has a **name** of 'specification category member', only items of type **product_concept_-feature** shall be in the set of **items**.

WR4: If the **role** has a **name** of 'group membership', only items of type **geometric_representation_-item** or **shape_aspect** shall be in the set of **items**.

WR5: If the **role** has a **name** of 'group membership', the set of **items** shall include either objects of type **geometric_representation_item** or **shape_aspect**.

5.2.3.1.16 applied_identification_assignment

An **applied_identification_assignment** is a type of **identification_assignment** that assigns an **identifier** to an **identification_item**.

EXPRESS specification:

```
*)
ENTITY applied_identification_assignment
  SUBTYPE OF (identification_assignment);
  items : SET [1:?] OF identification_item;
WHERE
 WR1: ( NOT ( SELF.role. name ='version' ) ) OR item_correlation
     ( SELF.items , ['ACTION' , 'ACTION_DIRECTIVE' ,
     'SHAPE_REPRESENTATION' , 'EFFECTIVITY' , 'PRODUCT_CONCEPT'
     , 'CONFIGURATION_ITEM' , 'PRODUCT_DEFINITION' ,
     'PRODUCT_CONCEPT_FEATURE' , 'DOCUMENT_FILE' , 'CLASS' ,
     'APPLIED_IDENTIFICATION_ASSIGNMENT' , 'DRAUGHTING_MODEL' ,
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
     'PRESENTATION_AREA'] ) ;
 WR2: ( NOT ( SELF.role. name = 'lot context' ) ) OR
     item_correlation ( SELF.items , ['PRODUCT_DEFINITION'] ) ;
 WR3: ( NOT ( SELF.role. name = 'property change id context' ) )
     OR item_correlation ( SELF.items ,
     ['PROPERTY_DEFINITION_RELATIONSHIP' ,
     'SHAPE_ASPECT_RELATIONSHIP' , 'ACTION_PROPERTY'] ) ;
 WR4: ( NOT ( SELF.role. name = 'size id' ) ) OR
     item_correlation ( SELF.items , ['DIMENSIONAL_SIZE'] ) ;
 WR5: ( NOT ( SELF.role. name = 'model change id' ) ) OR
     item_correlation ( SELF.items , ['PROPERTY_DEFINITION' ,
     'ACTION_PROPERTY'] ) ;
 WR6: ( NOT ( SELF.role. name ='alias' ) ) OR item_correlation (
     SELF.items , ['APPLICATION_CONTEXT' , 'APPROVAL_STATUS' ,
     'ASSEMBLY_COMPONENT_USAGE' , 'CLASS' , 'CLASS_SYSTEM' ,
     'DOCUMENT_TYPE' , 'DRAUGHTING_MODEL' , 'GENERAL_PROPERTY' ,
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
     'ORGANIZATION' , 'PRODUCT' , 'PRODUCT_CONCEPT' ,
     'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' , 'PRODUCT_DEFINITION' ,
```

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```
     'PRODUCT_DEFINITION_FORMATION' , 'PROPERTY_DEFINITION' ,
     'SECURITY_CLASSIFICATION_LEVEL' , 'SHAPE_REPRESENTATION'] )
     ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **identifier** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'version', only items of type **action**, **action_directive**, **shape_representation**, **effectivity**, **product_concept**, **configuration_item**, **product_definition**, **product_concept_feature**, **document_file**, **class**, **applied_identification_assignment**, **draughting_model**, **mechanical_design_geometric_presentation_representation**, or **presentation_area** shall be in the set of **items**.

WR2: If the **role** has a **name** of 'lot context', only items of type **product_definition** shall be in the set of **items**.

WR3: If the **role** has a **name** of 'property change id context', only items of type **property_definition_relationship**, **shape_aspect_relationship**, or **action_property** shall be in the set of **items**.

WR4: If the **role** has a **name** of 'size id', only items of type **dimensional_size** shall be in the set of **items**.

WR5: If the **role** has a **name** of 'model change id', only items of type **property_definition**, or **action_property** shall be in the set of **items**.

WR6: If the **role** has a **name** of 'alias', only items of type **application_context**, **approval_status**, **assembly_component_usage**, **class**, **class_system**, **document_type**, **draughting_model**, **general_property**, **mechanical_design_geometric_presentation_representation**, **organization**, **product**, **product_concept**, **product_concept_feature**, **product_concept_feature_category**, **product_definition**, **product_definition_formation**, **property_definition**, **security_classification_level**, or **shape_representation** shall be in the set of **items**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **applied_identification_assignment** entity:

– restrict_version_assignment_for_applied_identification_assignment (see 5.2.4.197).

5.2.3.1.17 applied_ineffectivity_assignment

An **applied_ineffectivity_assignment** is a type of **effectivity_assignment** that specifies that the associated **effectivity_item**s are set ineffective.

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EXPRESS specification:

```
*)
ENTITY applied_ineffectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET [1:?] OF effectivity_item;
WHERE
 WR1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'SERIAL_NUMBERED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( SELF.assigned_effectivity ) ) =0;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** that are set ineffective by the **applied_ineffectivity_assignment**.

Formal propositions:

WR1: An **applied_ineffectivity_assignment** shall have an **assigned_effectivity** which is not of type **lot_effectivity**, **serial_numbered_effectivity**, or **product_definition_effectivity**.

5.2.3.1.18 applied_name_assignment

An **applied_name_assignment** is a type of **name_assignment** that assigns a **name** to a **name_item**.

EXPRESS specification:

```
*)
ENTITY applied_name_assignment
  SUBTYPE OF (name_assignment);
  items : SET [1:?] OF name_item;
WHERE
 WR1: ( NOT ( SELF.role. name = 'kinematic element name' ) ) OR
     item_correlation ( SELF.items , ['KINEMATIC_STRUCTURE' ,
     'KINEMATIC_JOINT' , 'KINEMATIC_LINK'] ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **name** is assigned.

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Formal propositions:

WR1: If the **role** has a **name** of 'kinematic element name', only items of type **kinematic_structure**, **kinematic_joint**, or **kinematic_link** shall be in the set of **items**.

5.2.3.1.19 applied_organization_assignment

An **applied_organization_assignment** is a type of **organization_assignment** that assigns an **organization** to an **organization_item**.

EXPRESS specification:

```
*)
ENTITY applied_organization_assignment
  SUBTYPE OF (organization_assignment);
  items : SET [1:?] OF organization_item;
WHERE
 WR1: ( NOT ( SELF.role. name = 'organization in contract' ) )
     OR item_correlation ( SELF.items , ['CONTRACT'] ) ;
 WR2: ( NOT ( SELF.role. name = 'signing for contract' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_ORGANIZATION_ASSIGNMENT'] ) ;
 WR3: ( NOT ( SELF.role. name = 'validity context' ) ) OR
     item_correlation ( SELF.items , ['ACTION_PROPERTY' ,
     'RESOURCE_PROPERTY' , 'PROPERTY_DEFINITION'] ) ;
 WR4: ( NOT ( SELF.role. name = 'alias scope' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_IDENTIFICATION_ASSIGNMENT'] ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **organization** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'organization in contract', only items of type **contract** shall be in the set of **items**.

WR2: If the **role** has a **name** of 'signing for contract', only items of type **applied_organization_assignment** shall be in the set of **items**.

WR3: If the **role** has a **name** of 'validity context', only items of type **action_property**, **resource_property**, or **property_definition** shall be in the set of **items**.

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WR4: If the **role** has a **name** of 'alias scope', only items of type **applied_identification_assignment** shall be in the set of **items**.

5.2.3.1.20 applied_organizational_project_assignment

An **applied_organizational_project_assignment** is a type of **organizational_project_assignment** that assigns an **organizational_project** to an **organizational_project_item**.

EXPRESS specification:

```
*)
ENTITY applied_organizational_project_assignment
  SUBTYPE OF (organizational_project_assignment);
  items : SET [1:?] OF organizational_project_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **organizational_project** is assigned.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **applied_organizational_-project_assignment** entity:

– restrict_applied_organizational_project_assignment (see 5.2.4.82).

5.2.3.1.21 applied_person_and_organization_assignment

An **applied_person_and_organization_assignment** is a type of **person_and_organization_assign-ment** that assigns a **person_and_organization** to a **person_and_organization_item**.

EXPRESS specification:

```
*)
ENTITY applied_person_and_organization_assignment
  SUBTYPE OF (person_and_organization_assignment);
  items : SET [1:?] OF person_and_organization_item;
WHERE
 WR1: ( NOT ( SELF.role. name = 'signing for contract' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_ORGANIZATION_ASSIGNMENT'] ) ;
```

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```
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **person_and_organization** is assigned.

Formal propositions:

WR1: If the **role** has a **name** of 'signing for contract', only items of type **applied_organization_assignment** shall be in the set of **items**.

5.2.3.1.22 applied_presented_item

An **applied_presented_item** is a type of **presented_item** that that assigns an item in the **presented_item_select** to a **presentation_representation** or a **presentation_set**.

EXPRESS specification:

```
*)
ENTITY applied_presented_item
  SUBTYPE OF (presented_item);
  items : SET [1:?] OF presented_item_select;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **presentation_representation** or **presentation_area** is assigned.

5.2.3.1.23 applied_security_classification_assignment

An **applied_security_classification_assignment** is a type of **security_classification_assignment** that assigns a **security_classification** to a **security_classification_item**.

EXPRESS specification:

```
*)
ENTITY applied_security_classification_assignment
  SUBTYPE OF (security_classification_assignment);
  items : SET [1:?] OF security_classification_item;
```

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```
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **security_classification** is assigned.

5.2.3.1.24 applied_time_interval_assignment

An **applied_time_interval_assignment** is a type of **time_interval_assignment** that assigns a **time_interval** to a **time_interval_item**.

EXPRESS specification:

```
*)
ENTITY applied_time_interval_assignment
  SUBTYPE OF (time_interval_assignment);
  items : SET [1:?] OF time_interval_item;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which the **time_interval** is assigned.

5.2.3.1.25 attribute_language_assignment

A **attribute_language_assignment** is a type of **attribute_classification_assignment**. It associates the specification of a language used for a string valued attribute to the entity instance that has this attribute. The attribute value is further classified as either being specified in the original language or as a translation thereof.

EXPRESS specification:

```
*)
ENTITY attribute_language_assignment
  SUBTYPE OF (attribute_classification_assignment);
  items : SET [1:?] OF attribute_language_item;

DERIVE
language : label := SELF\attribute_classification_assignment.
                        assigned_class.name;
```

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```
WHERE
 WR1:SELF\attribute_classification_assignment. role.name IN
     ['primary' , 'translated'];
 WR2:'AUTOMOTIVE_DESIGN.'+'LANGUAGE' IN TYPEOF (
     SELF\attribute_classification_assignment. assigned_class )
     ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of objects to which the language classification is assigned.

language: The **language** specifies the **name** of the **assigned_class** that provides an identification for the language in which an attribute value is specified.

Formal propositions:

WR1: The language used to specify the string valued attributes in the set of **items** shall be marked either as the 'primary' language or as 'translated'.

WR2: The instance referenced as **assigned_class** shall be of type **language**.

5.2.3.1.26 barring_hole

A **barring_hole** is a type of **feature_definition** representing a hole in a panel part where the puched material is partially bended in the punch direction. See ARM definition for Panel_hole_with_barring in paragraph 4.2.336 for more information.

EXPRESS specification:

```
*)
ENTITY barring_hole
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     name = 'hole profile' ) AND ( sa. description =
     'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'profile usage' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' ,
```

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```
    'AUTOMOTIVE_DESIGN.'+ 'CLOSED_PATH_PROFILE']* TYPEOF ( sar.
    relating_shape_aspect ) ) =1 ) ) ) =1 ) ) ) =1;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'barring profile' ) AND ( sa. description =
    'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
    USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) ) ) =1 ) ) ) =1;
 WR3: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
    <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND {1<= SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) =1 ) ;
 WR4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN ['orientation'
    , 'base radius' ] ) ) ) >0 ) ) ) <>0;
 WR5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'base radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <>1 ) )
    ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **barring_hole** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'hole profile' and a **description** of 'closed profile occurrence'. This **shape_aspect** shall be the **related_-shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' and a **relating_shape_aspect** that references a **circular_closed_profile**, **ngon_closed_profile**, **rectangular_-closed_profile**, or **closed_path_profile**.

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WR2: The **barring_hole** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'barring profile' and a **description** of 'closed profile occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description of** of 'profile usage'.

WR3: The **barring_hole** shall contain exactly one implicit representation of type **shape_representation_with_parameters**. This implicit representation of the **barring_hole** shall contain between one and two **representation_item** in its set of **items**.

WR4: The implicit representation of a **barring_hole** shall contain only **representation_items** with a **name** of either 'orientation' or 'base radius'.

WR5: The implicit representation of a **barring_hole** shall contain exactly one **representation_item** that has a **name** of 'base radius' and is of type **measure_representation_item** and **length_measure_with_unit**.

Informal propositions:

IP1: The barring profile shall lie in the same plane as the hole profile.

IP2: The barring profile shall lie completely inside the hole profile.

5.2.3.1.27 bead

A **bead** is a type of **feature_definition** applicable to panel parts that is used to increase the stiffness of the part. See ARM definition for Bead in paragraph 4.2.39 for more information.

EXPRESS specification:

```
*)
ENTITY bead
  SUBTYPE OF (feature_definition);
WHERE
 WR1: ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) >2 ) ) ) =0 ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
```

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```
    , 'base radius' ] ) ) ) >0 ) ) ) =0;
WR3: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'base radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) >1 ) )
    ) =0;
WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'sweep path' ) AND ( sa. description =
    'path feature component occurrence' ) AND ( SIZEOF ( QUERY
    ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
    sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
WR5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'bead profile' ) AND ( sa. description =
    'open profile occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
    USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
    'VEE_PROFILE']* TYPEOF ( sar. relating_shape_aspect ) ) =1
    ) ) ) =1 ) ) ) =1;
WR6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'end condition' ) AND ( sa. description =
    'bead end occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
    USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. name = 'bead end usage' ) AND ( sar. description =
    'end condition at path start' ) AND ( 'AUTOMOTIVE_DESIGN.'+
    'BEAD_END' IN TYPEOF ( sar. relating_shape_aspect ) ) ) )
    =1 ) ) ) =1;
WR7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'end condition' ) AND ( sa. description =
    'bead end occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
    USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
```

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```
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'bead end usage' ) AND ( sar. description =
     'end condition at path end' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'BEAD_END' IN TYPEOF ( sar. relating_shape_aspect ) ) ) )
     =1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **bead** shall contain at most one implicit representation of type **shape_representation_with_parameters**. If present, this implicit representation of the **bead** shall contain at most two **representation_item**s in its set of **items**.

WR2: The implicit representation of a **bead** shall only contain **representation_item**s in its set of **items** that have a **name** of either 'orientation' or 'base radius'.

WR3: The implicit representation of the **bead** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'base radius'.

WR4: The **bead** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'sweep path' and a **description** of 'path feature component occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'path feature component usage' in which the **relating_shape_aspect** is a **path_feature_component**.

WR5: The **bead** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'bead profile' and a **description** of 'open profile occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is an **open_path_profile**, a **partial_circular_profile**, a **rounded_u_profile**, a **square_u_profile**, a **tee_profile**, or a **vee_profile**.

WR6: The **bead** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'end condition' and a **description** of 'bead end occurrence' that is the **related_shape_aspect** in exactly one **feature_component_relationship** with a **name** of 'bead end usage' and a **description** of 'end condition at path start' in which the **relating_shape_aspect** is a **bead_end**.

WR7: The **bead** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'end condition' and a **description** of 'bead end occurrence' that is the **related_shape_aspect** in exactly one **feature_component_relationship** with a **name** of 'bead end usage' and a **description** of 'end condition at path end' in which the **relating_shape_aspect** is a **bead_end**.

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5.2.3.1.28 bead_end

A **bead_end** is a type of **shape_aspect** that is the representation of the end condition for a bead. See ARM definition for Bead_end_type in paragraph 4.2.38, for Open_bead_end_type in paragraph 4.2.327, for Radiused_bead_end_type in paragraph 4.2.418, and for Linear_bead_end_type in paragraph 4.2.298 for more information.

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EXPRESS specification:

```
*)
ENTITY bead_end
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN ['linear' , 'open' , 'radiused'];
 WR3: ( SELF.description<>'linear' ) XOR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) >0 ) ;
 WR4: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1 ) ;
 WR5: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'end length' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR6: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'end shape' ) AND (
     i\descriptive_representation_item. description IN
     ['straight' , 'tapered'] ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1 ) ;
 WR7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'bead end usage' ) AND ( sar. description IN [
     'end condition at path start' , 'end condition at path end'
     ] ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'BEAD' IN TYPEOF ( sar.
     related_shape_aspect.of_shape. definition ) ) AND ( sar.
     related_shape_aspect.of_shape.
     definition\characterized_object. name = 'end condition' )
     AND ( sar. related_shape_aspect.of_shape.
```

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```
     definition\characterized_object. description =
     'bead end occurrence' ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **bead_end** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** for the **bead_end** shall be either 'linear', 'open', or 'radiused'.

WR3: A **bead_end** has an implicit representation if and only if it has a **description** of 'linear'.

WR4: If the **description** of the **bead_end** is 'linear', its implicit representation shall contain exactly two **representation_item**s in its set of **items**.

WR5: If the **description** of the **bead_end** is 'linear', exactly one **representation_item** used for the implicit representation of the **bead_end** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'end length'.

WR6: If the **description** of the **bead_end** is 'linear', exactly one **representation_item** used for the implicit representation of the **bead_end** shall be of type **descriptive_representation_item** with a name of 'end shape' and a **description** of either 'straight' or 'tapered'.

WR7: The **bead_end** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship** with a **name** of 'bead end usage' and a **description** of either 'end condition at path start' or 'end condition at path end' in which the **related_shape_aspect** is a **shape_aspect** of a **bead** with a **name** of 'end condition' and a **description** of 'bead end occurrence'.

5.2.3.1.29 boss

A **boss** is a type of **feature_definition** that is the representation of an enclosed shape protrusion that is added to a solid base shape. This added volume is represented by sweeping a closed profile along a linear path represented by a **path_feature_component**. The top of the **boss** is represented by a **boss_top**. The walls of the **boss** may have a slope that is represented by a **taper**. See ARM definition for Boss_feature in paragraph 4.2.42, for Circular_boss in paragraph 4.2.57, for Rectangular_boss in paragraph 4.2.420, and for General_boss in paragraph 4.2.214 for more information.

EXPRESS specification:

```
*)
ENTITY boss
  SUBTYPE OF (feature_definition);
WHERE
 WR1:SELF.description IN ['circular' , 'rectangular' ,
     'complex'];
 WR2: ( SELF.description<>'circular' ) OR ( SIZEOF ( QUERY ( sa
     <* get_shape_aspects ( SELF ) | ( sa. description =
```

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```
    'circular profile occurrence' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_CLOSED_PROFILE' IN TYPEOF (
    sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1 ) ;
WR3: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( sa
    <* get_shape_aspects ( SELF ) | ( sa. description =
    'enclosed boundary occurrence' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CLOSED_PATH_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE']* TYPEOF ( sar.
    relating_shape_aspect ) ) =1 ) ) ) =1 ) ) ) =1 ) ;
WR4: ( SELF.description<>'rectangular' ) OR ( SIZEOF ( QUERY (
    sa <* get_shape_aspects ( SELF ) | ( sa. description =
    'rectangular profile occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' IN
    TYPEOF ( sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1 ) ;
WR5: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr
    <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND NOT ( {1<= SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) ) =0 ) ;
WR6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN ['orientation'
    , 'fillet radius' ] ) ) ) >0 ) ) ) =0;
WR7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'fillet radius' ) AND
```

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```
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) >1 ) )
     ) =0;
 WR8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'boss hight occurrence' ) AND ( SIZEOF (
     QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'boss hight' ) AND ( sar. description =
     'path feature component usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
     sar. relating_shape_aspect ) ) AND ( sar.
     relating_shape_aspect.description ='linear' ) ) ) =1 ) ) )
     =1;
 WR9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'top condition occurrence' ) AND ( SIZEOF (
     QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'boss top usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'BOSS_TOP' IN TYPEOF ( sar.
     relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
 WR10: NOT ( SELF.description IN ['rectangular' , 'complex'] )
     OR ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     sa. description = 'change in boundary occurrence' ) AND (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'taper usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
     relating_shape_aspect ) ) AND ( sar.
     relating_shape_aspect.description IN [ 'angle taper' ,
     'directed taper' ] ) ) ) =1 ) ) ) <=1 ) ;
 WR11: ( SELF.description<>'circular' ) OR ( SIZEOF ( QUERY ( sa
     <* get_shape_aspects ( SELF ) | ( sa. description =
     'change in diameter occurrence' ) AND ( SIZEOF ( QUERY (
     sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'taper usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
     relating_shape_aspect ) ) AND ( sar.
     relating_shape_aspect.description IN [ 'angle taper' ,
     'diameter taper' ] ) ) ) =1 ) ) ) <=1 ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **description** for the **boss** shall be either 'circular', 'rectangular', or 'complex'.

WR2: If the **boss** has a **description** of 'circular' the **boss** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'circular profile occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is a **circular_closed_profile**.

WR3: If the **boss** has a **description** of 'complex', the **boss** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'enclosed boundary occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is either a **closed_path_profile** or a **ngon_closed_profile**.

WR4: If the **boss** has a **description** of 'rectangular' the **boss** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'rectangular profile occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is a **rectangular_closed_profile**.

WR5: The **boss** shall contain at most one implicit representation of type **shape_representation_with_parameters**. If present, this **representation** shall contain between one and two **representation_item**s in its set of **items**.

WR6: The implicit representation of the **boss** shall contain only **representation_item**s that have a **name** of either 'orientation' or 'fillet radius'.

WR7: At most one **representation_item** used for the implicit representation of the **boss** shall have a **name** of 'fillet radius'. This **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR8: The **boss** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'boss height occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'boss height' and a **description** of ' path feature component usage' in which the **relating_shape_aspect** is a **path_feature_component** with a **description** of 'linear'.

WR9: The **boss** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'top condition occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'boss top usage' in which the **relating_shape_aspect** is a **boss_top**.

WR10: If the **boss** has a **description** of 'rectangular' or 'complex', the **boss** shall be the basis shape for at most one **shape_aspect** with a **description** of 'change in boundary occurrence' that is the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'taper usage' in which the **relating_shape_aspect** is a **taper** with a **description** of either 'angle taper' or 'directed taper'.

WR11: If the **boss** has a **description** of 'circular', the **boss** shall be the basis shape for at most one **shape_aspect** with a **description** of 'change in diameter occurrence' that is the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'taper usage' in which the **relating_shape_aspect** is a **taper** with a **description** of either 'angle taper' or 'diameter taper'.

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5.2.3.1.30 boss_top

A **boss_top** is a type of **shape_aspect** that is the end condition for a **boss**. See ARM definition for Boss_-top_condition in paragraph 4.2.43, for Planar_top_condition in paragraph 4.2.359, and for General_top_-condition in paragraph 4.2.236 for more information.

EXPRESS specification:

```
*)
ENTITY boss_top
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN ['planar' , 'complex'];
 WR3: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR4: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR5: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR6: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'boss top usage' ) AND ( sar. description IN [
     'boss height start' , 'boss height end' ] ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'BOSS' IN TYPEOF ( sar.
     related_shape_aspect ) ) AND ( sar.
     related_shape_aspect.name = 'top condition occurrence' ) )
     ) =1;
 WR7: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) >1 ) ) ) =0 ) ;
```

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```
 WR8: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( ( SIZEOF ( pdr.
     used_representation.items ) =0 ) XOR ( SIZEOF ( QUERY ( i
     <* pdr. used_representation.items | ( i.name= 'top radius'
     ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) ) <=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **boss_top** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** of the **boss_top** shall be either 'planar' or 'complex'.

WR3: If the **description** of the **boss_top** is 'planar', the **boss_top** shall have exactly one **direction_-shape_representation**.

WR4: If the **description** of the **boss_top** is 'planar', the **boss_top** shall have exactly one **location_-shape_representation**.

WR5: If the **description** of the **boss_top** is 'complex', the **boss_top** shall have exactly one **face_-shape_representation**.

WR6: The **boss_top** shall be the **relating_shape_aspect** in exactly one **feature_component_relation-ship** with a **name** of 'boss top usage' and a **description** of either 'boss height start' or 'boss height end' in which the **related_shape_aspect** is a **shape_aspect** of a **boss** with a **name** of 'top condition occurrence'.

WR7: The **boss_top** shall have at most one **shape_representation_with_parameters** to specify its implicit representation. If present, this implicit representation shall contain at most one **representation_-item** it its set of **items**.

WR8: If present, the **representation_item** shall be of type **measure_representation_item** and **length_-measure_with_unit** and shall have a **name** of 'top radius'.

5.2.3.1.31 camera_image_2d_with_scale

A **camera_image_2d_with_scale** is a type of **camera_image** with a derived **scale**. The **scale** is the ratio between the size of the viewport and the size of the view window of the **camera_model**.

NOTE 1 - The viewport specifies the rectangular boundary of the view as it is depicted in the drawing sheet.

NOTE 2 - The definition of this entity is identical to the definition in ISO 10303-202.

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EXPRESS specification:

```
*)
ENTITY camera_image_2d_with_scale
  SUBTYPE OF (camera_image);

DERIVE
scale: positive_ratio_measure :=
       (SELF\mapped_item.mapping_target\planar_extent.size_in_x) /
       (SELF\mapped_item.mapping_source.mapping_origin\
             camera_model_d2.view_window\planar_extent.size_in_x);
WHERE
 WR1: ( 'AUTOMOTIVE_DESIGN.'+ 'CAMERA_MODEL_D2' IN TYPEOF (
     SELF\mapped_item. mapping_source.mapping_origin ) ) ;
 WR2:aspect_ratio ( SELF\mapped_item. mapping_target )
     =aspect_ratio ( SELF\mapped_item.
     mapping_source.mapping_origin\ camera_model_d2.view_window
     ) ;
 WR3:SELF\mapped_item. mapping_source.mapping_origin\
     camera_model_d2.view_window_clipping;
END_ENTITY;
(*
```

Attribute definitions:

scale: The **positive_ratio_measure** derived from the rectangular size of the viewport and the rectangular size of the **view_window** of the **camera_model_d2**.

Formal propositions:

WR1: The source of the projection shall be a **camera_model_d2**.

WR2: The aspect ratio of the viewport shall equal the aspect ratio of the **view_window** of the **camera_-model**.

WR3: The **view_window_clipping** attribute of the **camera_model_d2** shall be true.

5.2.3.1.32 chamfer

A **chamfer** is a type of **transition_feature** that is the representation of a linear transition between two joining non-coplanar faces. See ARM definition for Chamfer in paragraph 4.2.51 for more information.

EXPRESS specification:

```
*)
```

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```
ENTITY chamfer
  SUBTYPE OF (transition_feature);
WHERE
 WR1: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'CHAMFER_OFFSET' IN TYPEOF ( sar.
      related_shape_aspect ) ) AND ( sar.
      related_shape_aspect.description = 'first offset' ) ) ) =1;
 WR2: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'CHAMFER_OFFSET' IN TYPEOF ( sar.
      related_shape_aspect ) ) AND ( sar.
      related_shape_aspect.description = 'second offset' ) ) )
      =1;
 WR3: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr. used_representation ) ) AND ( pdr.
      used_representation.name = 'chamfer face' ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **chamfer** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship**, where the **related_shape_aspect** is a **chamfer_offset** with a **description** of 'first offset'.

WR2: The **chamfer** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship** where the **related_shape_aspect** is a **chamfer_offset** with a **description** of 'second offset'.

WR3: The **chamfer** shall contain exactly one **face_shape_representation** of its resulting chamfer face. This **representation** shall have a **name** of 'chamfer face'.

5.2.3.1.33 chamfer_offset

A **chamfer_offset** is a type of **shape_aspect** that is the representation of the linear setbacks from the edge of two surfaces to create a chamfer feature. See ARM definition for Chamfer_offset in paragraph 4.2.54 and for Chamfer_angle in paragraph 4.2.52 for more information.

EXPRESS specification:

```
*)
ENTITY chamfer_offset
```

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```
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:SELF.description IN [ 'first offset' , 'second offset' ];
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR4: ( SELF.description<> 'first offset' ) OR ( SIZEOF ( QUERY
     ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'offset amount' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR5: ( SELF.description<> 'second offset' ) OR ( SIZEOF ( QUERY
     ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'offset amount' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) OR
     ( SIZEOF ( QUERY ( i <* pdr. used_representation.items | (
     i.name= 'offset angle' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT' IN TYPEOF ( i ) ) ) ) =1 )
     ) ) ) =1 ) ;
 WR6: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'CHAMFER' IN TYPEOF ( sar.
     relating_shape_aspect ) ) ) ) >=1;
 WR7: ( SELF.description<> 'first offset' ) OR ( SIZEOF ( QUERY
     ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'first face shape' ) ) ) =1 ) ;
 WR8: ( SELF.description<> 'second offset' ) OR ( SIZEOF ( QUERY
```

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```
     ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'second face shape' ) ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **description** for the **chamfer_offset** shall be either 'first offset' or 'second offset'.

WR2: The **chamfer_offset** shall have its implicit representation specified by exactly one **shape_representation_with_parameters**.

WR3: The **chamfer_offset** shall have an implicit representation that contains exactly one **representation_item** in its set of **items**.

WR4: If the **description** of the **chamfer_offset** is 'first offset', exactly one **representation_item** used for the implicit representation of the **chamfer_offset** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'offset amount'.

WR5: If the **description** of the **chamfer_offset** is 'second offset', the implicit representation shall contain a **representation_item** that is of type **measure_representation_item** with either a **name** of 'offset amount' and of type **length_measure_with_unit** or a **name** of 'offset angle' that is of type **plane_angle_measure_with_unit**.

WR6: The **chamfer_offset** shall be the **related_shape_aspect** in at least one **feature_component_relationship** that refers to a **chamfer** as its **relating_shape_aspect**.

WR7: If the **chamfer_offset** has a **description** of 'first offset', it shall contain exactly one **face_shape_representation** with a **name** of 'first face shape'.

WR8: If the **chamfer_offset** has a **description** of 'second offset', it shall contain exactly one **face_shape_representation** with a **name** of 'second face shape'.

5.2.3.1.34 characterized_class

A **characterized_class** is a type of **class** and **characterized_object** with associated characteristics.

EXPRESS specification:

```
*)
ENTITY characterized_class
  SUBTYPE OF (characterized_object, class);
END_ENTITY;
(*
```

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5.2.3.1.35 circular_closed_profile

A **circular_closed_profile** is a type of **shape_aspect** that consists of an enclosed 2D area and a reference system for the parameters of the **circular_closed_profile**. The enclosed area is circular and defined by a radius. The reference system is used to define location and orientation of the **circular_closed_profile** and consists of two orthogonal axes X and Y that intersect in a reference point. See ARM definition for Circular_closed_profile in paragraph 4.2.58 for more information.

EXPRESS specification:

```
*)
ENTITY circular_closed_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='diameter' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **circular_closed_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **circular_closed_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **circular_closed_profile** shall contain two **representation_item**s in its set of **items**.

WR4: Exactly one **representation_item** used for the implicit representation of a **circular_closed_profile** shall be of type **placement** with a **name** of 'orientation'.

WR5: Exactly one **representation_item** used for the implicit representation of a **circular_closed_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'diameter'.

Informal propositions:

IP1: The **circular_closed_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **circular_closed_profile** is defined at the centre of the circle.

5.2.3.1.36 circular_pattern

A **circular_pattern** is a type of **replicate_feature** representing a pattern where a number of occurrences of a base feature are equally spaced around a diameter. See ARM definition for Circular_pattern in paragraph 4.2.62 for more information.

EXPRESS specification:

```
*)
ENTITY circular_pattern
  SUBTYPE OF (replicate_feature);
WHERE
 WR1: ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {2<= SIZEOF ( pdr.
     used_representation.items ) <=5} ) ) =1 ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
```

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```
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='diameter' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) <=1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name=
     'base feature rotation' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) <=1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'number of features'
     ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM'
     IN TYPEOF ( i ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'COUNT_MEASURE' IN TYPEOF ( i\measure_with_unit.
     value_component ) ) ) ) =1 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'angular spacing' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **circular_pattern** shall have exactly one implicit representation of type **shape_representation_with_parameters**. This **representation** shall contain between two and five **representation_item**s in its set of **items**.

WR2: The implicit representation of the **circular_pattern** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'diameter'.

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WR3: The implicit representation of the **circular_pattern** shall contain at most one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'base feature rotation'.

WR4: The implicit representation of the **circular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'number of features'.

WR5: The implicit representation of the **circular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'angular spacing'.

Informal propositions:

IP1: The location of the **circular_pattern** shall be defined at the centre of the circle.

IP2: The **circular_pattern** shall be defined in the X-Y plane, with the X direction intersecting the placement position of the first base feature.

5.2.3.1.37 class

A **class** is a type of **group** that is a classification of an object which characterizes all objects of the same kind; such a classification is independent from the application of the classified object.

EXPRESS specification:

```
*)
ENTITY class
  SUBTYPE OF (group);
END_ENTITY;
(*
```

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **class** entity:

– restrict_class_system_assignment_for_class (see 5.2.4.87);

– restrict_group_relationship_for_general_classification_hierarchy (see 5.2.4.102);

– restrict_version_assignment_for_class (see 5.2.4.198).

5.2.3.1.38 class_system

A **class_system** is a type of **group** that specifies a method for classifying objects.

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EXPRESS specification:

```
*)
ENTITY class_system
  SUBTYPE OF (group);
END_ENTITY;
(*
```

5.2.3.1.39 class_usage_effectivity_context_assignment

A **class_usage_effectivity_context_assignment** is a type of **effectivity_context_assignment** that assigns an **applied_effectivity_assignment** specifying the **effectivity_item**s that impact the design of a solution for an **effectivity_context_item**.

EXPRESS specification:

```
*)
ENTITY class_usage_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
  items : SET [1:?] OF class_usage_effectivity_context_item;
WHERE
 WR1:SELF.role. name = 'class usage influence' ;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | NOT (
      'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF ( i )
      ) ) ) =0;
 WR3: ( 'AUTOMOTIVE_DESIGN.'+ 'APPLIED_EFFECTIVITY_ASSIGNMENT'
      IN TYPEOF ( SELF.assigned_effectivity_assignment ) ) AND (
      SIZEOF ( TYPEOF ( SELF.assigned_effectivity_assignment.
      assigned_effectivity ) ) =1 ) AND (
      SELF.assigned_effectivity_assignment.
      assigned_effectivity.id = 'class usage' ) AND ( SIZEOF (
      QUERY ( i <* SELF.assigned_effectivity_assignment\
      applied_effectivity_assignment.items | NOT (
      'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' IN TYPEOF ( i ) )
      ) ) =0 ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** for which the **applied_effectivity_assignment** identifies a design impact.

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Formal propositions:

WR1: The **class_usage_effectivity_context_assignment** shall have a **role** with a **name** of 'class usage influence'.

WR2: The **class_usage_effectivity_context_assignment** shall only have **product_definition**s in its set of **items** which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'conceptual definition'.

WR3: The **class_usage_effectivity_context_assignment** shall reference an **applied_effectivity_assignment** with an **assigned_effectivity** which is not of an **effectivity** subtype and which has an **id** of 'class usage' and which has only **product_concept_feature_category_usage** objects in the set of **items**.

5.2.3.1.40 closed_path_profile

A **closed_path_profile** is a type of **shape_aspect** that consists of a connected set of curves and possibly a reference system that may be used to place the **closed_path_profile**. See ARM definition for General_closed_profile in paragraph 4.2.218 for more information.

EXPRESS specification:

```
*)
ENTITY closed_path_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | 'AUTOMOTIVE_DESIGN.'+ 'PATH_SHAPE_REPRESENTATION' IN
```

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```
     TYPEOF ( pdr. used_representation ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PATH_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( SIZEOF ( QUERY
     ( i <* pdr. used_representation.items | ( i.name=
     'profile shape' ) ) ) =1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **closed_path_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **closed_path_profile** shall have exactly one implicit representation defined by a **shape_-representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **closed_path_profile** shall contain one **representation_item** in its set of **items**.

WR4: Exactly one **representation_item** used for the implicit representation of a **closed_path_profile** shall be of type **placement** with a **name** of 'orientation'.

WR5: The **closed_path_profile** shall have exactly one **path_shape_representation**.

WR6: The **representation_item** contained in the **path_shape_representation** shall have a **name** of 'profile shape'.

Informal propositions:

IP1: The **closed_path_profile** shall be planar and shall lie in the X-Y plane of the reference system if this is present.

5.2.3.1.41 composite_hole

A **composite_hole** is a type of **compound_feature** that is the representation of two **round_hole**s for the purpose of creating two commonly used **round_hole** combinations, the countersunk hole and the counterbore hole. The counterbore hole is the representation of two **round_hole**s with one having a larger diameter than the second. The countersunk hole is the representation of two **round_hole**s, the first having a larger diameter than the second with a linear decrease in diameter until it is the same as the second. This linear decrease shall be represented by a **taper**. See ARM definition for Compound_hole in paragraph 4.2.91 for more information.

EXPRESS specification:

```
*)
```

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```
ENTITY composite_hole
  SUBTYPE OF (compound_feature);
WHERE
 WR1:SELF\characterized_object. description IN ['counterbore' ,
     'countersunk'];
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) AND ( sa. name = 'compound feature in solid' ) AND (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | 'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_RELATIONSHIP'
     IN TYPEOF ( sar ) ) ) =2 ) ) ) =1;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) AND ( sa. name = 'compound feature in solid' ) AND (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | 'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_RELATIONSHIP'
     IN TYPEOF ( sar ) ) ) =2 ) AND ( SIZEOF (
     get_round_holes_for_composite_hole ( bag_to_set ( USEDIN (
     sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) ) ) ) =2 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) AND ( sa. name = 'compound feature in solid' ) AND (
     SIZEOF ( QUERY ( rh1 <* get_round_holes_for_composite_hole
     ( bag_to_set ( USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) ) ) | ( SIZEOF ( QUERY ( rh2 <*
     get_round_holes_for_composite_hole ( bag_to_set ( USEDIN (
     sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) ) ) | ( rh1:<>:rh2 ) AND ( get_diameter_for_round_hole (
     rh1 ) =get_diameter_for_round_hole ( rh2 ) ) ) =0 ) ) )
     =0 ) ) ) =1;
 WR5: ( SELF.description<>'countersunk' ) OR ( SIZEOF ( QUERY (
     sa <* get_shape_aspects ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) AND ( sa. name
     = 'compound feature in solid' ) AND ( SIZEOF ( QUERY ( rh
     <* get_round_holes_for_composite_hole ( bag_to_set ( USEDIN
     ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) ) ) | ( SIZEOF ( QUERY ( sa1 <* get_shape_aspects ( rh )
     | ( sa. description = 'change in diameter occurrence' ) AND
     ( SIZEOF ( QUERY ( sar <* USEDIN ( sa1 ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
     ) | ( sar. description = 'taper usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
     relating_shape_aspect ) ) ) ) =1 ) ) ) =1 ) ) ) =1 ) ) ) =1
     ) ;
END_ENTITY;
```

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```
(*
```

Formal propositions:

WR1: The **description** of the **composite_hole** shall be either 'counterbore' or 'countersunk'.

WR2: The basis shape of the **composite_hole** shall be refered to by a **composite_shape_aspect** with a **name** of 'compound feature in solid'. This **shape_aspect** shall be the **relating_shape_aspect** of exactly two instances of **feature_component_relationship**.

WR3: The **feature_component_relationship**s refering to the basis shape shall refer both either to instances of **instanced_feature** or to instances of **placed_feature** as their **related_shape_aspect**. In case the **related_shape_aspect**s are of type **instanced_feature** they shall be of type **round_hole**, else the **placed_feature**s shall refer to **round_hole**s as their base features.

WR4: The **round_hole**s that comprise the **composite_hole** shall not have diameters that are equal in length.

WR5: If the **description** of the **composite_hole** is 'countersunk', exactly one **round_hole** that comprises it shall be a tapered hole.

5.2.3.1.42 compound_feature

A **compound_feature** is a type of **feature_definition** that is the representation of several other features and their relationships to one another for the purpose of creating unique user defined features. See ARM definitions for Compound_feature_in_panel in paragraph 4.2.85 and for Compound_feature_in_solid in paragraph 4.2.88 for more information.

EXPRESS specification:

```
*)
ENTITY compound_feature
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     name IN [ 'compound feature in solid' ,
     'compound feature in panel' ] ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) ) ) =1;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) ) ) >0
     ) ) ) =0;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
```

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```
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'INSTANCED_FEATURE' , 'AUTOMOTIVE_DESIGN.'+
    'PLACED_FEATURE' , 'AUTOMOTIVE_DESIGN.'+ 'APPLIED_AREA' ,
    'AUTOMOTIVE_DESIGN.'+ 'TRANSITION_FEATURE']*TYPEOF ( sar.
    related_shape_aspect ) ) =1 ) ) ) >0 ) ) ) =0;
WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
    sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLACED_FEATURE' IN TYPEOF (
    sar. related_shape_aspect ) ) AND ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( sar.
    related_shape_aspect.of_shape. definition ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'element placement' )
    AND ( 'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) )
    ) <>1 ) ) ) >0 ) ) ) >0 ) ) ) =0;
WR5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'compound feature in solid' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'TRANSITION_FEATURE'
    , 'AUTOMOTIVE_DESIGN.'+ 'BOSS' , 'AUTOMOTIVE_DESIGN.'+
    'APPLIED_AREA']*TYPEOF ( sar. related_shape_aspect ) ) +
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'SLOT' ,
    'AUTOMOTIVE_DESIGN.'+ 'POCKET' , 'AUTOMOTIVE_DESIGN.'+
    'ROUND_HOLE' , 'AUTOMOTIVE_DESIGN.'+ 'RIB' ,
    'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_FEATURE']*TYPEOF ( sar.
    related_shape_aspect.of_shape. definition ) ) =0 ) ) ) >0 )
    ) ) =0;
WR6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'compound feature in panel' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'TRANSITION_FEATURE']*TYPEOF ( sar. related_shape_aspect )
    ) + SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'BEAD' ,
    'AUTOMOTIVE_DESIGN.'+ 'HOLE_IN_PANEL' ,
    'AUTOMOTIVE_DESIGN.'+ 'FEATURE_IN_PANEL' ,
    'AUTOMOTIVE_DESIGN.'+ 'JOGGLE' , 'AUTOMOTIVE_DESIGN.'+
    'LOCATOR' , 'AUTOMOTIVE_DESIGN.'+
    'COMPOUND_FEATURE']*TYPEOF ( sar.
    related_shape_aspect.of_shape. definition ) ) =0 ) ) ) >0 )
    ) ) =0;
WR7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'compound feature in panel' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_FEATURE' IN TYPEOF (
```

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```
     sar. related_shape_aspect.of_shape. definition ) ) AND (
     sar. related_shape_aspect.name =
     'compound feature in solid' ) ) ) >0 ) ) ) + SIZEOF ( QUERY
     ( sa <* get_shape_aspects ( SELF ) | ( sa. name =
     'compound feature in solid' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_FEATURE' IN TYPEOF (
     sar. related_shape_aspect.of_shape. definition ) ) AND (
     sar. related_shape_aspect.name =
     'compound feature in panel' ) ) ) >0 ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **compound_feature** shall have a basis shape that has exactly one **shape_aspect** identified on it that is of type **composite_shape_aspect**. The **composite_shape_aspect** shall have a **name** of either 'compound feature in solid' or 'compound feature in panel'.

WR2: The **shape_aspect_relationship**s that are used to relate the single features with the **composite_shape_aspect** shall be of type **feature_component_relationship**.

WR3: The **composite_shape_aspect** defining a **compound_feature** shall be the **relating_shape_aspect** only in **shape_aspect_relationship**s with a **related_shape_aspect** that is of type **instanced_feature**, **placed_feature**, **applied_area**, or **transition_feature**.

WR4: Each **placed_feature** that is specified by the **component_relationship**s of a **composite_shape_aspect** of a **compound_feature** shall have a **representation_item** of type **placement** with a **name** of 'element placement' in its **shape_representation_with_parameters**.

WR5: If the **compound_feature** is a solid feature, its constituents shall only be of type **transition_feature**, **slot**, **pocket**, **boss**, **round_hole**, **rib**, **applied_area**, or another **compound_feature**.

WR6: If the **compound_feature** is a panel feature, its constituents shall only be of type **transition_feature**, **bead**, **hole_in_panel**, **feature_in_panel**, **joggle**, **locator**, or another **compound_feature**.

WR7: The **compound_feature** shall only have constituent **compound_feature**s of the same type (i.e. solid feature or panel feature).

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **compound_feature** entity:

– compound_features_of_equal_type (see 5.2.4.5).

5.2.3.1.43 compound_shape_representation

A **compound_shape_representation** is a type of **shape_representation** that represents the shape or a portion of the shape of a product using elements of different dimensionality such as wireframes or surface

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models that are topologically connected. The topology of a **compound_shape_representation** may be non-manifold. See ARM definition for Compound_model in paragraph 4.2.92 for more information.

EXPRESS specification:

```
*)
ENTITY compound_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: ( 'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_CONTEXT'
     IN TYPEOF ( SELF.context_of_items ) ) AND (
     SELF.context_of_items\
     geometric_representation_context.coordinate_space_dimension
     =3 ) ;
 WR2: SIZEOF ( QUERY ( cbsr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( cbsr_i ) ) <>1 ) ) =0;
 WR3: SIZEOF ( QUERY ( cbsr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( cbsr_i ) )
     =1 ) ) >0;
 WR4: SIZEOF ( QUERY ( cbsr_i <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( cbsr_i ) )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'COMPOUND_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+
     'NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION']* TYPEOF (
     cbsr_i\ mapped_item.mapping_source ) ) <>1 ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **compound_shape_representation** shall have a **coordinate_space_dimension** equal to three.

WR2: The **items** in the **compound_shape_representation** shall be of type **edge_based_wireframe_model**, **face_based_surface_model**, **mapped_item** or **axis2_placement_3d**.

WR3: The **items** of a **compound_shape_representation** shall include at least one **mapped_item** or one **edge_based_wireframe_model** or one **face_based_surface_model**.

WR4: If there is a **mapped_item** in a **compound_shape_representation**, the source of the **mapped_item** shall be a **compound_shape_representation**, a **edge_based_wireframe_shape_representation**, or a **non_manifold_surface_shape_representation**.

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Informal propositions:

IP1: All elements in a **compound_shape_representation** shall be topologically connected.

5.2.3.1.44 configured_effectivity_assignment

A **configured_effectivity_assignment** is a type of **effectivity_assignment** that defines a valid usage of a **configured_effectivity_item** in the context of a certain **product_class**. See Configuration 4.2.94 for more information.

EXPRESS specification:

```
*)
ENTITY configured_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET [1:?] OF configured_effectivity_item;
WHERE
 WR1: ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'EFFECTIVITY']* TYPEOF (
     SELF.assigned_effectivity ) ) =1 ) AND (
     SELF.assigned_effectivity. id = 'configuration validity' )
     ;
 WR2: SIZEOF ( SELF.items ) =1;
 WR3: SIZEOF ( QUERY ( i <* SELF.items | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF ( i )
     ) OR NOT ( i\product_definition. frame_of_reference.name IN
     [ 'conceptual definition', 'part occurrence' ,
     'functional definition', 'alternative definition' ] ) ) )
     =0;
 WR4:SELF.role. name IN ['design' , 'usage'];
 WR5: ( SELF.role. name<>'design' ) OR ( SIZEOF ( QUERY ( i <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION'
     IN TYPEOF ( i ) ) AND ( i\product_definition.
     frame_of_reference.name = 'part occurrence' ) ) ) =0 ) ;
 WR6: ( SELF.role. name<>'usage' ) OR ( SIZEOF ( QUERY ( i <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION'
     IN TYPEOF ( i ) ) AND ( i\product_definition.
     frame_of_reference.name = 'conceptual definition' ) ) ) =0
     ) ;
 WR7:SELF.role. description IN ['exception' , 'inherited' ,
     'local'];
 WR8: SIZEOF ( QUERY ( x <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'EFFECTIVITY_CONTEXT_ASSIGNMENT.'+
     'ASSIGNED_EFFECTIVITY_ASSIGNMENT' ) | 'AUTOMOTIVE_DESIGN.'+
     'CONFIGURED_EFFECTIVITY_CONTEXT_ASSIGNMENT' IN TYPEOF ( x )
     ) ) =1;
END_ENTITY;
(*
```

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Attribute definitions:

items: the set of items to which the configuration information is assigned.

Formal propositions:

WR1: The **configured_effectivity_assignment** shall have an **assigned_effectivity** which is not of an **effectivity** subtype and which has an **id** of 'configuration validity'.

WR2: The **configured_effectivity_assignment** shall have exactly one item in its set of **items**.

WR3: The **configured_effectivity_assignment** shall only have **product_definitions** in its set of **items** which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'conceptual definition', 'part occurrence', 'functional definition', or 'alternative definition'.

WR4: The **configured_effectivity_assignment** shall have as **role** an **object_role** with a **name** of 'design' or 'usage'.

WR5: If the **configured_effectivity_assignment** has as **role** an **object_role** with a **name** of 'design', it may not have **product_definition**s in its set of **items** which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence'.

WR6: If the **configured_effectivity_assignment** has as **role** an **object_role** with a **name** of 'usage', it may not have **product_definition**s in its set of **items** which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'conceptual definition', or 'functional definition'.

WR7: The **configured_effectivity_assignment** shall have as **role** an **object_role** with a **description** of 'exception', 'inherited', or 'local'.

WR8: The **configured_effectivity_assignment** shall be referenced as **assigned_effectivity_assignment** by exactly one **configured_effectivity_context_assignment**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **configured_effectivity_assignment** entity:

– restrict_effectivity_usage (see 5.2.4.99).

5.2.3.1.45 configured_effectivity_context_assignment

A **configured_effectivity_context_assignment** is a type of **effectivity_context_assignment** that specifies the characteristic or combination of characteristics for which the **configured_effectivity_item**s in the set of **items** of the **assigned_effectivity_assignment** provide a solution.

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EXPRESS specification:

```
*)
ENTITY configured_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
  items : SET [1:?] OF configured_effectivity_context_item;
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'CONFIGURED_EFFECTIVITY_ASSIGNMENT'
     IN TYPEOF ( SELF.assigned_effectivity_assignment ) ;
 WR2: SIZEOF ( SELF.items ) =1;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of items that specify the characteristic or combination of characteristics for which the **configured_effectivity_item**s in the set of **items** of the **assigned_effectivity_assignment** provide a solution.

Formal propositions:

WR1: The **configured_effectivity_context_assignment** shall reference as **assigned_effectivity_assignment** a **configured_effectivity_assignment**.

WR2: The **configured_effectivity_context_assignment** shall have exactly one item in its set of **items**.

5.2.3.1.46 constructive_geometry_representation

A **constructive_geometry_representation** is a type of **representation** that is a collection of non-shape geometry that is used to support the definition of the geometry that is representing the shape of the part. See ARM definition for Constructive_geometry in paragraph 4.2.100 for more information.

EXPRESS specification:

```
*)
ENTITY constructive_geometry_representation
  SUBTYPE OF (representation);
WHERE
 WR1: ( 'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_CONTEXT'
     IN TYPEOF ( SELF.context_of_items ) ) AND (
     {2<=SELF.context_of_items\
     geometric_representation_context.coordinate_space_dimension<=3}
     ) ;
 WR2: SIZEOF ( QUERY ( cgr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'CURVE' , 'AUTOMOTIVE_DESIGN.'+ 'EDGE' ,
     'AUTOMOTIVE_DESIGN.'+ 'FACE' , 'AUTOMOTIVE_DESIGN.'+
     'POINT' , 'AUTOMOTIVE_DESIGN.'+ 'SURFACE' ,
      'AUTOMOTIVE_DESIGN.'+ 'FACE_SURFACE' ,
     'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT']* TYPEOF ( cgr_i ) )
     <>1 ) ) =0;
 WR3: SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
     'REP_2' ) ) >0;
 WR4: SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_MAP.'+
     'MAPPED_REPRESENTATION' ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **constructive_geometry_representation** shall have a **geometric_representation_context** as **context_of_items**. This **geometric_representation_context** shall have a **coordinate_space_dimension** of value '2' or '3'.

WR2: The **items** in the **constructive_geometry_representation** shall be of type **placement**, **curve**, **edge**, **face**, **point**, **surface**, **face_surface** or **vertex_point**.

WR3: The **constructive_geometry_representation** shall play the role of **rep_2** for at least one **constructive_geometry_representation_relationship**.

WR4: The **constructive_geometry_representation** shall not play the role of **mapped_representation** for a **representation_map**.

5.2.3.1.47 constructive_geometry_representation_relationship

A **constructive_geometry_representation_relationship** is a type of **representation_relationship** that associates the geometry representing the shape of a part with the constructive geometry which was used for its definition or a constructive geometry with another constructive geometry which was used for its definition.

EXPRESS specification:

```
*)
ENTITY constructive_geometry_representation_relationship
  SUBTYPE OF (representation_relationship);
WHERE
 WR1: ( SELF.rep_1. context_of_items:=:SELF.rep_2.
     context_of_items ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF ( SELF.rep_1.
     context_of_items ) ) ;
```

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```
 WR2:'AUTOMOTIVE_DESIGN.'+
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION' IN TYPEOF (
     SELF.rep_2 ) ;
 WR3: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION']* TYPEOF (
     SELF.rep_1 ) ) =1;
 WR4: NOT (
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP_WITH_TRANSFORMATION'
     IN TYPEOF ( SELF ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Both **representation**s playing the roles of **rep_1** and **rep_2** of the **constructive_geometry_-representation_relationship** shall share the same **geometric_representation_context**.

WR2: The **representation** playing the role of **rep_2** of the **constructive_geometry_representation_-relationship** shall be of type **constructive_geometry_representation**.

WR3: The **representation** playing the role of **rep_1** of the **constructive_geometry_representation_-relationship** shall be of type **shape_representation** or **constructive_geometry_representation**.

WR4: The **constructive_geometry_representation_relationship** shall not be of type **representation_-relationship_with_transformation**.

5.2.3.1.48 contact_ratio_representation

A **contact_ratio_representation** is a type of **representation** that represents the ratio of contact between an object and a measuring gauge. For more information see ARM definition for Contact_ratio in paragraph 4.2.102.

EXPRESS specification:

```
*)
ENTITY contact_ratio_representation
  SUBTYPE OF (representation);
WHERE
 WR1: ( SIZEOF ( SELF.items ) =1 ) AND ( SIZEOF ( QUERY ( i <*
     SELF.items | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'VALUE_RANGE']* TYPEOF ( i ) ) =1 ) AND ( i.name =
     'ratio value' ) ) ) =1 ) ;
 WR2: ( SIZEOF ( QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | pdr. name =
     'contact ratio reference' ) ) =1 ) AND ( SIZEOF ( QUERY (
```

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```
     pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | ( pdr. name =
     'contact ratio reference' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'PHYSICALLY_MODELLED_PRODUCT_DEFINITION' IN TYPEOF ( pdr.
     definition.definition ) ) ) ) =1 ) ;
 WR3: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN (
     pdr. definition ,
     'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
     'DERIVED_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'GENERAL_PROPERTY' IN TYPEOF ( gpa. base_definition ) ) AND
     ( gpa. base_definition.name ='surface_condition' ) ) ) =1 )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **contact_ratio_representation** shall contain exactly one **representation_item** in its set of **items**. This **representation_item** shall be of type **measure_representation_item** or of type **value_range** and it shall have a **name** of 'ratio value'.

WR2: Each instance of **contact_ratio_representation** shall be referenced as the **used_representation** by exactly one **property_definition_representation** that has a **name** of 'contact ratio reference'. This **property_definition_representation** shall relate the **representation** with a **physically_modelled_product_definition**.

WR3: Each instance of **contact_ratio_representation** shall be referenced by exactly one **property_definition_representation**. This **property_definition_representation** shall relate the **representation** with a **property_definition** that is the **derived_definition** of a **general_property_association** that refers as **base_definition** to a **general_property** with a **name** of 'surface_condition'.

5.2.3.1.49 default_tolerance_table

A **default_tolerance_table** is a type of **representation** that specifies information about general tolerances. See ARM definition for General_tolerance_table in paragraph 4.2.234 for more information.

EXPRESS specification:

```
*)
ENTITY default_tolerance_table
  SUBTYPE OF (representation);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( i <* SELF.items | NOT (
      'AUTOMOTIVE_DESIGN.'+ 'DEFAULT_TOLERANCE_TABLE_CELL' IN
      TYPEOF ( i ) ) ) ) =0;
 WR2: ( SIZEOF ( QUERY ( rr <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
      'REP_1' ) | rr. name<> 'general tolerance definition' ) )
      =0 ) AND ( SIZEOF ( QUERY ( rr <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
      'REP_1' ) | ( rr. name = 'general tolerance definition' )
      AND ( rr. rep_2.name<> 'default tolerances' ) ) ) =0 ) AND
      ( SIZEOF ( USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
      'REP_2' ) ) =0 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: An instance of **default_tolerance_table** shall contain only **representation_item**s of type **default_tolerance_table_cell** in its set or **items**.

WR2: An instance of **default_tolerance_table** shall not be referenced by any **representation_relationship** except as **rep_1** by zero or more **representation_relationship**s with a **name** of 'general tolerance definition'. If such **representation_relationships** exist, they shall reference as **rep_2 representation**s with a **name** of 'default tolerances'.

5.2.3.1.50 default_tolerance_table_cell

A **default_tolerance_table_cell** is a type of **compound_representation_item** that specifies one cell entry in a **default_tolerance_table**. See ARM definition for Tolerance_table_cell in paragraph 4.2.523 for more information.

EXPRESS specification:

```
*)
ENTITY default_tolerance_table_cell
  SUBTYPE OF (compound_representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( x <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REPRESENTATION.'+ 'ITEMS' ) |
      'AUTOMOTIVE_DESIGN.'+ 'DEFAULT_TOLERANCE_TABLE' IN TYPEOF (
      x ) ) ) =1;
 WR2:default_tolerance_table_cell_wr2 (
      SELF\compound_representation_item. item_element ) ;
 WR3:default_tolerance_table_cell_wr3 (
      SELF\compound_representation_item. item_element ) ;
```

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```
 WR4:default_tolerance_table_cell_wr4 (
     SELF\compound_representation_item. item_element ) ;
 WR5:default_tolerance_table_cell_wr5 (
     SELF\compound_representation_item. item_element ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **default_tolerance_table_cell** shall be in the set of **items** of exactly one **default_tolerance_table**.

WR2: Each instance of **default_tolerance_table_cell** shall refer to at most five **representation_item**s as **item_element**.

WR3: Either exactly one **representation_item** in the set of **item_element**s shall be a **measure_representation_item** with the **name** of 'significant number of digits' or there shall be two **representation_item**s of type **measure_representation_item** where one of them has the **name** of 'lower limit' and the other one has the **name** of 'upper limit'.

WR4: Either exactly one **representation_item** in the set of **item_element**s shall be a **measure_representation_item** with the **name** of 'plus minus tolerance value' or there shall be two **representation_item**s of type **measure_representation_item** where one of them has the **name** of 'lower tolerance value' and the other one has the **name** of 'upper tolerance value'.

WR5: At most one **representation_item** in the set of **item_element**s shall be of type **descriptive_representation_item**. If present, this **descriptive_representation_item** shall have a **name** of 'cell description'.

5.2.3.1.51 derived_unit_variable

A **derived_unit_variable** is a type of **derived_unit** and **variable_semantics** that represents the unit in an explicitly defined mathematical function.

EXPRESS specification:

```
*)
ENTITY derived_unit_variable
  SUBTYPE OF (derived_unit, variable_semantics);

INVERSE
associated_variable_environment: environment FOR semantics;
END_ENTITY;
(*
```

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Attribute definitions:

associated_variable_environment: the **environment** that specifies the representation for the derived unit.

5.2.3.1.52 directed_angle

A **directed_angle** is a type of **shape_aspect** that specifies an angle value and the element from which the angle is measured. See ARM definition for Angle_specification in paragraph 4.2.11 for more information.

EXPRESS specification:

```
*)
ENTITY directed_angle
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR4:SELF.description IN [ 'punch direction' , 'profile normal'
     , 'surface normal' ];
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='angle' ) AND ( SIZEOF
     ( ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) =1;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **directed_angle** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **directed_angle** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the shape of the **directed_angle** shall contain exactly one **representation_item** in its set of **items**.

WR4: The **description** of the **directed_angle** shall be either 'punch direction', 'profile normal', or 'surface normal'.

WR5: The implicit representation of the **directed_angle** shall have exactly one **representation_item** in its set of **items**. This **representation_item** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** and shall have a **name** of 'angle'.

5.2.3.1.53 directed_dimensional_location

A **directed_dimensional_location** is a type of **dimensional_location** that specifies that the direction of the location dimension is of interest, i.e., the dimension is specified from the **relating_shape_aspect** to the **related_shape_aspect**.

EXPRESS specification:

```
*)
ENTITY directed_dimensional_location
  SUBTYPE OF (dimensional_location);
END_ENTITY;
(*
```

5.2.3.1.54 direction_shape_representation

A **direction_shape_representation** is a type of **shape_representation** that represents a direction vector in two or three dimensional space.

EXPRESS specification:

```
*)
ENTITY direction_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( SELF.items ) =1;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION' IN TYPEOF ( i ) ) ) =1;
END_ENTITY;
```

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```
(*
```

Formal propositions:

WR1: The **direction_shape_representation** shall have exactly one **representation_item** in its set of **items**.

WR2: The geometric element that is used to represent the **direction_shape_representation** shall be a **direction**.

5.2.3.1.55 document_file

A **document_file** is of type document and of type **characterized_object** and characterizes files with properties, e.g. file size, creating system, etc.

EXPRESS specification:

```
*)
ENTITY document_file
  SUBTYPE OF (document,characterized_object);
WHERE
 WR1:SELF\characterized_object. name =’’;
 WR2: NOT EXISTS ( SELF\characterized_object. description ) ;
 WR3: SIZEOF ( QUERY ( drt <* SELF\document.
     representation_types | drt. name IN [’digital’ ,
     ’physical’] ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The name of the **characterized_object** shall not be used, use name of document.

WR2: The description of the **characterized_object** shall not be used, use description of document.

WR3: The document shall have exactly one **document_representation_type** with a **name** of either ’digital’ or ’physical’.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **document_file** entity:

– restrict_properties_of_document_file (see 5.2.4.185);

– restrict_version_assignment_for_document_file (see 5.2.4.200).

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5.2.3.1.56 document_product_equivalence

A **document_product_equivalence** is a type of **document_product_association**. It specifies the equivalence of a **product**, a **product_definition**, or **product_definition_formation** instance with a **document** instance.

EXPRESS specification:

```
*)
ENTITY document_product_equivalence
  SUBTYPE OF (document_product_association);
WHERE
 WR1:SELF.name ='equivalence';
 WR2: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT' IN TYPEOF (
     SELF.related_product ) ) OR ( ( SELF.relating_document.
     kind.product_data_type =
     'configuration controlled document' ) AND ( SIZEOF ( QUERY
     ( prpc <* USEDIN ( SELF.related_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name ='document' ) ) =1 ) ) ;
 WR3: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_FORMATION'
     IN TYPEOF ( SELF.related_product ) ) OR ( (
     SELF.relating_document. kind.product_data_type =
     'configuration controlled document version' ) AND ( SIZEOF
     ( QUERY ( prpc <* USEDIN (
     SELF.related_product\product_definition_formation.
     of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name ='document' ) ) =1 ) ) ;
 WR4: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF
     ( SELF.related_product ) ) OR ( ( SELF.relating_document.
     kind.product_data_type =
     'configuration controlled document definition' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN (
     SELF.related_product\product_definition.
     formation.of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name ='document' ) ) =1 ) ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The name of the **document_product_association** shall be 'equivalence'.

WR2: If the **related_product** is a **product** then the **relating_document** shall have a **document_type** with **product_data_type** 'configuration controlled document' and there is exactly one **product_related_product_category** with a **name** of 'document' for the **product**.

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WR3: If the **related_product** is a **product_definition_formation** then the **relating_document** shall have a **document_type** with **product_data_type** 'configuration controlled document version' and there is exactly one **product_related_product_category** with a **name** of 'document' for the **product** of the related **product_definition_formation**.

WR4: If the **related_product** is a **product_definition** then the **relating_document** shall have a **document_type** with **product_data_type** 'configuration controlled document definition' and there is exactly one **product_related_product_category** with a **name** of 'document' for the **product** of the related **product_definition**.

5.2.3.1.57 draughting_pre_defined_text_font

A **draughting_pre_defined_text_font** is a type of **pre_defined_text_font** that is identified by name. The definition of the appearance of each **draughting_pre_defined_text_font** is given in ISO 3098-1.

NOTE - The definition of this entity is identical to the definition in ISO 10303–202.

EXPRESS specification:

```
*)
ENTITY draughting_pre_defined_text_font
  SUBTYPE OF (pre_defined_text_font);
WHERE
 WR1:SELF.name IN [ 'ISO 3098-1 font A' , 'ISO 3098-1 font B' ];
END_ENTITY;
(*
```

Formal propositions:

WR1: The name of the **draughting_pre_defined_text_font** shall be 'ISO 3098-1 font A' or 'ISO 3098-1 font B'.

Attribute value definitions:

The **draughting_pre_defined_text_font**s are:

ISO 3098-1 font A: the text font denoted as Lettering A in clause 3 of ISO 3098-1.

ISO 3098-1 font B: the text font denoted as Lettering B in clause 3 of ISO 3098-1.

5.2.3.1.58 draughting_specification_reference

A **draughting_specification_reference** is a type of **document_reference** that is the designation of an external draughting specification for a drawing revision.

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NOTE - The definition of this entity is identical to the definition in ISO 10303 – 505.

EXPRESS specification:

```
*)
ENTITY draughting_specification_reference
  SUBTYPE OF (document_reference);
  specified_items : SET [1:?] OF specified_item;
WHERE
 WR1: ( SELF.assigned_document. kind.product_data_type =
     'draughting specification' ) ;
END_ENTITY;
(*
```

Attribute definitions:

specified_items: The **drawing_revision**s to which a draughting specification is applied.

Formal propositions:

WR1: Each document assigned shall be a draughting specification.

5.2.3.1.59 drawing_sheet_layout

A **drawing_sheet_layout** is a symbol that presents the layout or format for a drawing sheet.

EXPRESS specification:

```
*)
ENTITY drawing_sheet_layout
  SUBTYPE OF (draughting_symbol_representation);
END_ENTITY;
(*
```

5.2.3.1.60 edge_round

An **edge_round** is a type of **transition_feature** that is the representation of a circular convex transition between two faces. See ARM definition for Edge_round in paragraph 4.2.177 for more information.

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EXPRESS specification:

```
*)
ENTITY edge_round
  SUBTYPE OF (transition_feature);
WHERE
 WR1: ( SELF.description<> 'constant radius' ) XOR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR2: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {1<= SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) =1 ) ;
 WR3: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['radius' ,
     'first offset' , 'second offset' ] ) ) ) >0 ) ) ) =0 ) ;
 WR4: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR5: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'first offset' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <=1 ) )
     ) =1 ) ;
 WR6: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
```

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```
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'second offset' ) AND
      ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <=1 ) )
      ) =1 ) ;
  WR7: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr. used_representation ) ) AND ( pdr.
      used_representation.name = 'first face shape' ) ) ) =1;
  WR8: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr. used_representation ) ) AND ( pdr.
      used_representation.name = 'second face shape' ) ) ) =1;
  WR9: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr. used_representation ) ) AND ( pdr.
      used_representation.name = 'edge round face' ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: An **edge_round** has an implicit representation of type **shape_representation_with_parameters** if and only if it has a **description** of 'constant radius'.

WR2: If the **description** of the **edge_round** is 'constant radius', the implicit representation shall contain between one and three **representation_item**s in its set of **items**.

WR3: If the **description** of the **edge_round** is 'constant radius', the implicit representation shall only contain **representation_item**s in its set of **items** that have a **name** of either 'radius', 'first offset', or 'second offset'.

WR4: If the **description** of the **edge_round** is 'constant radius', exactly one **representation_item** used for the implicit representation of the **edge_round** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR5: If the **description** of the **edge_round** is 'constant radius', at most one **representation_item** used for the implicit representation of the **edge_round** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'first offset'.

WR6: If the **description** of the **edge_round** is 'constant radius', at most one **representation_item** used for the implicit representation of the **edge_round** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'second offset'.

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WR7: The **edge_round** shall be defined by exactly one **representation** of type **face_shape_representation** with a **name** of 'first face shape'.

WR8: The **edge_round** shall be defined by exactly one **representation** of type **face_shape_representation** with a **name** of 'second face shape'.

WR9: The **edge_round** shall be defined by exactly one **representation** of type **face_shape_representation** with a **name** of 'edge round face'.

5.2.3.1.61 element_delivery

An **element_delivery** is a type of **action** that specifies the expected delivery of an activity element defined by an **applied_action_assignment**. See ARM definition for Element_delivery in paragraph 4.2.182 for more information.

EXPRESS specification:

```
*)
ENTITY element_delivery
  SUBTYPE OF (action);
WHERE
 WR1: ( SIZEOF ( QUERY ( aa <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.ACTION_ASSIGNMENT.ASSIGNED_ACTION' ) |
      'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF
      ( aa ) ) ) =1 ) AND ( SIZEOF ( QUERY ( aaa <* USEDIN ( SELF
      , 'AUTOMOTIVE_DESIGN.'+'ACTION_ASSIGNMENT.'+
      'ASSIGNED_ACTION' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( aaa ) ) AND ( aaa.
      role.name = 'deliverable element' ) AND ( SIZEOF ( aaa.
      items ) =1 ) AND ( SIZEOF ( QUERY ( i <* aaa. items | (
      'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF
      ( i ) ) AND ( SIZEOF ( i\applied_action_assignment. items )
      =1 ) AND ( SIZEOF ( QUERY ( i1 <* aaa\
      applied_action_assignment.items | ( 'AUTOMOTIVE_DESIGN.'+
      'CONFIGURATION_ITEM' IN TYPEOF ( i1 ) ) OR ( (
      'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF ( i1 )
      ) AND ( i1\ product_definition.frame_of_reference. name =
      'physical occurrence' ) ) OR ( ( 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_DEFINITION_FORMATION' IN TYPEOF ( i1 ) ) AND (
      SIZEOF ( QUERY ( prpc <* USEDIN ( i1 ,
      'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
      'PRODUCTS' ) | prpc\ product_category.name IN ['part' ,
      'raw material' , 'tool'] ) ) =1 ) ) ) ) =1 ) ) ) =1 ) ) )
      =1 ) ;
 WR2: ( SIZEOF ( USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ORGANIZATION_ASSIGNMENT.'+
      'ITEMS' ) ) =1 ) AND ( SIZEOF ( QUERY ( aoa <* USEDIN (
      SELF ,
      'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ORGANIZATION_ASSIGNMENT.'+
```

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```
    'ITEMS' ) |  aoa. role.name ='destination' ) ) =1 ) ;
 WR3: ( SIZEOF ( USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.'+ 'ACTION_PROPERTY.'+ 'DEFINITION' ) )
    =1 ) AND ( SIZEOF ( QUERY ( ap <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY.'+ 'DEFINITION' ) |
    SIZEOF ( USEDIN ( ap ,
    'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
    'PROPERTY' ) ) =1 ) ) =1 ) AND ( SIZEOF ( QUERY ( ap <*
    USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY.'+
    'DEFINITION' ) | SIZEOF ( QUERY ( apr <* USEDIN ( ap ,
    'AUTOMOTIVE_DESIGN.'+ 'ACTION_PROPERTY_REPRESENTATION.'+
    'PROPERTY' ) | ( apr. representation.name =
    'delivery quantity' ) AND ( SIZEOF ( apr.
    representation.items ) =1 ) AND ( SIZEOF ( QUERY ( i <*
    apr. representation.items | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'VALUE_RANGE']* TYPEOF ( i ) ) =1 ) ) =1 ) ) ) =1 ) ) =1 )
    ;
 WR4: SIZEOF ( USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
    'RELATING_ACTION' ) ) + SIZEOF ( USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
    'RELATED_ACTION' ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **element_delivery** shall be referenced as **assigned_action** by exactly one **applied_action_assignment**. This **applied_action_assignment** shall reference as its **role** an **object_role** that has a **name** of 'deliverable element' and shall have exactly one element in its set of **items**. This element shall be of type **applied_action_assignment** and shall have exactly one element in its set of **items**. This element shall be of type **configuration_item**, or shall be a **product_definition** which references as **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence', or shall be a **product_definition_formation** which references as **of_product** a **product** which is referenced by a **product_related_product_category** with a **name** of either 'part', 'raw material', or 'tool'.

WR2: There shall be exactly one instance of **applied_organization_assignment** that contains the **element_delivery** in its set of **items**. This **applied_organization_assignment** shall reference as its **role** an **organization_role** that has a **name** of 'destination'.

WR3: There shall be exactly one instance of **action_property** that references the **element_delivery** as its **definition**. This **action_property** shall be referenced as the **property** by exactly one instance of **action_property_representation**. This **action_property_representation** shall reference as its **representation** a **representation** that has a **name** of 'delivery quantity' and that contains exactly one **representation_item** in its set of **items**. This **representation_item** shall be a **measure_representation_item**, or a **value_range**.

WR4: The **element_delivery** shall not be referenced by an **action_relationship**.

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5.2.3.1.62 exclusive_product_concept_feature_category

An **exclusive_product_concept_feature_category** is a type of **product_concept_feature_category** in which the contained **product_concept_feature** instances describe mutually exclusive characteristics of a product. See ARM definition for Specification_category in paragraph 4.2.468 for more information.

EXPRESS specification:

```
*)
ENTITY exclusive_product_concept_feature_category
  SUBTYPE OF (product_concept_feature_category);
END_ENTITY;
(*
```

5.2.3.1.63 expression_conversion_based_unit

An **expression_conversion_based_unit** is a type of **context_dependent_unit** and **variable_semantics** that represents the unit in an explicitly defined mathematical function.

EXPRESS specification:

```
*)
ENTITY expression_conversion_based_unit
  SUBTYPE OF (context_dependent_unit, variable_semantics);

INVERSE
associated_variable_environment: environment FOR semantics;
END_ENTITY;
(*
```

Attribute definitions:

associated_variable_environment: the **environment** that specifies the representation for the derived unit.

5.2.3.1.64 externally_defined_class

An **externally_defined_class** is a type of **externally_defined_item** and **class** that represents classification information whose identification and definition is defined externally, i.e., not within this part of ISO 10303.

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EXPRESS specification:

```
*)
ENTITY externally_defined_class
  SUBTYPE OF (class,externally_defined_item);
END_ENTITY;
(*
```

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **externally_defined_class** entity:

– externally_defined_class_with_known_source_requirement (see 5.2.4.59);

– plib_class_reference_requires_version (see 5.2.4.66).

5.2.3.1.65 externally_defined_feature_definition

An **externally_defined_feature_definition** is a type of **externally_defined_item**. It relates the document containing a feature specification to a **feature_definition**. See ARM definition for Catalogue_-thread in paragraph 4.2.48 for more information.

EXPRESS specification:

```
*)
ENTITY externally_defined_feature_definition
  SUBTYPE OF (feature_definition,externally_defined_item);
WHERE
 WR1: ( SELF\externally_defined_item. item_id =
     'external thread' ) AND ( SELF\externally_defined_item.
     source.source_id = 'external feature specification' ) ;
 WR2: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_CLASSIFICATION_ASSIGNMENT.ITEMS'
     ) ) =1 ) OR ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_DOCUMENT_REFERENCE.ITEMS' ) ) +
     SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_DOCUMENT_USAGE_CONSTRAINT_ASSIGNMENT.ITEMS'
     ) ) =1 ) ;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {6<= SIZEOF ( pdr.
     used_representation.items ) <=7} ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
```

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```
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    i.name = 'thread side' ) AND (
    i\descriptive_representation_item. description IN
    ['internal' , 'external'] ) ) ) =1 ) ) ) =1;
WR5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name = 'major diameter' ) ) ) =1 ) ) )
    =1;
WR6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'RATIO_MEASURE_WITH_UNIT']*TYPEOF ( i
    ) ) =2 ) AND ( i.name = 'number of threads' ) ) ) =1 ) ) )
    =1;
WR7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    i.name = 'fit class' ) ) ) =1 ) ) ) =1;
WR8: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    i.name ='form' ) ) ) =1 ) ) ) =1;
WR9: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    i.name ='hand' ) AND ( i\descriptive_representation_item.
```

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```
     description IN [ 'left hand' , 'right hand' ] ) ) ) =1 ) )
     ) =1;
 WR10: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name ='qualifier' ) ) ) =1 ) ) ) <=1;
 WR11: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( NOT ( i.name IN [
     'thread side' , 'major diameter' , 'number of threads' ,
     'fit class' , 'form' , 'hand' , 'qualifier'] ) ) ) ) >0 ) )
     ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **externally_defined_feature_definition** shall have a **item_id** of 'external thread' and a **source** of 'external feature specification'.

WR2: The **externally_defined_feature_definition** shall be referenced in the role of **items** by an **applied_classification_assignment** or either an **applied_document_reference** or an **applied_document_usage_constraint_assignment**.

WR3: The **shape_representation_with_parameters** that represents the **externally_defined_feature_definition** shall contain between six and seven **representation_item**s in its set of **items**.

WR4: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **descriptive_representation_item** with a **name** of 'thread side' and a **description** of either 'internal' or 'external'.

WR5: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'major diameter'.

WR6: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **measure_representation_item** and **ratio_measure_with_unit** with a **name** of 'number of threads'.

WR7: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **descriptive_representation_item** with a **name** of 'fit class'.

WR8: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **descriptive_representation_item** with a **name** of 'form'.

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WR9: Exactly one **representation_item** used for the implicit representation of the **externally_defined_feature_definition** shall be of type **descriptive_representation_item** with a **name** of 'hand'. The **descriptive_representation_item** shall have a **description** of either 'left hand' or 'right hand'.

WR10: The implicit representation of the **externally_defined_feature_definition** shall contain at most one **representation_item** of type **descriptive_representation_item** that has a **name** of 'qualifier'.

WR11: The implicit representation of a **externally_defined_feature_definition** shall contain only **representation_item**s with a name of either 'thread side', 'major diameter', 'number of threads', 'fit class', 'form', 'hand', or 'qualifier'.

5.2.3.1.66 externally_defined_general_property

An **externally_defined_general_property** is a type of **general_property** and **externally_defined_item** that represents general property definition information which is defined externally, i.e., not within this part of ISO 10303.

EXPRESS specification:

```
*)
ENTITY externally_defined_general_property
  SUBTYPE OF (general_property,externally_defined_item);
END_ENTITY;
(*
```

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **externally_defined_general_property** entity:

– plib_property_reference_requires_name_scope (see 5.2.4.67);

– plib_property_reference_requires_version (see 5.2.4.68).

5.2.3.1.67 face_shape_representation

A **face_shape_representation** is a type of **shape_representation** that represents a portion of the boundary of a part by a topologically bounded face or shell.

EXPRESS specification:

```
*)
ENTITY face_shape_representation
  SUBTYPE OF (shape_representation);
```

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```
WHERE
 WR1: SIZEOF ( SELF.items ) =1;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'FACE' , 'AUTOMOTIVE_DESIGN.'+
     'CLOSED_SHELL' , 'AUTOMOTIVE_DESIGN.'+ 'OPEN_SHELL']*TYPEOF
     ( i ) ) =1 ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **face_shape_representation** shall have exactly one **representation_item** in its set of **items**.

WR2: The item that is used to represent the **face_shape_representation** shall be a either a **face**, a **closed_shell**, or an **open_shell**.

5.2.3.1.68 feature_component_definition

A **feature_component_definition** is a type of **characterized_object** that is used as a constituent of a preconceived form pattern.

EXPRESS specification:

```
*)
ENTITY feature_component_definition
  SUBTYPE OF (characterized_object);
WHERE
 WR1: SIZEOF ( get_shape_aspects ( SELF ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **feature_component_definition** shall be the basis shape for exactly one **shape_aspect**.

Informal propositions:

IP1: The **feature_component_definition**s that serve as definitions for modifications of a **circular_-pattern** or a **rectangular_pattern** shall be used in at least one definition of a pattern.

NOTE - See definition for Circular_offset_pattern in paragraph 4.2.59, for Circular_omit_pattern in paragraph 4.2.60, for Rectangular_offset_pattern in paragraph 4.2.423, and for Rectangular_omit_pattern in paragraph 4.2.424 for further information.

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5.2.3.1.69 feature_component_relationship

A **feature_component_relationship** is a type of **shape_aspect_relationship** that is used to relate features with implicitly represented components.

EXAMPLE 1 A **chamfer** may have the implicit chamfer offset amount defined with a **feature_component_relationship**.

EXPRESS specification:

```
*)
ENTITY feature_component_relationship
  SUBTYPE OF (shape_aspect_relationship);
WHERE
 WR1: ( 'AUTOMOTIVE_DESIGN.'+ 'TRANSITION_FEATURE' IN TYPEOF (
     SELF.related_shape_aspect ) ) OR ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_DEFINITION']*TYPEOF (
     SELF.related_shape_aspect. of_shape.definition ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **feature_component_relationship** shall reference as **related_shape_aspect** an aspect of the shape of a **transition_feature**, a **feature_definition** or a **feature_component_definition**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **feature_component_relationship** entity:

– subtype_exclusiveness_feature_component_relationship (see 5.2.4.226).

5.2.3.1.70 feature_definition

A **feature_definition** is a type of **characterized_object** that is a preconceived form pattern. See ARM definition for Feature_definition in paragraph 4.2.199 for more information.

EXPRESS specification:

```
*)
ENTITY feature_definition
```

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```
  SUBTYPE OF (characterized_object);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1;
 WR2: ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) =0 ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) <=1
     ) ) ) =1 ) ;
 WR3: NOT ( ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'BARRING_HOLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'BEAD' , 'AUTOMOTIVE_DESIGN.'+
     'HOLE_IN_PANEL' , 'AUTOMOTIVE_DESIGN.'+ 'FEATURE_IN_PANEL'
     , 'AUTOMOTIVE_DESIGN.'+ 'JOGGLE' , 'AUTOMOTIVE_DESIGN.'+
     'LOCATOR']*TYPEOF ( SELF ) ) =1 ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_FEATURE' IN TYPEOF ( SELF )
     ) AND ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) |
     ( sa. name = 'compound feature in panel' ) ) ) =1 ) ) OR (
     ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) ) <=1 ) AND ( (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) ) =0 ) OR ( SIZEOF (
     QUERY ( pdr <* get_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. used_representation.name
     = 'punch direction' ) ) ) =1 ) ) ) ;
 WR4: ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) =0 ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF ( pdr.
     used_representation.context_of_items ) ) AND ( pdr.
     used_representation.context_of_items\
```

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```
     geometric_representation_context.coordinate_space_dimension
     =3 ) ) ) =1 ) ;
 WR5: NOT ( ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'BOSS' ,
     'AUTOMOTIVE_DESIGN.'+ 'RIB' , 'AUTOMOTIVE_DESIGN.'+ 'SLOT'
     , 'AUTOMOTIVE_DESIGN.'+ 'ROUND_HOLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POCKET']*TYPEOF ( SELF ) ) =1 ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_FEATURE' IN TYPEOF ( SELF )
     ) AND ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) |
     ( 'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
     ( sa ) ) AND ( sa. name = 'compound feature in solid' ) ) )
     =1 ) ) OR ( ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) ) =1 ) AND ( SIZEOF (
     QUERY ( pdr <* get_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name ='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1 ) ) ;
 WR6: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'BEAD' ,
     'AUTOMOTIVE_DESIGN.'+ 'BARRING_HOLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'BOSS' , 'AUTOMOTIVE_DESIGN.'+
     'COMPOUND_FEATURE' , 'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.'+ 'FEATURE_IN_PANEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'GENERAL_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'HOLE_IN_PANEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'JOGGLE' , 'AUTOMOTIVE_DESIGN.'+
     'LOCATOR' , 'AUTOMOTIVE_DESIGN.'+ 'POCKET' ,
     'AUTOMOTIVE_DESIGN.'+ 'RIB' , 'AUTOMOTIVE_DESIGN.'+
     'REPLICATE_FEATURE' , 'AUTOMOTIVE_DESIGN.'+ 'ROUND_HOLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'SLOT' , 'AUTOMOTIVE_DESIGN.'+
     'THREAD']* TYPEOF ( SELF ) ) <=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **feature_definition** shall have at most one implicit **representation** of type **shape_representation_with_parameters**.

WR2: If a implicit representation is present, at most one **representation_item** in this representation of the **feature_definition** shall be a **placement** with a **name** of 'orientation'. This **placement** shall define a reference location and orientation for the origin of the **feature_definition**.

WR3: If the **feature_definition** is of type **barring_hole**, **bead**, **hole_in_panel**, **feature_in_panel**, **joggle**, or **locator**, or is a **compound_feature** with a basis shape of an **shape_aspect** with a **name** of

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'compound feature in panel', it shall be represented by at most one **direction_shape_representation**. If present, this **representation** shall have a **name** of 'punch direction'.

WR4: If an implicit representation is present, it shall have a **geometric_representation_context** as its **context_of_items** that has a **coordinate_space_dimension** equal to 3.

WR5: If the **feature_definition** is of type **boss**, **rib**, **slot**, **round_hole**, or **pocket**, or is a **compound_feature** that has a basis shape refered to by a **composite_shape_aspect** with a **name** of 'compound feature in solid', The **feature_definition** shall have exactly one implicit representation, and this representation shall contain a **representation_item** of type **placement** and a **name** of 'orientation'.

WR6: The subtypes **bead**, **barring_hole**, **boss**, **compound_feature**, **externally_defined_feature_definition**, **feature_in_panel**, **general_feature**, **hole_in_panel**, **joggle**, **locator**, **pocket**, **rib**, **replicate_feature**, **round_hole**, **slot**, and **thread** of **feature_definition** shall be mutually exclusive.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **feature_definition** entity:

– subtype_exclusiveness_feature_definition (see 5.2.4.227).

5.2.3.1.71 feature_in_panel

A **feature_in_panel** is a type of **feature_definition** applicable to panel parts. A **feature_in_panel** consists of a ruled surface between two closed profiles one of which lies on the panel. See ARM definition for Form_feature_in_panel in paragraph 4.2.212 for more information.

EXPRESS specification:

```
*)
ENTITY feature_in_panel
  SUBTYPE OF (feature_definition);
WHERE
 WR1:SELF.description IN ['pocket' , 'boss' , 'stairstep'];
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {2<= SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'base radius' , 'target radius' ] ) ) ) >0 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pdr <*
```

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```
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'base radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1;
WR5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'target radius' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1;
WR6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'base boundary' ) AND ( sa. description IN [
    'directed angle occurrence' , 'closed profile occurrence' ]
    ) ) ) =1;
WR7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'target boundary' ) AND ( sa. description IN [
    'directed angle occurrence' , 'closed profile occurrence' ]
    ) ) ) =1;
WR8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'directed angle occurrence' ) ) ) <=1;
WR9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'directed angle occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. name = 'directed angle usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'DIRECTED_ANGLE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) = SIZEOF ( QUERY (
    sa <* get_shape_aspects ( SELF ) | ( sa. description =
    'directed angle occurrence' ) ) ) ;
WR10: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'closed profile occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'CLOSED_PATH_PROFILE']* TYPEOF ( sar.
    relating_shape_aspect ) ) =1 ) ) ) =1 ) ) ) = SIZEOF (
```

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```
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'closed profile occurrence' ) ) ) ;
 WR11: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN TYPEOF
    ( pdr. used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY
    ( pdr <* get_property_definition_representations ( SELF ) |
    ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr. used_representation ) ) AND NOT ( pdr.
    used_representation.name = 'target face' ) ) ) =0 ) ;
 WR12: ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa. name = 'target boundary' ) AND ( sa. description =
    'directed angle occurrence' ) ) ) =0 ) OR ( SIZEOF ( QUERY
    ( pdr <* get_property_definition_representations ( SELF ) |
    ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr. used_representation ) ) ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **feature_in_panel** shall have a **description** of either 'pocket', 'boss', or 'stairstep'.

WR2: The implicit representation of the **feature_in_panel** shall contain two or three **representation_item**s in its set of **items**.

WR3: The implicit representation of the **feature_in_panel** shall contain only **representation_item**s with a **name** of 'orientation', 'base radius', or 'target radius'.

WR4: The implicit representation of a **feature_in_panel** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'base radius'.

WR5: The implicit representation of a **feature_in_panel** shall contain exaclty one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'target radius'.

WR6: The **feature_in_panel** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'base boundary' and a **description** of either 'directed angle occurrence' or 'closed profile occurrence'.

WR7: The **feature_in_panel** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'target boundary' and a **description** of either 'directed angle occurrence' or 'closed profile occurrence'.

WR8: The **feature_in_panel** shall be the basis shape for at most one **shape_aspect** with a **description** of 'directed angle occurrence'.

WR9: Each **shape_aspect** of a **feature_in_panel** with a **description** of 'directed angle occurrence' shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'directed angle usage' in which the **relating_shape_aspect** is a **directed_angle**.

WR10: Each **shape_aspect** of a **feature_in_panel** with a **description** of 'closed profile occurrence' shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' and a **relating_shape_aspect** that references a **circular_closed_profile**, **ngon_closed_profile**, **rectangular_closed_profile**, or **closed_path_profile**.

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WR11: The **feature_in_panel** shall have at most one **face_shape_representation**. If present, this **face_shape_representation** shall have a **name** of 'target face'.

WR12: Each **feature_in_panel** that is the basis shape for a **shape_aspect** with a **name** of 'target boundary' and a **description** of 'directed angle occurrence' shall have a **face_shape_representation**.

5.2.3.1.72 feature_pattern

A **feature_pattern** is a type of **replicate_feature** that represents additional occurrences of a base feature where the additional occurrences are not arranged in a circular or rectangular pattern. See ARM definition for General_pattern in paragraph 4.2.228 for more information.

EXPRESS specification:

```
*)
ENTITY feature_pattern
  SUBTYPE OF (replicate_feature);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =
     'added instance placement' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) ) ) >1 ) ) ) =1;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) ) ) >0 ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The implicit representation of a **feature_pattern** shall contain one or more **representation_items** in its set of **items** of type **placement** with a **name** of 'added instance placement'.

WR2: The implicit representation of a **feature_pattern** shall only contain **representation_items** in its set of **items** that are of type **placement**.

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5.2.3.1.73 featured_shape

A **featured_shape** is a type of **product_definition_shape** that represents a product that includes features. See ARM definition for Featured_shape in paragraph 4.2.203 for more information.

EXPRESS specification:

```
*)
ENTITY featured_shape
  SUBTYPE OF (product_definition_shape);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.definition ) ;
 WR2: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_RELATIONSHIP.'+'RELATED_PROPERTY_DEFINIT
     ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_RELATIONSHIP.'+
     'RELATED_PROPERTY_DEFINITION' ) | ( pdr. name =
     'featured shape sequence' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_SHAPE' IN TYPEOF ( pdr.
     relating_property_definition ) ) AND ( pdr.
     relating_property_definition:<>:SELF ) ) ) =1 ) ;
 WR3: SIZEOF ( QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_RELATIONSHIP.'+
     'RELATED_PROPERTY_DEFINITION' ) | SELF.definition:=:pdr.
     relating_property_definition.definition ) ) =1;
 WR4: SIZEOF ( QUERY ( sa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT.'+ 'OF_SHAPE' ) | SIZEOF
     ( ['AUTOMOTIVE_DESIGN.'+ 'PLACED_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+.'INSTANCED_FEATURE']* TYPEOF ( sa ) )
     =1 ) ) >=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **featured_shape** shall be the shape of a **product_definition**.

WR2: The **featured_shape** shall be the **related_property_definition** in exactly one **property_definition_relationship**. This **property_definition_relationship** shall have a **name** of 'featured shape sequence' and shall reference as **relating_property_definition** a different instance of **product_definition_shape**.

WR3: The **featured_shape** shall refer as **definition** to the same instance of **product_definition** as the **product_definition_shape** it is related with.

WR4: The **featured_shape** shall have at least one **shape_aspect** of type **placed_feature** or **instanced_feature**.

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Informal propositions:

IP1: If an **featured_shape** has a **shape_representation** and if the **product_definition_shape** it is related with has a **shape_representation** then these **shape_representation**s shall have the same **geometric_representation_context**.

5.2.3.1.74 fillet

A **fillet** is a type of **transition_feature** that is the representation of a circular concave transition between two faces. See ARM definition for Fillet in paragraph 4.2.205 and for Constant_radius_fillet in paragraph 4.2.98 for more information.

EXPRESS specification:

```
*)
ENTITY fillet
  SUBTYPE OF (transition_feature);
WHERE
 WR1: ( SELF.description<> 'constant radius' ) XOR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR2: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {1<= SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) =1 ) ;
 WR3: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['radius' ,
     'first offset' , 'second offset' ] ) ) ) >0 ) ) ) =0 ) ;
 WR4: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR5: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'first offset' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <=1 ) )
     ) =1 ) ;
 WR6: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'second offset' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <=1 ) )
     ) =1 ) ;
 WR7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( SIZEOF ( QUERY
     ( i <* pdr. used_representation.items | ( i.name=
     'first face shape' ) ) ) =1 ) ) ) =1;
 WR8: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( SIZEOF ( QUERY
     ( i <* pdr. used_representation.items | ( i.name=
     'second face shape' ) ) ) =1 ) ) ) =1;
 WR9: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( SIZEOF ( QUERY
     ( i <* pdr. used_representation.items | ( i.name=
     'fillet face' ) ) ) =1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **fillet** has an implicit representation if and only if it has a **description** of 'constant radius'.

WR2: If the **description** of the **fillet** is 'constant radius', the implicit representation shall contain between one and three **representation_item**s in its set of **items**.

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WR3: If the **description** of the **fillet** is 'constant radius', the implicit representation shall only contain **representation_item**s in its set of **items** that have a **name** of either 'radius', 'first offset', or 'second offset'.

WR4: If the **description** of the **fillet** is 'constant radius', exactly one **representation_item** used for the implicit representation of the **fillet** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR5: If the **description** of the **fillet** is 'constant radius', at most one **representation_item** used for the implicit representation of the **fillet** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'first offset'.

WR6: If the **description** of the **fillet** is 'constant radius', at most one **representation_item** used for the implicit representation of the **fillet** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'second offset'.

WR7: The **fillet** shall be defined by exactly **representation** of type **face_shape_representation** with a **name** of 'first face shape'.

WR8: The **fillet** shall be defined by exactly **representation** of type **face_shape_representation** with a **name** of 'second face shape'.

WR9: The **fillet** shall be defined by exactly **representation** of type **face_shape_representation** with a **name** of 'fillet face'.

5.2.3.1.75 general_feature

A **general_feature** is a type of **feature_definition** that provides a mechanism to categorize an area of interest in a shape and to associate additional information with it. See ARM definition for General_feature in paragraph 4.2.221 for more information.

EXPRESS specification:

```
*)
ENTITY general_feature
  SUBTYPE OF (feature_definition);
WHERE
 WR1: ( SIZEOF ( get_property_definition_representations ( SELF
     ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1 ) ;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
     description = 'course of travel occurrence' ) ) = SIZEOF (
     QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'course of travel occurrence' ) AND ( SIZEOF
     ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
```

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```
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'course of travel' ) ) ) =1 ) ) ) ;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
     description = 'course of travel occurrence' ) ) = SIZEOF (
     QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'course of travel occurrence' ) AND ( SIZEOF
     ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
     sar. relating_shape_aspect ) ) ) ) =1 ) ) ) ;
 WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
     description = 'boundary occurrence' ) ) = SIZEOF ( QUERY (
     sa <* get_shape_aspects ( SELF ) | ( sa. description =
     'boundary occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'profile usage' ) ) ) =1 ) ) ) ;
 WR5: ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     sa ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( sa <*
     get_shape_aspects ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) AND ( sa. name
     = 'general compound feature' ) AND ( SIZEOF ( QUERY ( sar
     <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'INSTANCED_FEATURE' IN TYPEOF ( sar.
     related_shape_aspect ) ) ) ) >=2 ) ) ) <=1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **general_feature** shall represented by at most one implicit representation. If present, this **representation** shall be of type **shape_representation_with_parameters**.

WR2: If the **general_feaure** is the basis shape for one or more occurrences of **shape_aspect** with a **description** of 'course of travel occurrence', these **shape_aspect**s shall be the **related_shape_aspect** of a **shape_defining_relationship** that has a **name** of 'course of travel'.

WR3: The aspects of the basis shape that have a **description** of 'course of travel occurrence' shall be the **related_shape_aspect** of a **shape_defining_relationship** that refers to a **path_feature_component** as **relating_shape_aspect**.

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WR4: If the **general_feaure** is the basis shape for one or more occurrences of **shape_aspect** with a **description** of 'boundary occurrence', these **shape_aspect**s shall be the **related_shape_aspect** of a **shape_defining_relationship** that has a **description** of 'profile usage'.

WR5: The basis shape of a **general_feature** shall be refered to by at most one **shape_aspect** that is of type **composite_shape_aspect**. If present, this **shape_aspect** shall have a **name** of 'general compound feature' and shall be the **relating_shape_aspect** of at least two **feature_component_relationship**s. These **feature_component_relationship**s shall refer to **instanced_feature** instances as their **related_shape_aspect**.

5.2.3.1.76 general_material_property

A **general_material_property** is a type of **general_property** that depends on material aspects.

EXPRESS specification:

```
*)
ENTITY general_material_property
  SUBTYPE OF (general_property);
WHERE
 WR1: SIZEOF ( QUERY ( gpa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.GENERAL_PROPERTY_ASSOCIATION.'+'BASE_DEFINITION'
     ) | NOT ( 'AUTOMOTIVE_DESIGN.'+ 'MATERIAL_PROPERTY' IN
     TYPEOF ( gpa. derived_definition ) ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **general_material_property** may only be referenced as the **base_definition** by **general_property_association** instances which reference as **derived_definition** a **property_definition** of type **material_property**.

5.2.3.1.77 hardness_representation

A **hardness_representation** is a type of **representation** that representats the hardness of an object. For more information see ARM definition for Hardness in paragraph 4.2.254.

EXPRESS specification:

```
*)
ENTITY hardness_representation
  SUBTYPE OF (representation);
WHERE
```

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```
 WR1: ( {2<= SIZEOF ( SELF.items ) <=4} ) AND ( SIZEOF ( QUERY (
      i <* items | ( 'AUTOMOTIVE_DESIGN.'+
      'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
      i.name IN [ 'measuring method' , 'measuring position' ] ) )
      ) + SIZEOF ( QUERY ( i <* items | ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE']* TYPEOF ( i ) ) =1 )
      AND ( i.name IN ['depth' , 'hardness'] ) ) ) = SIZEOF (
      SELF.items ) ) ;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | i.name =
      'measuring method' ) ) =1;
 WR3: SIZEOF ( QUERY ( i <* SELF.items | i.name ='hardness' ) )
      =1;
 WR4: SIZEOF ( QUERY ( i <* SELF.items | i.name =
      'measuring position' ) ) <=1;
 WR5: SIZEOF ( QUERY ( i <* SELF.items | i.name ='depth' ) )
      <=1;
 WR6: ( SIZEOF ( USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
      'USED_REPRESENTATION' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
      <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
      'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN (
      pdr. definition ,
      'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
      'DERIVED_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'GENERAL_PROPERTY' IN TYPEOF ( gpa. base_definition ) ) AND
      ( gpa. base_definition.name ='surface_condition' ) ) ) =1 )
      ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **hardness_representation** shall contain between two and four **representation_items** in its set of **items**. These **representation_items** shall either be of type **descriptive_representation_item** and have a **name** of either 'measuring method' or 'measuring position', or shall be of type **measure_representation_item** or **value_range** and have a **name** of either 'depth' or 'hardness'.

WR2: Each instance of **hardness_representation** shall contain exactly one **representation_item** in its set of **items** that has a **name** of 'measuring method'.

WR3: Each instance of **hardness_representation** shall contain exactly one **representation_item** in its set of **items** that has a **name** of 'hardness'.

WR4: Each instance of **hardness_representation** shall contain at most one **representation_item** in its set of **items** that has a **name** of 'measuring position'.

WR5: Each instance of **hardness_representation** shall contain at most one **representation_item** in its set of **items** that has a **name** of 'depth'.

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WR6: Each instance of **hardness_representation** shall be referenced by exactly one **property_definition_representation**. This **property_definition_representation** shall relate the **representation** with a **property_definition** that is the **derived_definition** of a **general_property_association** that refers as **base_definition** to a **general_property** with a **name** of 'surface_condition'.

Informal propositions:

IP1: If the **hardness_representation** contains **qualified_representation_item**s that refer to a **type_qualifier** representing the value determination then all of the **representation_item**s shall also be **qualified_representation_item**s that refer to the same instance of **type_qualifier**.

5.2.3.1.78 hidden_element_over_riding_styled_item

The **hidden_element_over_riding_styled_item** is a type of **context_dependent_over_riding_styled_item** that specifies the handling of hidden elements. See ARM definition for Hidden_element_handling in paragraph 4.2.256 for more information.

EXPRESS specification:

```
*)
ENTITY hidden_element_over_riding_styled_item
  SUBTYPE OF (context_dependent_over_riding_styled_item);
WHERE
 WR1: SIZEOF ( SELF.style_context ) =1;
 WR2:'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW' IN TYPEOF (
     SELF.style_context[1] ) ;
 WR3:'AUTOMOTIVE_DESIGN.'+ 'CAMERA_IMAGE' IN TYPEOF ( SELF.item
     ) ;
 WR4:'AUTOMOTIVE_DESIGN.'+ 'CAMERA_MODEL_D3_WITH_HLHSR' IN
     TYPEOF ( SELF.item\ mapped_item.mapping_source.
     mapping_origin ) ;
 WR5: SIZEOF ( QUERY ( rep <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) |
     'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW' IN TYPEOF ( rep )
     ) ) >0;
END_ENTITY;
(*
```

Formal propositions:

WR1: There shall be exactly one **style_context**.

WR2: The **style_context** shall be a **presentation_view**.

WR3: The item where the overriding style is applied for all hidden elements shall be a **camera_image**.

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WR4: The **mapping_origin** of the item shall be a **camera_model_d3_with_hlhsr**.

WR5: The **hidden_element_over_riding_styled_item** shall be included in the set of items of a **presentation_view**.

5.2.3.1.79 hole_bottom

A **hole_bottom** is a type of **shape_aspect** that is the end condition for a **round_hole**. See ARM definition for Conical_bottom in paragraph 4.2.95, for Flat_bottom in paragraph 4.2.207, for Flat_with_taper_bottom in paragraph 4.2.210, for Flat_with_radius_bottom in paragraph 4.2.209, for Spherical_bottom in paragraph 4.2.474, and for Through_hole_bottom_condition in paragraph 4.2.519 for more information.

EXPRESS specification:

```
*)
ENTITY hole_bottom
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN ['through' , 'flat' , 'flat with taper'
     ,   'flat with radius' , 'spherical' , 'conical'];
 WR3: NOT ( SELF.description IN ['through' , 'flat'] ) OR (
     SIZEOF (
     get_shape_aspect_property_definition_representations ( SELF
     ) ) =0 ) ;
 WR4: NOT ( SELF.description IN [ 'flat with radius' ,
     'flat with taper' , 'spherical' , 'conical'] ) OR ( SIZEOF
     ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR5: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1 ) ;
 WR6: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {1<= SIZEOF ( pdr.
     used_representation.items ) <=2} ) ) =1 ) ;
 WR7: NOT ( SELF.description IN [ 'flat with radius' ,
     'spherical'] ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
```

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```
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =1 ) ) ) =1 ) ;
WR8: ( SELF.description<> 'flat with radius' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'corner radius' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1 ) ;
WR9: ( SELF.description<>'spherical' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name='radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1 ) ;
WR10: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY ( pdr
    <* get_shape_aspect_property_definition_representations (
    SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'tip radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) <=1 ) )
    ) =1 ) ;
WR11: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY ( pdr
    <* get_shape_aspect_property_definition_representations (
    SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'tip angle' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
    ) ) ) =1 ) ;
WR12: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'final diameter' )
```

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```
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR13: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'taper diameter' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) =1 ) ;
 WR14: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'hole bottom usage' ) AND ( sar.
     related_shape_aspect.description =
     'bottom condition occurrence' ) ) ) =1;
 WR15: ( SELF.description ='through' ) OR ( SIZEOF ( QUERY ( sar
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name IN [ 'hole depth start' , 'hole depth end' ] ) )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **hole_bottom** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** of the **hole_bottom** shall be either 'through', 'flat', 'flat with taper', 'flat with radius', 'spherical', or 'conical'.

WR3: If the **description** of the **hole_bottom** is 'flat' or 'through', the **hole_bottom** shall not have any **representation**.

WR4: If the **description** of the **hole_bottom** is 'flat with radius', 'flat with taper', 'spherical', or 'conical', the **hole_bottom** shall have exactly one **shape_representation_with_parameters** to specify its implicit representation.

WR5: If the **description** of the **hole_bottom** is 'flat with taper' the **shape_representation_with_parameters** that represents the **hole_bottom** shall contain exactly two **representation_item**s in its set of **items**.

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WR6: If the **description** of the **hole_bottom** is 'conical', the **shape_representation_with_parameters** that represents the **hole_bottom** shall contain one or two **representation_item**s in its set of **items**.

WR7: If the **description** of the **hole_bottom** is 'flat with radius' or 'spherical', there shall be exactly one implicit representation, andi it shall conatin exactly one **representation_item**.

WR8: If the **description** of the **hole_bottom** is 'flat with radius', exactly one **representation_item** used for the implicit representation of a **hole_bottom** shall have a **name** of 'corner radius'. This **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR9: If the **description** of the **hole_bottom** is 'spherical', exactly one **representation_item** used for the implicit representation of a **hole_bottom** shall have a **name** of 'radius'. This **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR10: If the **description** of the **hole_bottom** is 'conical', at most one **representation_item** used for the implicit representation of a **hole_bottom** shall have a **name** of 'tip radius'. This **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR11: If the **description** of the **hole_bottom** is 'conical', exactly one **representation_item** used for the implicit representation of a **hole_bottom** shall have a **name** of 'tip angle'. This **representation_item** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit**.

WR12: If the **description** of the **hole_bottom** is 'flat with taper', the implicit representation shall contain exactly one **representation_item** that has a **name** of 'final diameter' and is of type **measure_representation_item** and **length_measure_with_unit**.

WR13: If the **description** of the **hole_bottom** is 'flat with taper', the implicit representation shall contain exactly one **representation_item** that has a **name** of 'taper diameter' and is of type **measure_representation_item** and **plane_angle_measure_with_unit**.

WR14: The **hole_bottom** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'hole bottom usage'. The **related_shape_aspect** of this **feature_component_relationship** shall have a **description** of 'bottom condition occurrence'.

WR15: If the **description** of the **hole_bottom** is not 'through', the **feature_component_relationship** that refers to it, shall have a **name** of either 'hole depth start' or 'hole depth end'.

5.2.3.1.80 hole_in_panel

A **hole_in_panel** is a type of **feature_definition** applicable to panel parts. A **hole_in_panel** is an opening in a panel bounded by a closed profile that is created by a stamping process. See ARM definition for Hole_feature_in_panel in paragraph 4.2.258 for more information.

EXPRESS specification:

```
*)
ENTITY hole_in_panel
  SUBTYPE OF (feature_definition);
WHERE
```

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```
 WR1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     name = 'hole profile' ) AND ( sa. description =
     'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'profile usage' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'CLOSED_PATH_PROFILE']* TYPEOF ( sar.
     relating_shape_aspect ) ) =1 ) ) ) =1 ) ) ) =1;
 WR2: SIZEOF ( get_property_definition_representations ( SELF )
     ) = SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | SIZEOF (
     pdr. used_representation.items ) =1 ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **hole_in_panel** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'hole profile' and a **description** of 'closed profile occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' and a **relating_shape_aspect** that references a **circular_closed_profile**, **ngon_closed_profile**, **rectangular_closed_profile**, or **closed_path_profile**.

WR2: If an implicit representation of the **hole_in_panel** is present, it shall contain at most one **representation_item** in its set of **items**.

5.2.3.1.81 homokinetic_pair

A **homokinetic_pair** is a type of **universal_pair**, where the rotation of input axis and output axis are uniform.

EXPRESS specification:

```
*)
ENTITY homokinetic_pair
  SUBTYPE OF (universal_pair);
WHERE
 WR1: NOT EXISTS ( SELF.input_skew_angle ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: For a **homokinetic_pair** the **input_skew_angle** shall be omitted.

5.2.3.1.82 inclusion_product_concept_feature

An **inclusion_product_concept_feature** is a type of **conditional_concept_feature** that is the representation of the statement that the application of a **product_concept_feature** or of a **conditional_concept_feature** implies the inclusion of an additional **product_concept_feature** or **conditional_concept_feature**. See Specification_inclusion 4.2.471 for more information

EXPRESS specification:

```
*)
ENTITY inclusion_product_concept_feature
  SUBTYPE OF (conditional_concept_feature);
WHERE
 WR1: NOT ( 'AUTOMOTIVE_DESIGN.'+
     'PACKAGE_PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( SELF ) ) ;
 WR2: SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.'+'RELATING_PRODUCT_CONCEPT_FEATURE
     ) | 'AUTOMOTIVE_DESIGN.'+
     'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF (
     cfr ) ) ) + SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.'+'RELATED_PRODUCT_CONCEPT_FEATURE
     ) | 'AUTOMOTIVE_DESIGN.'+
     'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF (
     cfr ) ) ) =0;
 WR3:SELF.condition. conditional_operator.name ='implication';
END_ENTITY;
(*
```

Formal propositions:

WR1: An **inclusion_product_concept_feature** shall not be of type **package_product_concept_feature**.

WR2: An **inclusion_product_concept_feature** shall not be referenced as **relating_product_concept_feature** nor as **related_product_concept_feature** by **concept_feature_relationship_with_condition** instances.

WR3: An **inclusion_product_concept_feature** shall reference as **condition** a **concept_feature_relationship_with_condition** which references a **concept_feature_operator** with a **name** of 'implication'.

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5.2.3.1.83 instanced_feature

An **instanced_feature** is a type of **shape_aspect** and of **feature_definition** that is the identification of a preconceived form pattern on a part. See ARM definition for Included_feature in paragraph 4.2.261 for more information.

EXPRESS specification:

```
*)
ENTITY instanced_feature
  SUBTYPE OF (shape_aspect,feature_definition);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.of_shape. definition ) ;
 WR2:SELF.product_definitional;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'maximum feature limit' ) ) )
     =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **instanced_feature** shall be an aspect of the shape of a **product_definition**.

WR2: The **instanced_feature** shall lie on the boundary of the part.

WR3: The **instanced_feature** shall be **represented_by** exactly one **planar_shape_representation**. This **planar_shape_representation** shall have a **name** of 'maximum feature limit'.

5.2.3.1.84 joggle

A **joggle** is a type of **feature_definition** applicable to panel parts. A **joggle** is a change in elevation of a face along a rim desgned to accommodate either clearance for the insertion of another part or a contact point for attachment of another part. See ARM definition for Joggle_feature in paragraph 4.2.277 for more information.

EXPRESS specification:

```
*)
ENTITY joggle
  SUBTYPE OF (feature_definition);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND NOT ( {5<= SIZEOF ( pdr.
      used_representation.items ) <=10} ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | NOT ( i.name IN ['orientation'
      , 'base radius 1' , 'base radius 2' , 'direction angle 1',
      'direction angle 2' , 'height' , 'slope angle 1' ,
      'slope angle 2' , 'top radius 1' , 'top radius 2' ] ) ) )
      >0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'direction angle 1' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
      ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'direction angle 2' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
      ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name='height' ) AND (
      SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
      ) <=1;
 WR6: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
    used_representation.items | ( i.name= 'slope angle 1' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
    ) ) ) =1;
WR7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'slope angle 2' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
    ) ) ) =1;
WR8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name = 'defining path' ) AND ( sa. description =
    'path feature component occurrence' ) AND ( SIZEOF ( QUERY
    ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
    sar. relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description ='linear' ) ) ) =1 ) ) )
    =1;
WR9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    name ='termination' ) AND ( sa. description =
    'joggle termination occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. name = 'joggle termination usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'JOGGLE_TERMINATION' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
WR10: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'base radius 1' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) <=1;
WR11: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
     used_representation.items | ( i.name= 'base radius 2' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) =1 ) )
     ) <=1;
 WR12: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'top radius 1' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) =1 ) )
     ) <=1;
 WR13: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'top radius 2' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) =1 ) )
     ) <=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The implicit representation of a **joggle** shall contain between five and ten **representation_item**s in its set of **items**.

WR2: The **implicit_representation** shall contain only **representation_item**s wit a **name** of 'orientation', 'base radius 1', 'base radius 2', 'direction angle 1', 'direction angle 2', 'height', 'slope angle 1', 'slope angle 2', 'top radius 1', or 'top radius 2'.

WR3: The implicit representation of a **joggle** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'direction angle 1'.

WR4: The implicit representation of a **joggle** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'direction angle 2'.

WR5: The implicit representation of a **joggle** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'height'.

WR6: The implicit representation of a **joggle** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'slope angle 1'.

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WR7: The implicit representation of a **joggle** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'slope angle 2'.

WR8: The **joggle** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'defining path' and a **description** of 'path feature component occurrence' that is the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'path feature component usage' in which the **relating_shape_aspect** is a **path_feature_component** with a **description** of 'linear'.

WR9: The **joggle** shall be the basis shape for exactly one **shape_aspect** with a **name** of 'termination' and a **description** of 'joggle termination occurrence' that is the **related_shape_aspect** in exactly one **feature_component_relationship** with a **name** of 'joggle termination usage' in which the **relating_shape_aspect** is a **joggle_termination**.

WR10: The implicit representation of a **joggle** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'base radius 1'.

WR11: The implicit representation of a **joggle** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'base radius 2'.

WR12: The implicit representation of a **joggle** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'top radius 1'.

WR13: The implicit representation of a **joggle** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'top radius 2'.

5.2.3.1.85 joggle_termination

A **joggle_termination** is a type of **shape_aspect** that is the represenation of the end condition of a **joggle**. See ARM definition for Joggle_termination in paragraph 4.2.278, for Face_termination in paragraph 4.2.193, and for Value_termination in paragraph 4.2.548 for more information.

EXPRESS specification:

```
*)
ENTITY joggle_termination
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN [ 'value termination' ,
     'face termination' ];
 WR3: ( SELF.description = 'value termination' ) XOR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =0 ) ;
 WR4: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
```

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```
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1 ) ;
 WR5: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='depth' ) AND ( SIZEOF
     ( ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
     i ) ) =2 ) ) ) =1 ) ) ) =1 ) ;
 WR6: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='angle' ) AND ( SIZEOF
     ( ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) =1 ) ;
 WR7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'joggle termination usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'JOGGLE' IN TYPEOF ( sar.
     related_shape_aspect.of_shape. definition ) ) AND ( sar.
     related_shape_aspect.of_shape.
     definition\characterized_object. name ='termination' ) AND
     ( sar. related_shape_aspect.of_shape.
     definition\characterized_object. description =
     'joggle termination occurrence' ) ) ) =1;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **joggle_termination** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** for the **joggle_termination** shall be either 'value termination' or 'face termination'.

WR3: A **joggle_termination** has an implicit representation if and only if it has a **description** of 'value termination'.

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WR4: If the **description** of the **joggle_termination** is 'value termination', its implicit representation shall contain exactly two **representation_item**s in its set of **items**.

WR5: If the **description** of the **joggle_termination** is 'value termination', exactly one **representation_item** used for the implicit representation of the **joggle_termination** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'depth'.

WR6: If the **description** of the **joggle_termination** is 'value termination', exactly one **representation_item** used for the implicit representation of the **joggle_termination** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'angle'.

WR7: The **joggle_termination** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship** with a **name** of 'joggle termination usage' in which the **related_shape_aspect** is a **shape_aspect** of a **joggle** with a **name** of 'termination' and a **description** of 'joggle termination occurrence'.

5.2.3.1.86 known_source

A **known_source** is a type of **external_source** and of **pre_defined_item** that is a source of information whose name and content are predetermined. It provides a mechanism to refer to an entry in an external library.

EXPRESS specification:

```
*)
ENTITY known_source
  SUBTYPE OF (external_source, pre_defined_item);
END_ENTITY;
(*
```

Informal propositions:

IP1: The contents of the **item_id** attribute of **externally_defined_item**s that reference a **known_source** as their **source** has to be formatted according to the rules specified for this **known_source**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **known_source** entity:

– restrict_name_for_known_source (see 5.2.4.175).

5.2.3.1.87 language

A **language** is a type of **group** that is a a specification of the language in which an information is given. The **group** shall specify in its **name** a language code according to ISO 639-2, and, if present, in its

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description a country code according to ISO 3166-1. See ARM definition for String_with_language for more information.

EXPRESS specification:

```
*)
ENTITY language
  SUBTYPE OF (group);
WHERE
 WR1: ( SIZEOF ( QUERY ( ca <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'CLASSIFICATION_ASSIGNMENT.'+'ASSIGNED_CLASS'
     ) | 'AUTOMOTIVE_DESIGN.'+'LANGUAGE_ASSIGNMENT' IN TYPEOF (
     ca ) ) ) >0 ) OR ( SIZEOF ( QUERY ( aca <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_CLASSIFICATION_ASSIGNMENT.'+'ASSIGNED_CLASS'
     ) | 'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT' IN
     TYPEOF ( aca ) ) ) >0 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: An instance of type language shall be referenced only by either the attribute **assigned_class** of a **classification_assignment** that is also a **language_assignment**, or by the attribute **assigned_class** of a **attribute_classification_assignment** that is also a **attribute_language_assignment**

Informal propositions:

IP1: The **name** shall specify a language code according to ISO 639-2.

IP2: If present, the **description** shall specify a country code according to to ISO 3166-1.

5.2.3.1.88 language_assignment

A **language_assignment** is a type of **classification_assignment**. It specifes a language for the **items** it is assigned to. This language shall be specified by the **language** that is referenced in the role of **assigned_class**.

EXPRESS specification:

```
*)
ENTITY language_assignment
  SUBTYPE OF (classification_assignment);
  items : SET [1:?] OF language_item;
```

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```
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'LANGUAGE' IN TYPEOF (
     SELF.assigned_class ) ;
 WR2:SELF.role. name ='language';
 WR3: SIZEOF ( SELF.items ) = SIZEOF ( QUERY ( i <* SELF.items |
     ( 'AUTOMOTIVE_DESIGN.'+ 'REPRESENTATION' IN TYPEOF ( i ) )
     AND ( i\representation. name = 'document content' ) ) ) ;
END_ENTITY;
(*
```

Attribute definitions:

items: the set of **items** to which a **language** is assigned.

Formal propositions:

WR1: The instance referenced as **assigned_class** shall be of type **language**.

WR2: The **name** of the **classification_role** referenced as **role** shall be 'language'.

WR3: The **representation**s in the set of items shall be of **name** 'document content'.

5.2.3.1.89 location_shape_representation

A **location_shape_representation** is a type of **shape_representation** that represents a geometric position or a reference point.

EXPRESS specification:

```
*)
ENTITY location_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( SELF.items ) =1;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'+
     'POINT' IN TYPEOF ( i ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **location_shape_representation** shall have exactly one **representation_item** in its set of **items**.

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WR2: The geometric element that is used to represent the **location_shape_representation** shall be a **point**.

5.2.3.1.90 locator

A **locator** is a type of **feature_definition** applicable to panel parts. A **locator** is a conical impression used to locate the panel in the tooling. See ARM definition for Locator_feature in paragraph 4.2.302 for more information.

EXPRESS specification:

```
*)
ENTITY locator
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {2<= SIZEOF ( pdr.
     used_representation.items ) <=5} ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='diameter' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'tip radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) <=1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'tip angle' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'base radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) <=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The implicit representation of the locator shall contain between two and five **representation_item**s in its set of **items**.

WR2: The implicit representation of the **locator** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'diameter'.

WR3: The implicit representation of the **locator** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'tip radius'.

WR4: The implicit representation of the **locator** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'tip angle'.

WR5: The implicit representation of the **locator** shall contain at most one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'base radius'.

5.2.3.1.91 modified_pattern

A **modified_pattern** is a type of **replicate_feature** that represents the result of a collection of omissions and offsets of a base feature in either a **rectangular_pattern** or a **circular_pattern**.

EXPRESS specification:

```
*)
ENTITY modified_pattern
  SUBTYPE OF (replicate_feature);
WHERE
 WR1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( sar. description =
     'base pattern' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
```

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```
     'CIRCULAR_PATTERN' , 'AUTOMOTIVE_DESIGN.'+
     'RECTANGULAR_PATTERN']* TYPEOF ( sar.
     related_shape_aspect.of_shape. definition ) ) =1 ) ) ) =1 )
     ) ) =1;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( SIZEOF ( QUERY ( sar1 <*
     USEDIN ( sar. related_shape_aspect ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( sar.
     related_shape_aspect:<>:sar1. related_shape_aspect ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'PATTERN_OFFSET_MEMBERSHIP'
     , 'AUTOMOTIVE_DESIGN.'+ 'PATTERN_OMIT_MEMBERSHIP']* TYPEOF
     ( sar1 ) ) =1 ) ) ) =1 ) ) ) >=1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The basis shape of the **modified_pattern** shall have an aspect of shape that is the **relating_shape_aspect** in exactly one **shape_aspect_relationship** that has a **description** of 'base pattern'. This **shape_aspect_relationship** shall refer as **related_shape_aspect** to an **shape_aspect** that is an aspect of the basis shape of either a **circular_pattern** or a **rectangular_pattern**.

WR2: The basis shape of the **modified_pattern** shall have an aspect of shape that is the **relating_shape_aspect** in at least one **shape_aspect_relationship** in which the **related_shape_aspect** is the **related_shape_aspect** in a different instance of **shape_aspect_relationship** that is either a **pattern_offset_membership** or **pattern_omit_membership**.

5.2.3.1.92 moments_of_inertia_representation

A **moments_of_inertia_representation** is a type of **representation** that describes the law of inertia in the context of the rotation of a rigid body. The 9 inertia values are represented as a **list_representation_item** containing 3 elements, each describing one row of the inertia matrix, and each having 3 elements that describe the columns of each row.

EXPRESS specification:

```
*)
ENTITY moments_of_inertia_representation
  SUBTYPE OF (representation);
WHERE
 WR1: ( SIZEOF ( SELF.items ) =1 ) AND ( SIZEOF ( QUERY ( i <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.'+
     'COMPOUND_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name = 'moments of inertia matrix' ) ) ) =1 ) ;
```

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```
 WR2: SIZEOF ( QUERY ( i <* SELF.items | ( 'AUTOMOTIVE_DESIGN.'+
     'COMPOUND_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     SIZEOF ( i\compound_representation_item. item_element ) =3
     ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'LIST_REPRESENTATION_ITEM' IN
     TYPEOF ( i\compound_representation_item. item_element ) )
     AND value_range_aggregate_rep_item (
     i\compound_representation_item. item_element ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **moments_of_inertia_representation** contains exactly one **representation_item** in its set of **items**. This **representation_item** is of type **compound_representation_item** and has a **name** of 'moments of inertia matrix'.

WR2: The **compound_representation_item** that is contained in the **moments_of_inertia_representation** references exactly three **representation_item**s. These **representation_item**s are of type **compound_representation_item** and reached through **list_representation_item**. Each of these **compound_representation_item**s references three **measure_representation_item**s through **list_representation_item**.

5.2.3.1.93 multi_language_attribute_assignment

The **multi_language_attribute_assignment** is a type of **attribute_value_assignment**. It specifes an alternative value for the string valued attribute of an existing entity and the name of that attribute.

EXPRESS specification:

```
*)
ENTITY multi_language_attribute_assignment
  SUBTYPE OF (attribute_value_assignment);
  items : SET [1:?] OF multi_language_attribute_item;

DERIVE
language : label := get_multi_language(SELF);

WHERE
 WR1:SELF\attribute_value_assignment. role.name =
     'alternate language' ;
 WR2: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ATTRIBUTE_LANGUAGE_ASSIGNMENT.ITEMS' ) )
     =1 ) AND ( SIZEOF ( QUERY ( ala <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ala. attribute_name ='attribute_value' ) ) =1 )
     ;
END_ENTITY;
```

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```
(*
```

Attribute definitions:

items: the set of **items** for which an alternative string value is specified.

language: The **language** specifies the **attribute_language_assignemnt** that refers as **items** to this object and provides the information concerning the language, in which an attribute value is specified.

Formal propositions:

WR1: The **attribute_value_role** specified by the **multi_language_attribute_assignment** shall have a **name** of 'alternate language'.

WR2: The **multi_language_attribute_assignment** shall be used exactly one time in role of **items** by an **attribute_language_assignment**. This **attribute_language_assignment** shall have a **attribute_name** of 'attribute_value'.

Informal propositions:

IP1: The **attribute_name** shall be the name of the attribute for which an alternative value is specified.

5.2.3.1.94 named_unit_variable

A **named_unit_variable** is a type of **named_unit** and **variable_semantics** that represents the unit in an explicitly defined mathematical function.

EXPRESS specification:

```
*)
ENTITY named_unit_variable
  SUBTYPE OF (named_unit, variable_semantics);

INVERSE
associated_variable_environment: environment FOR semantics;
END_ENTITY;
(*
```

Attribute definitions:

associated_variable_environment: the **environment** that specifies the representation for the derived unit.

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5.2.3.1.95 ngon_closed_profile

A **ngon_closed_profile** is a type of **shape_aspect** that consists of an enclosed 2D area and a reference system for the parameters of the **ngon_closed_profile**. The enclosed area is defined by three or more straight sides with the corners lying on one circle. The reference system is used to define location and orientation of the **square_u_profile** and consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Ngon_profile in paragraph 4.2.323 for more information.

EXPRESS specification:

```
*)
ENTITY ngon_closed_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {3<= SIZEOF ( pdr.
     used_representation.items ) <=4} ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'number of sides' , 'circumscibed diameter' ,
     'diameter across flats' , 'corner radius' ] ) ) ) =0 ) ) )
     =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
     used_representation.items | ( i.name= 'number of sides' )
     AND ( 'AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM'
     IN TYPEOF ( i ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'COUNT_MEASURE' IN TYPEOF ( i\measure_with_unit.
     value_component ) ) ) ) =1 ) ) ) =1;
 WR7: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name IN [
     'circumscribed diameter' , 'diameter across flats' ] ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
 WR8: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'corner radius' ) )
     ) <=1 ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'corner radius' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =
     SIZEOF ( QUERY ( i <* pdr. used_representation.items | (
     i.name = 'corner radius' ) ) ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **ngon_closed_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **ngon_closed_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **ngon_closed_profile** shall contain three or four **representation_item**s in its set of **items**.

WR4: The implicit representation of an **ngon_closed_profile** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'number of sides', 'circumscribed diameter', 'diameter across flats', or 'corner radius'.

WR5: Exactly one **representation_item** used for the implicit representation of an **ngon_closed_profile** shall be of type **placement** with a **name** of 'orientation'.

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WR6: Exactly one **representation_item** used for the implicit representation of an **ngon_closed_profile** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of ‘number of sides’.

WR7: Exactly one **representation_item** used for the implicit representation of an **ngon_closed_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of either ‘circumscribed diameter’ or ’diameter across flats’.

WR8: At most one **representation_item** used for the implicit representation of an **ngon_closed_profile** shall have a **name** of ’corner radius’. If present, this **representation_item** shall be of type **measure_-representation_item** and **length_measure_with_unit**.

Informal propositions:

IP1: The **ngon_closed_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **ngon_closed_profile** is defined at the centre of the defining circle.

IP3: One of the sides of the ngon shall be parallel to the X direction intersecting the negative Y direction.

5.2.3.1.96 open_path_profile

An **open_path_profile** is a type of **shape_aspect** that consists of a connected set of curves and a reference system that may be used to place the **open_path_profile**. The start vertex and end vertex for the set of curves do not connect creating an area open on one side. The reference system consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for General_-open_profile in paragraph 4.2.225 for more information.

EXPRESS specification:

```
*)
ENTITY open_path_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:’AUTOMOTIVE_DESIGN.’+ ’FEATURE_COMPONENT_DEFINITION’ IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( ’AUTOMOTIVE_DESIGN.’+
     ’SHAPE_REPRESENTATION_WITH_PARAMETERS’ IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( ’AUTOMOTIVE_DESIGN.’+
     ’SHAPE_REPRESENTATION_WITH_PARAMETERS’ IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
```

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```
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PATH_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) ) ) =1;
 WR6: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) ) <=1 ) AND (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) ) = SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'profile limit' ) ) ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **open_path_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **open_path_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **open_path_profile** shall contain exactly one **representation_item**s in its set of **items**.

WR4: Exactly one **representation_item** used for the implicit representation of an **open_path_profile** shall be of type **placement** with a **name** of 'orientation'.

WR5: The **open_path_profile** shall have exactly one **path_shape_representation**.

WR6: The **open_path_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of 'profile limit'.

Informal propositions:

IP1: The **open_path_profile** shall be planar and shall lie in the X-Y plane of the reference system.

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5.2.3.1.97 package_product_concept_feature

A **package_product_concept_feature** is a type of **product_concept_feature** that is a combination of **product_concept_feature**s that shall be offered to the market as a set. See ARM definition for Specification in paragraph 4.2.467 for more information.

EXPRESS specification:

```
*)
ENTITY package_product_concept_feature
  SUBTYPE OF (product_concept_feature);
WHERE
 WR1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CONDITIONAL_CONCEPT_FEATURE'
     IN TYPEOF ( SELF ) ) ;
 WR2: SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.'+'RELATING_PRODUCT_CONCEPT_FEATURE
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF (
     cfr ) ) AND ( SIZEOF ( QUERY ( ipcf <* USEDIN ( cfr ,
     'AUTOMOTIVE_DESIGN.CONDITIONAL_CONCEPT_FEATURE.'+'CONDITION'
     ) | 'AUTOMOTIVE_DESIGN.'+
     'INCLUSION_PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( ipcf ) ) )
     =1 ) ) ) >0;
END_ENTITY;
(*
```

Formal propositions:

WR1: An **package_product_concept_feature** shall not be of type **conditional_concept_feature**.

WR2: A **package_product_concept_feature** shall be referenced as **relating_product_concept_feature** by at least one **concept_feature_relationship_with_condition** which is referenced as **condition** by a **conditional_concept_feature** of type **inclusion_product_concept_feature**.

5.2.3.1.98 partial_circular_profile

A **partial_circular_profile** is a type of **shape_aspect** that consists of an arc of constant radius and a reference system for the parameters of the **partial_circular_profile**. The reference system is used to define location and orientation of the **partial_circular_profile** and consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Partial_circular_profile in paragraph 4.2.340 for more information.

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EXPRESS specification:

```
*)
ENTITY partial_circular_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =3 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'sweep angle' , 'radius'] ) ) ) =0 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
 WR7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'sweep angle' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
```

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```
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
     ) ) ) =1;
 WR8: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) ) ) <=1 ) AND (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) ) = SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'profile limit' ) ) ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **partial_circular_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **partial_circular_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **partial_circular_profile** shall contain exactly three **representation_item**s in its set of **items**.

WR4: The implicit representation of the **partial_circular_profile** shall contain only **representation_item**s that have a **name** of 'orientation', 'sweep angle', or 'radius'.

WR5: Exactly one **representation_item** used for the implicit representation of a **partial_circular_profile** shall be of type **placement** with a **name** of 'orientation'.

WR6: Exactly one **representation_item** used for the implicit representation of a **partial_circular_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR7: Exactly one **representation_item** used for the implicit representation of a **partial_circular_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'sweep angle'.

WR8: The **partial_circular_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of 'profile limit'.

Informal propositions:

IP1: The **partial_circular_profile** shall be planar and shall lie in the X-Y plane of the reference system.

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IP2: The reference point of the **partial_circular_profile** is defined at the arc origin.

IP3: The arc that defines the **partial_circular_profile** shall start at the X axis.

5.2.3.1.99 path_feature_component

A **path_feature_component** is a type of **shape_aspect** that represents a path used to define preconceived form patterns. The **path_feature_component** may be represented explicitly by a curve or a set of curves or implicitly by parameters that are defined in a reference system. The reference system is an **axis_placement**. See ARM definition for Path in paragraph 4.2.342, for General_path in paragraph 4.2.227, for Linear_path in paragraph 4.2.300, for Circular_path in paragraph 4.2.61, for Complete_circular_path in paragraph 4.2.79, and for Partial_circular_path in paragraph 4.2.339 for more information.

EXPRESS specification:

```
*)
ENTITY path_feature_component
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN [ 'partial circular' ,
     'complete circular' , 'linear' , 'complex'];
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR5: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =3 ) ) ) =1 ) ;
 WR6: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
    used_representation.items | ( i.name='radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1 ) ;
WR7: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'sweep angle' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
    ) ) ) =1 ) ;
WR8: ( SELF.description<> 'complete circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =2 ) ) ) =1 ) ;
WR9: ( SELF.description<> 'complete circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name='radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1 ) ;
WR10: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY ( pdr
    <* get_shape_aspect_property_definition_representations (
    SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =2 ) ) ) =1 ) ;
WR11: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY ( pdr
    <* get_shape_aspect_property_definition_representations (
    SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name='distance' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1 ) ;
WR12: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( pdr
    <* get_shape_aspect_property_definition_representations (
```

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```
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'PATH_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. name= 'sweep path' ) ) )
     =1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PATH_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr. name=
     'sweep path' ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'path curve' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF ( i ) ) ) ) =1 ) )
     ) =1 ) ;
 WR13: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **path_feature_component** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** for the **path_feature_component** shall be either 'partial circular', 'complete circular', 'linear', or 'complex'.

WR3: The **path_feature_component** shall have exactly one implicit representation of type **shape_representation_with_parameters**.

WR4: The implicit representation of the **path_feature_component** shall contain one **representation_item** of type **placement** and a **name** of 'orientation'.

WR5: If the **description** of the **path_feature_component** is 'partial circular', the implicit representation of the **path_feature_component** shall contain exactly three **representation_item**s in its set of **items**.

WR6: If the **description** of the **path_feature_component** is 'partial circular', exactly one **representation_item** used for the implicit representation of the **path_feature_component** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR7: If the **description** of the **path_feature_component** is 'partial circular', exactly one **representation_item** used for the implicit representation of the **path_feature_component** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'sweep angle'.

WR8: If the **description** of the **path_feature_component** is 'complete circular', the implicit representation of the **path_feature_component** shall contain exactly two **representation_item**s in its set of **items**.

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WR9: If the **description** of the **path_feature_component** is 'complete circular', exactly one **representation_item** used for the implicit representation of the **path_feature_component** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR10: If the **description** of the **path_feature_component** is 'linear', the implicit representation of the **path_feature_component** shall contain exactly two **representation_item**s in its set of **items**.

WR11: If the **description** of the **path_feature_component** is 'linear', exactly one **representation_item** used for the implicit representation of the **path_feature_component** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'distance'.

WR12: If the **description** of the **path_feature_component** is 'complex', the **path_feature_component** shall have exactly one **path_shape_representation** with a **name** of 'sweep path'. This **path_shape_representation** shall contain a **curve** with a **name** of 'path curve'.

WR13: If the **description** of the **path_feature_component** is 'complex', the implicit representation of the **path_feature_component** shall contain exactly one **representation_item**s in its set of **items**.

5.2.3.1.100 path_shape_representation

A **path_shape_representation** is a type of **shape_representation** that represents a curved path such that the collection of curves is continuous and directed.

EXPRESS specification:

```
*)
ENTITY path_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( SELF.items ) =1;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'BOUNDED_CURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_CURVE' , 'AUTOMOTIVE_DESIGN.'+
     'PATH']* TYPEOF ( i ) ) =1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **path_shape_representation** shall have exactly one **representation_item** in its set of **items**.

WR2: The geometric element that is used to represent the **path_shape_representation** shall be a **bounded_curve**, an **edge_curve**, or a **path**.

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5.2.3.1.101 pattern_offset_membership

A **pattern_offset_membership** specifies the relationships necessary to offset a feature from either a **rectangular_pattern** or a **circular_pattern**.

EXPRESS specification:

```
*)
ENTITY pattern_offset_membership
  SUBTYPE OF (feature_component_relationship);
WHERE
 WR1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' ,
     'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN']* TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) =1;
 WR2: SIZEOF ( QUERY ( sar <* USEDIN ( SELF.related_shape_aspect
     ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'MODIFIED_PATTERN' IN TYPEOF ( sar.
     relating_shape_aspect.of_shape. definition ) ) AND ( sar.
     description = 'modified pattern' ) ) ) >=1;
 WR3: SIZEOF ( get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) ) =1;
 WR4: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' IN TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( pdr. used_representation.items ) =2 ) ) ) =1 ) ;
 WR5: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' IN TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'index number' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) ) =1 ) ) ) =1 )
     ;
 WR6: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' IN TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | (
     i.name='offset' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1
```

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```
     ) ) ) =1 ) ;
 WR7: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( pdr. used_representation.items ) =3 ) ) ) =1 ) ;
 WR8: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'row index' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) =1 ) ) =1 )
     ;
 WR9: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'column index' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) =1 ) ) =1 )
     ;
 WR10: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'offset distance' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR11: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | (
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'offset direction' ) ) ) =1 ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **pattern_offset_membership** shall refer as **relating_shape_aspect** to an aspect of the basis shape of either a **circular_pattern** or a **rectangular_pattern**.

WR2: The **related_shape_aspect** that defines the offset in the **pattern_offset_membership** shall be incorporated in at least one basis shape of a **modified_pattern** by a **feature_component_relationship** with a **description** of 'modified pattern'.

WR3: The **shape_aspect** that is referenced as **related_shape_aspect** of the **pattern_offset_membership** shall have exactly one **representation**.

WR4: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **circular_pattern**, the **representation** of the **shape_aspect** referenced as the **related_shape_aspect** of the **pattern_offset_membership** shall contain two **representation_item**s in its set of **items**.

WR5: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **circular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'index number'.

WR6: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **circular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'offset'.

WR7: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **rectangular_pattern**, the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall contain three **representation_item**s in its set of **items**.

WR8: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **rectangular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'row index'.

WR9: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **rectangular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'column index'.

WR10: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **rectangular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'offset distance'.

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WR11: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_offset_membership** is an aspect of the basis shape of a **rectangular_pattern**, the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_offset_membership** shall have exactly one **direction_shape_representation** with a **name** of 'offset direction'.

5.2.3.1.102 pattern_omit_membership

A **pattern_omit_membership** specifies the relationships necessary to omit a feature from either a **rectangular_pattern** or a **circular_pattern**.

EXPRESS specification:

```
*)
ENTITY pattern_omit_membership
  SUBTYPE OF (feature_component_relationship);
WHERE
 WR1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' ,
     'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN'] * TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) =1;
 WR2: SIZEOF ( QUERY ( sar <* USEDIN ( SELF.related_shape_aspect
     ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'MODIFIED_PATTERN' IN TYPEOF ( sar.
     relating_shape_aspect.of_shape. definition ) ) AND ( sar.
     description = 'modified pattern' ) ) ) >=1;
 WR3: SIZEOF ( get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) ) =1;
 WR4: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' IN TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( pdr. used_representation.items ) =1 ) ) ) =1 ) ;
 WR5: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_PATTERN' IN TYPEOF (
     SELF.relating_shape_aspect. of_shape.definition ) ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'index number' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) ) =1 ) ) ) =1 )
     ;
 WR6: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
```

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```
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( pdr. used_representation.items ) =2 ) ) ) =1 ) ;
 WR7: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'row index' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) =1 ) ) ) =1 )
     ;
 WR8: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_PATTERN' IN
     TYPEOF ( SELF.relating_shape_aspect. of_shape.definition )
     ) OR ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations (
     SELF.related_shape_aspect. of_shape.definition ) | ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | ( i.name=
     'column index' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COUNT_MEASURE' IN TYPEOF (
     i\measure_with_unit. value_component ) ) ) =1 ) ) ) =1 )
     ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **pattern_omit_membership** shall refer as **relating_shape_aspect** to an aspect of the basis shape of either a **circular_pattern** or a **rectangular_pattern**.

WR2: The **related_shape_aspect** that defines the omission in the **pattern_offset_membership** shall be incorporated in at least one basis shape of a **modified_pattern** by a **feature_component_relationship** with a **description** of 'modified pattern'.

WR3: The **shape_aspect** that is referenced by **related_shape_aspect** of the **pattern_omit_membership** shall have exactly one **representation**.

WR4: If the **shape_aspect** referenced as the **relating_shape_aspect** of the **pattern_omit_membership** is an aspect of the shape of the basis shape of a **circular_pattern**, the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_omit_membership** shall contain one **representation_item** in its set of **items**.

WR5: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_omit_membership** is an aspect of the basis shape of a **circular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_omit_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'index number'.

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WR6: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_omit_membership** is an aspect of the basis shape of a **rectangular_pattern**, the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_omit_membership** shall contain two **representation_item**s in its set of **items**.

WR7: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_omit_membership** is an aspect of the basis shape of a **rectangular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_omit_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'row index'.

WR8: If the **shape_aspect** referenced by the **relating_shape_aspect** of the **pattern_omit_membership** is an aspect of the basis shape of a **rectangular_pattern**, exactly one **representation_item** used for the **representation** of the **shape_aspect** referenced by the **related_shape_aspect** of the **pattern_omit_membership** shall be of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'column index'.

5.2.3.1.103 person_and_organization_address

A **person_and_organization_address** is a type of **personal_address** and **organizatiional_address**. It specifies the relevant address of a **person_and_organization**. See ARM definition for Person_in_organization for more information.

EXPRESS specification:

```
*)
ENTITY person_and_organization_address
  SUBTYPE OF (organizational_address,personal_address);
WHERE
 WR1: SIZEOF ( SELF\personal_address. people ) =1;
 WR2: SIZEOF ( SELF\organizational_address. organizations ) =1;
 WR3: SIZEOF ( QUERY ( pao <* USEDIN ( SELF.people[1] ,
      'AUTOMOTIVE_DESIGN.PERSON_AND_ORGANIZATION.THE_PERSON' ) |
      pao. the_organization:=:SELF\organizational_address.
      organizations[1] ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: There shall be exactly one item of type **person** in the set of **people**.

WR2: There shall be exactly one item of type **organization** in the set of **organizations**.

WR3: For each instance of type **person_and_organization_address** there exist a corresponding instance of type **person_and_organization**. The instance referenced by the attribute **people** of the instance of type **person_and_organization_address** is identical to the instance referenced by the attribue

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the_person of the instance of type **person_and_organization**. The instance referenced by the attribute **organizations** of the instance of type **person_and_organization_address** is identical to the instance referenced by the attribue **the_organization** of the instance of type **person_and_organization**.

5.2.3.1.104 physically_modelled_product_definition

A **physically_modelled_product_definition** is a type of **product_definition_with_associated_documentss** that specifies a model of a shape of the part which is physically available. See ARM definition for Physical_model in paragraph 4.2.354 for more information.

EXPRESS specification:

```
*)
ENTITY physically_modelled_product_definition
  SUBTYPE OF (product_definition_with_associated_documents);
WHERE
 WR1:SELF.frame_of_reference\ application_context_element.name =
     'physical model occurrence' ;
 WR2: ( SIZEOF ( documentation_ids ) =1 ) AND ( SIZEOF ( QUERY (
     d <* documentation_ids | ( SIZEOF ( QUERY ( drt <*
     d.representation_types | ( drt. name ='physical' ) ) ) =1 )
     ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **physically_modelled_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** that has a **name** of 'physical model occurrence'.

WR2: The **physically_modelled_product_definition** shall have exactly one **document** in its set of **documentation_ids**. This **document** shall reference as its **representation_type** a **document_representation_type** that has a **name** of 'physical'.

Informal propositions:

IP1: In case the **physically_modelled_product_definition** is not referenced by a **product_definition_shape** as the **definition**, the scale shall be 1:1.

5.2.3.1.105 placed_datum_target_feature

A **placed_datum_target_feature** is a type of **datum_target** that represents the implicit definition of a datum target for tolerancing purposes. See ARM definition for Placed_target in paragraph 4.2.357 for more information.

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EXPRESS specification:

```
*)
ENTITY placed_datum_target_feature
  SUBTYPE OF (datum_target);
WHERE
 WR1:SELF.description IN ['point' , 'line' , 'rectangle' ,
     'circle'];
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR4: ( SELF.description<>'point' ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1 ) ;
 WR5: ( SELF.description<>'circle' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1 ) ;
 WR6: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =3 ) ) ) =1 ) ;
 WR7: ( SELF.description<>'circle' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'target diameter' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR8: ( SELF.description<>'line' ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
```

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```
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'target length' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR9: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'target length' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR10: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'target width' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **description** for the **placed_datum_target_feature** shall be either 'point', 'line', 'rectangle' or 'circle'.

WR2: A **placed_datum_target_feature** shall have exactly one implicit representation.

WR3: Exactly one **representation_item** used for the implicit representation of the **placed_datum_-target_feature** shall be of type **placement** with a **name** of 'orientation'.

WR4: If the **placed_datum_target_feature** is a point, the **representation** shall contain exactly one **representation_item** in its set of **items**.

WR5: If the **placed_datum_target_feature** is a line or circle, the **representation** shall contain exactly two **representation_item**s in its set of **items**.

WR6: If the **placed_datum_target_feature** is a rectangle, the **representation** shall contain exactly three **representation_item**s in its set of **items**.

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WR7: If the **description** of the **placed_datum_target_feature** is 'circle', exactly one **representation_item** used for the implicit representation of the **placed_datum_target_feature** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'target diameter'.

WR8: If the **description** of the **placed_datum_target_feature** is 'line', exactly one **representation_item** used for the implicit representation of the **placed_datum_target_feature** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'target length'.

WR9: If the **description** of the **placed_datum_target_feature** is 'rectangle', exactly one **representation_item** used for the implicit representation of the **placed_datum_target_feature** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'target length'.

WR10: If the **description** of the **placed_datum_target_feature** is 'rectangle', exactly one **representation_item** used for the implicit representation of the **placed_datum_target_feature** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'target width'.

5.2.3.1.106 placed_feature

A **placed_feature** is a type of **shape_aspect** that is the identification of a preconceived form pattern on a part as a result of the placement of a **feature_definition** which is defined in its own context. See ARM definition for Placed_feature in paragraph 4.2.356 for more information.

EXPRESS specification:

```
*)
ENTITY placed_feature
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'feature definition placement' )
     AND ( SIZEOF ( QUERY ( i <* pdr. used_representation.items
     | ( 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( i ) )
     AND ( SIZEOF ( QUERY ( pdr1 <* USEDIN ( i\mapped_item.
     mapping_source.mapped_representation ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.USED_REPRESENTATION'
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'FEATURE_DEFINITION' IN TYPEOF
     ( pdr1. definition\property_definition. definition ) ) ) )
     =1 ) ) ) =1 ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'maximum feature limit' ) ) )
     =1;
```

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```
END_ENTITY;
(*
```

Formal propositions:

WR1: The **placed_feature** shall be an aspect of the shape of a **product_definition**.

WR2: The **placed_feature** shall have a **shape_representation** with a **name** of 'feature definition placement' that contains a **mapped_item** in its set of **items**. This **mapped_item** shall reference a **representation_map** that references the **shape_representation** of a **feature_definition** as **mapped_representation**.

WR3: The **placed_feature** shall be represented by exactly one **planar_shape_representation**. This **planar_shape_representation** shall have a **name** of 'maximum feature limit'.

Informal propositions:

IP1: If an **placed_feature** has a **shape_representation** and if the **product_definition_shape** that is referenced as **of_shape** by the **placed_feature** has a **shape_representation** then these **shape_representation**s shall have the same **geometric_representation_context**.

5.2.3.1.107 planar_shape_representation

A **planar_shape_representation** is a type of **shape_representation** that represents a plane.

EXPRESS specification:

```
*)
ENTITY planar_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( SELF.items ) =1;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'+
     'PLANE' IN TYPEOF ( i ) ) ) =1;
 WR3:SELF.name IN [ 'profile limit' , 'maximum feature limit' ];
 WR4: ( SELF.name<> 'maximum feature limit' ) OR ( SIZEOF (
     QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.USED_REPRESENTATION'
     ) | SIZEOF ( QUERY ( sa <* get_shape_aspects ( pdr.
     definition\property_definition. definition ) | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'INSTANCED_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PLACED_FEATURE']* TYPEOF ( sa ) ) =1
     ) ) =1 ) ) =1 ) ;
 WR5: ( SELF.name<> 'profile limit' ) OR ( SIZEOF ( QUERY ( pdr
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.USED_REPRESENTATION'
```

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```
     ) | SIZEOF ( QUERY ( sa <* get_shape_aspects ( pdr.
     definition\property_definition. definition ) | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'VEE_PROFILE']* TYPEOF ( sa ) ) =1 ) ) =1 ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **planar_shape_representation** shall contain exactly one **representation_item** in its set of **items**.

WR2: The **planar_shape_representation** shall refer to a **plane** as its representation.

WR3: The **planar_shape_representation** shall have a **name** of either 'profile limit' or 'maximum feature limit'.

WR4: If the **planar_shape_representation** has a **name** of 'maximum feature limit', it shall be the representation of a **shape_aspect** that is either of type **instanced_feature** or **placed_feature**.

WR5: If the **planar_shape_representation** has a **name** of 'profile limit', it shall be the representation of a **shape_aspect** that is of type **open_path_profile**, **partial_circular_profile**, **rounded_u_profile**, **square_u_profile**, **tee_profile**, or **vee_profile**.

5.2.3.1.108 pocket

A **pocket** is a type of **feature_definition** that is the representation of a volume that is removed from a solid base shape. This volume may be enclosed in which case it is represented by sweeping a closed profile along a linear path represented by a **path_feature_component**. If the removed volume is not enclosed it is represented by sweeping an open profile. The bottom of the pocket is represented by a **pocket_bottom**. The walls of a **pocket** may have a slope that is represented by a **taper**. See ARM definition for General_pocket in paragraph 4.2.229, Rectangular_closed_pocket in paragraph 4.2.421, and Rectangular_open_pocket in paragraph 4.2.425 for more information.

EXPRESS specification:

```
*)
ENTITY pocket
  SUBTYPE OF (feature_definition);
WHERE
 WR1:SELF.description IN [ 'open rectangular' ,
     'closed rectangular' , 'complex'];
 WR2: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( sa
```

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```
    <* get_shape_aspects ( SELF ) | ( sa. description =
    'boundary occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
    USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CIRCULAR_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'CLOSED_PATH_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
    'AUTOMOTIVE_DESIGN.'+ 'VEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
    'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE']*
    TYPEOF ( sar. relating_shape_aspect ) ) =1 ) ) ) =1 ) ) )
    =1 ) ;
WR3: ( SELF.description<> 'closed rectangular' ) OR ( SIZEOF (
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'closed boundary occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' IN
    TYPEOF ( sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1 ) ;
WR4: ( SELF.description<> 'open rectangular' ) OR ( SIZEOF (
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'open boundary occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'profile usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) =1 ) ;
WR5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'pocket depth occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. name = 'pocket depth' ) AND ( sar. description =
    'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
    sar. relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description ='linear' ) ) ) =1 ) ) )
    =1;
WR6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'bottom condition occurrence' ) AND ( SIZEOF
    ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
```

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```
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'pocket bottom usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'POCKET_BOTTOM' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
 WR7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'change in boundary occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'taper usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
    relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description IN [ 'angle taper' ,
    'directed taper' ] ) ) ) =1 ) ) ) <=1;
 WR8: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND NOT ( {1<= SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) ) =0;
 WR9: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN ['orientation'
    , 'fillet radius 1' ] ) ) ) >0 ) ) ) =0;
 WR10: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'base radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) <=1;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **pocket** shall have a **description** of 'open rectangular', 'closed rectangular', or 'complex'.

WR2: If the **pocket** has a **description** of 'complex', the **pocket** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'boundary occurrence'. This **shape_aspect** shall be the **related_-shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage'in which

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the **relating_shape_aspect** is a **circular_closed_profile**, **ngon_closed_profile**, **closed_path_profile**, **partial_circular_profile**, **rounded_u_profile**, **vee_profile**, **tee_profile**, or **open_path_profile**.

WR3: If the **pocket** has a **description** of 'closed rectangular', the **pocket** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'closed boundary occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is a **rectangular_closed_profile**.

WR4: If the **pocket** has a **description** of 'open rectangular', the **pocket** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'open boundary occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' in which the **relating_shape_aspect** is a **square_u_profile**.

WR5: The **pocket** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'pocket depth occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'pocket depth' and a **description** of 'path feature component usage' in which the **relating_shape_aspect** is a **path_feature_component** with a **description** of 'linear'.

WR6: The **pocket** shall be the basis shape for exactly one **shape_aspect** with a**description** of 'bottom condition occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'pocket bottom usage' in which the **relating_shape_aspect** is a **pocket_bottom**.

WR7: The **pocket** shall be the basis shape for at most one **shape_aspect** with a **description** of 'change in boundary occurrence'. If present, this **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'taper usage' in which the **relating_shape_aspect** is a **taper** with a **description** of either 'angle taper' or 'directed taper'.

WR8: The implicit representation of the **pocket** shall contain between one and two **representation_items** in its set of **items**.

WR9: The implicit representation of the **pocket** shall only contain **representation_items** in its set of **items** that have a **name** of either 'orientation' or 'fillet radius'.

WR10: The implicit representation of the **pocket** shall contain at most one **representation_items** in its set of **items** that has a **name** of 'base radius'. If present, this **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

5.2.3.1.109 pocket_bottom

A **pocket_bottom** is a type of **shape_aspect** that is the bottom condition for a **pocket**. See ARM definition for Pocket_bottom_condition in paragraph 4.2.365, for Planar_bottom_condition in paragraph 4.2.358, for Through_pocket_bottom_condition in paragraph 4.2.520, and for General_bottom_condition in paragraph 4.2.215 for more information.

EXPRESS specification:

```
*)
ENTITY pocket_bottom
```

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```
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN ['planar' , 'complex' , 'through'];
 WR3: NOT ( SELF.description IN ['planar' , 'complex'] ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) AND ( SIZEOF ( QUERY ( i
     <* pdr. used_representation.items | ( i.name='radius' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) <=1 ) ;
 WR4: NOT ( SELF.description IN ['planar' , 'complex'] ) OR (
     SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name IN [ 'pocket depth' , 'pocket depth end' ] ) ) )
     =1 ) ;
 WR5: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. used_representation.name
     ='floor' ) ) ) =1 ) ;
 WR6: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. used_representation.name
     = 'floor location' ) ) ) =1 ) ;
 WR7: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
```

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```
     used_representation ) ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. used_representation.name
     = 'floor normal' ) ) ) =1 ) ;
 WR8: ( SELF.description<>'through' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =0 ) ;
 WR9: ( SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) ) ) =1
     ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'pocket bottom usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'POCKET' IN TYPEOF ( sar.
     related_shape_aspect.of_shape. definition ) ) AND ( sar.
     related_shape_aspect.of_shape.
     definition\characterized_object. description =
     'bottom condition occurrence' ) ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **pocket_bottom** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** of the **pocket_bottom** shall be either 'planar', 'complex', or 'through'.

WR3: If the **pocket_bottom** has a **description** of 'planar' or 'complex', the **pocket_bottom** shall have its implicit representation specified by at most one **shape_representation_with_parameters**. If present, the implicit representation shall contain exactly one **representation_item** in its set of **items**. It shall be of type **measure_representation_item** and **length_measure_with_unit** and shall have a **name** of 'radius'.

WR4: If the **pocket_bottom** has a **description** of 'planar' or 'complex', the **feature_component_-relationship** that refers to the **pocket_bottom** as the **relating_shape_aspect** shall have a **name** of either 'pocket depth start' or 'pocket depth end'.

WR5: If the **description** of the **pocket_bottom** is 'complex', the **pocket_bottom** shall be represented by exactly one **face_shape_representation**. This representation shall have a **name** of 'floor'.

WR6: If the **description** of the **pocket_bottom** is 'planar', the **pocket_bottom** shall be represented by exactly one **location_shape_representation**. This representation shall have a **name** of 'floor location'.

WR7: If the **description** of the **pocket_bottom** is 'planar', the **pocket_bottom** shall be represented by exactly one **direction_shape_representation**. This representation shall have a **name** of 'floor normal'.

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WR8: If the **description** of the **pocket_bottom** is 'through', the **pocket_bottom** shall not be represented implicitly by a **shape_representation_with_parameters**.

WR9: The **pocket_bottom** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship**. This **feature_component_relationship** shall have a **description** of 'pocket bottom usage' and shall reference as the **related_shape_aspect** an aspect of the shape of a **pocket** that has a **description** of 'bottom condition occurrence'.

5.2.3.1.110 point_placement_shape_representation

A **point_placement_shape_representation** is a type of **shape_representation** that consists of sequences of pairs of points and directions. See ARM definition for Point_direction_model in paragraph 4.2.370 for more information.

EXPRESS specification:

```
*)
ENTITY point_placement_shape_representation
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'COMPOUND_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( i ) ) <>1 ) ) =0;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'COMPOUND_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( i ) ) =1 ) )
     >0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **items** in a **point_placement_shape_representation** shall be of type **compound_representation_item**, **mapped_item**, or **axis2_placement_3d**.

WR2: At least one of the **items** in a **point_placement_shape_representation** shall be either a **compound_representation_item** or a **mapped_item**.

Informal propositions:

IP1: For each **compound_representation_item** in the set of **items** the **item_element** shall be of type **list_representation_item**.

IP2: For each **compound_representation_item** in the set of **items** the **list_representation_item** shall include only **representation_item**s of type **placement** or **point**.

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5.2.3.1.111 pre_defined_dimension_symbol

A **pre_defined_dimension_symbol** is a **pre_defined_symbol** that presents a dimension and is identified by **name**. See ARM definition for Dimension_symbol in paragraph 4.2.153 for more information.

NOTE - The definition of this entity is identical to the definition in ISO 10303–202.

EXPRESS specification:

```
*)
ENTITY pre_defined_dimension_symbol
  SUBTYPE OF (pre_defined_symbol);
WHERE
 WR1:SELF.name IN [ 'arc length' , 'conical taper' ,
     'counterbore' , 'countersink' , 'depth' , 'diameter' ,
     'plus minus' , 'radius' , 'slope' , 'spherical diameter' ,
     'spherical radius' , 'square'];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **name** of the **pre_defined_dimension_symbol** shall be 'arc length', 'conical taper', 'counterbore', 'countersink', 'depth', 'diameter', 'plus minus', 'radius', 'slope', 'spherical diameter', 'spherical radius', or 'square'.

5.2.3.1.112 pre_defined_geometrical_tolerance_symbol

A **pre_defined_geometrical_tolerance_symbol** is a **pre_defined_symbol** that presents a geometrical tolerance and is identified by **name**. See ARM definition for Geometric_tolerance_symbol in paragraph 4.2.246 for more information.

NOTE - The definition of this entity is identical to the definition in ISO 10303–202.

EXPRESS specification:

```
*)
ENTITY pre_defined_geometrical_tolerance_symbol
  SUBTYPE OF (pre_defined_symbol);
WHERE
 WR1:SELF.name IN ['angularity' , 'basic dimension' ,
     'blanked datum reference' , 'circular runout' ,
     'circularity' , 'concentricity' , 'cylindricity' ,
     'datum target identification' , 'diameter' ,
```

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```
     'filled datum reference' , 'flatness' ,
     'least material condition' , 'maximum material condition' ,
     'parallelism' , 'perpendicularity' , 'position' ,
     'profile of a line' , 'profile of a surface' ,
     'projected tolerance zone' , 'regardless of feature size' ,
     'straightness' , 'symmetry' , 'total runout' ];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **name** of the **pre_defined_geometrical_tolerance_symbol** shall be 'angularity', 'basic dimension', 'blanked datum reference', 'circular runout', 'circularity', 'concentricity', 'cylindricity', 'datum target identification', 'diameter', 'filled datum reference', 'flatness', 'least material condition', 'maximum material condition', 'parallelism', 'perpendicularity', 'position', 'profile of a line', 'profile of a surface', 'projected tolerance zone', 'regardless of feature size', 'straightness', 'symmetry', or 'total runout'.

5.2.3.1.113 pre_defined_point_marker_symbol

A **pre_defined_point_marker_symbol** is a type of **pre_defined_symbol** that presents the position of a point and is identified by **name**. See ARM definition for Point_marker_symbol in paragraph 4.2.372 for more information.

NOTE - The definition of this entity is identical to the definition in ISO 10303–202.

EXPRESS specification:

```
*)
ENTITY pre_defined_point_marker_symbol
  SUBTYPE OF (pre_defined_marker,pre_defined_symbol);
WHERE
 WR1:SELF.name IN ['asterisk' , 'circle' , 'dot' , 'plus' ,
     'square' , 'triangle' , 'x'];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **name** of the **pre_defined_point_marker_symbol** shall be 'asterisk', 'circle', 'dot', 'plus', 'square', 'triangle', or 'x'.

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5.2.3.1.114 pre_defined_surface_condition_symbol

A **pre_defined_surface_condition_symbol** is a **pre_defined_symbol** that represents a surface quality and is identified by a three digit code represented as the **name**. See ARM definition for Surface_condition_symbol in paragraph 4.2.495 for more information.

EXPRESS specification:

```
*)
ENTITY pre_defined_surface_condition_symbol
  SUBTYPE OF (pre_defined_symbol);
WHERE
 WR1:SELF.name IN ['000' , '010' , '020' , '030' , '040' , '050'
     , '060' , '070' , '001' , '011' , '021' , '031' , '041' ,
     '051' , '061' , '071' , '100' , '110' , '120' , '130' ,
     '140' , '150' , '160' , '170' , '101' , '111' , '121' ,
     '131' , '141' , '151' , '161' , '171' , '200' , '210' ,
     '220' , '230' , '240' , '250' , '260' , '270' , '201' ,
     '211' , '221' , '231' , '241' , '251' , '261' , '271'];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **name** of the **pre_defined_surface_condition_symbol** shall be '000', '010', '020', '030', '040', '050', '060', '070', '001', '011', '021', '031', '041', '051', '061', '071', '100', '110', '120', '130', '140', '150', '160', '170', '101', '111', '121', '131', '141', '151', '161', '171', '200', '210', '220', '230', '240', '250', '260', '270', '201', '211', '221', '231', '241', '251', '261', or '271'.

5.2.3.1.115 pre_defined_terminator_symbol

A **pre_defined_terminator_symbol** is a type of **pre_defined_symbol** that presents a terminator and is identified by **name**. See ARM definition for Terminator_symbol in paragraph 4.2.513 for more information.

NOTE - The definition of this entity is identical to the definition in ISO 10303–202.

EXPRESS specification:

```
*)
ENTITY pre_defined_terminator_symbol
  SUBTYPE OF (pre_defined_symbol);
WHERE
 WR1:SELF.name IN [ 'blanked arrow' , 'blanked box' ,
```

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```
     'blanked dot' , 'dimension origin' , 'filled arrow' ,
     'filled box' , 'filled dot' , 'integral symbol' ,
     'open arrow' , 'slash' , 'unfilled arrow' ];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **name** of the **pre_defined_terminator_symbol** shall be 'blanked arrow', 'blanked box', 'blanked dot', 'dimension origin', 'filled arrow', 'filled box', 'filled dot', 'integral symbol', 'open arrow', 'slash', or 'unfilled arrow'.

5.2.3.1.116 process_operation

A **process_operation** is the identification of a specific step in a process. It collects all information that is common for all occurrences of this particular step in the processes which make use of this step. See ARM definition for Process_operation_definition in paragraph 4.2.381 for more information.

EXPRESS specification:

```
*)
ENTITY process_operation
  SUBTYPE OF (action_method);
WHERE
 WR1: SIZEOF ( QUERY ( amr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ACTION_METHOD_RELATIONSHIP.'+'RELATING_METHOD'
     ) | NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PROCESS_OPERATION' IN
     TYPEOF ( amr. related_method ) ) OR ( SELF:=:amr.
     related_method ) ) ) =0;
 WR2: SIZEOF ( QUERY ( amr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ACTION_METHOD_RELATIONSHIP.'+'RELATED_METHOD'
     ) | NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PROCESS_OPERATION' IN
     TYPEOF ( amr. relating_method ) ) OR ( SELF:=:amr.
     relating_method ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **process_operation** shall only be refered to by **action_method_relationship**s as **relating_-method**, where the **related_method** refers to another instance of **process_operation**.

WR2: A **process_operation** shall only be refered to by **action_method_relationship**s as **related_-method**, where the **relating_method** refers to another instance of **process_operation**.

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5.2.3.1.117 process_plan

A **process_plan** is a type of **action** that specifies the information necessary for manufacturing planning. See ARM definition for Process_plan in paragraph 4.2.387 for more information.

EXPRESS specification:

```
*)
ENTITY process_plan
  SUBTYPE OF (action);
WHERE
 WR1: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
      'RELATED_ACTION' ) | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar. relating_action ) )
      <>1 ) ) =0;
 WR2: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
      'RELATING_ACTION' ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar. related_action ) ) =1
      ) OR ( ( ar. name = 'process operation occurrence' ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'PROCESS_OPERATION' IN TYPEOF ( ar.
      related_action.chosen_method ) ) ) ) = SIZEOF ( USEDIN (
      SELF , 'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
      'RELATING_ACTION' ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **process_plan** shall only be referenced as the **related_action** by **action_relationship**s that reference as the **relating_action** a **process_plan** or a **product_process_plan**.

WR2: The **process_plan** shall only be referenced as the **relating_action** by **action_relationship**s that reference as the **related_action** a **process_plan**, or a **product_process_plan**, or by **action_relationship**s that have a **name** of 'process operation occurrence' and that reference as the **related_action** an **action** that refers to a **process_operation** as its **chosen_method**.

5.2.3.1.118 product_class

A **product_class** is a type of **product_concept** and **characterized_object** that is the identification of a set of similar products to be offered to the market. See ARM definition for Product_class in paragraph 4.2.392 for more information.

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EXPRESS specification:

```
*)
ENTITY product_class
  SUBTYPE OF (product_concept,characterized_object);
END_ENTITY;
(*
```

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_class** entity:

– restrict_configuration_design_for_product_class (see 5.2.4.93).

5.2.3.1.119 product_concept_feature_category

A **product_concept_feature_category** is a type of **group** that specifies a set of similar **product_concept_feature** instances. See ARM definition for Specification_category in paragraph 4.2.468 for more information.

EXPRESS specification:

```
*)
ENTITY product_concept_feature_category
  SUBTYPE OF (group);
WHERE
 WR1: SIZEOF ( QUERY ( aga <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.GROUP_ASSIGNMENT.'+'ASSIGNED_GROUP' ) |
      ( 'AUTOMOTIVE_DESIGN.'+ 'APPLIED_GROUP_ASSIGNMENT' IN
      TYPEOF ( aga ) ) AND ( ( aga. role.name<>
      'specification category member' ) OR ( SIZEOF ( QUERY ( i
      <* aga. items | ( 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( i ) ) AND NOT (
      'AUTOMOTIVE_DESIGN.'+ 'CONDITIONAL_CONCEPT_FEATURE' IN
      TYPEOF ( i ) ) ) ) <> SIZEOF ( aga. items ) ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **product_concept_feature_category** shall only be referenced as **assigned_group** by **applied_group_assignment** instances which reference as **role** an **object_role** with a **name** of 'specification category member' and which only contain **product_concept_feature**s in their set of **items** which are not of type **conditional_concept_feature**.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_concept_feature_-category** entity:

– product_concept_feature_requires_category (see 5.2.4.71);

– restrict_group_relationship_for_specification_category (see 5.2.4.103).

5.2.3.1.120 product_concept_feature_category_usage

A **product_concept_feature_category_usage** is a type of **group_assignment** that is the assignment of a **product_concept_feature_category** to a **product_class**. Additionally this assignment specifies if the usage of one or more **product_concept_feature**s belonging to this **product_concept_feature_category** is mandatory or optional for all products of that **product_class**.

EXPRESS specification:

```
*)
ENTITY product_concept_feature_category_usage
  SUBTYPE OF (group_assignment);
  items : SET [1:?] OF category_usage_item;
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY' IN
     TYPEOF ( SELF.assigned_group ) ;
 WR2:SELF.role. name IN [ 'mandatory category usage' ,
     'optional category usage' ];
END_ENTITY;
(*
```

Attribute definitions:

items: the set of items to which the **product_concept_feature_category** is assigned.

Formal propositions:

WR1: The **product_concept_feature_category_usage** shall have an **assigned_group** which is of type **product_concept_feature_category**.

WR2: The **product_concept_feature_category_usage** shall have as **role** an **object_role** with a **name** of 'mandatory category usage' or 'optional category usage'.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **product_concept_feature_category_usage** entity:

– restrict_effectivity_assignment_for_class_category_usage (see 5.2.4.97).

5.2.3.1.121 product_definition_resource

A **product_definition_resource** is a type of **product_definition** and **action_resource** that specifies a tool that is used to perform a Process_operation.

EXPRESS specification:

```
*)
ENTITY product_definition_resource
  SUBTYPE OF (action_resource,product_definition);
WHERE
 WR1: SIZEOF ( USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REQUIREMENT_FOR_ACTION_RESOURCE.'+
      'RESOURCES' ) ) >0;
 WR2:SELF.frame_of_reference. name IN ['part_definition' ,
      'part occurrence' , 'physical occurrence' ];
END_ENTITY;
(*
```

Formal propositions:

WR1: A **product_definition_resource** is contained in the set of **resources** of at least one **requirement_for_action_resource**.

WR2: A **product_definition_resource** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'part_definition', 'part occurrence', or 'physical occurrence'.

5.2.3.1.122 product_identification

A **product_identification** is a type of **configuration_item** and **characterized_object** that identifies a manufacturable object, or expected as so, which is defined with respect to the **product_class** it is a member of.

EXPRESS specification:

```
*)
ENTITY product_identification
  SUBTYPE OF (configuration_item,characterized_object);
WHERE
```

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```
 WR1: SIZEOF ( QUERY ( cd <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.CONFIGURATION_DESIGN.CONFIGURATION' ) |
      ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_FORMATION' IN
      TYPEOF ( cd. design ) ) AND ( SIZEOF ( QUERY ( prpc <*
      USEDIN ( cd. design\product_definition_formation.
      of_product ,
      'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
      ) | prpc. name IN ['part' , 'raw material' , 'tool'] ) ) >0
      ) ) ) <=1;
 WR2:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CLASS' IN TYPEOF (
      SELF.item_concept ) ;
 WR3: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CONFIGURABLE_ITEM' IN TYPEOF
      ( SELF ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_SPECIFICATION' IN TYPEOF ( SELF ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each **product_identification** shall be referenced as the **configuration** by at most one instance of **configuration_design** that references as **design** a **product_definition_formation** which references as **of_product** a **product** which is contained in the of **products** set of a **product_related_product_category** with a **name** of either 'part', 'raw material', or 'tool'.

WR2: Each **product_identification** shall reference as its **item_concept** a **product_class**.

WR3: If a **product_identification** is of type **configurable_item** it shall also be of type **product_specification**. If a **product_identification** is of type **product_specification** it shall also be of type **configurable_item**.

5.2.3.1.123 product_process_plan

A **product_process_plan** is a type of **product_definition_process** that specifies the information necessary for manufacturing planning to realize or produce a product. See ARM definition for Process_plan in paragraph 4.2.387 for more information.

EXPRESS specification:

```
*)
ENTITY product_process_plan
  SUBTYPE OF (product_definition_process);
WHERE
 WR1: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
      'RELATED_ACTION' ) | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.'+
      'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar. relating_action ) )
```

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```
     <>1 ) ) =0;
 WR2: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
     'RELATING_ACTION' ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar. related_action ) ) =1
     ) OR ( ( ar. name = 'process operation occurrence' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PROCESS_OPERATION' IN TYPEOF ( ar.
     related_action.chosen_method ) ) ) ) = SIZEOF ( USEDIN (
     SELF , 'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
     'RELATING_ACTION' ) ) ;
 WR3: SIZEOF ( QUERY ( ppa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROCESS_PRODUCT_ASSOCIATION.'+
     'PROCESS' ) | ( ppa. name<> 'produced output' ) OR NOT (
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF ( ppa.
     defined_product ) ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **product_process_plan** shall only be referenced as the **related_action** by **action_relationship**s that reference as the **relating_action** a **process_plan** or a **product_process_plan**.

WR2: The **product_process_plan** shall only be referenced as the **relating_action** by **action_relationship**s that reference as the **related_action** a **process_plan** or a **product_process_plan**, or by **action_relationship**s that have a **name** of 'process operation occurrence' and that reference as the **related_action** an **action** that refers to a **process_operation** as its **chosen_method**.

WR3: The **product_process_plan** shall only be referenced as **process** by **process_product_association**s that have a **name** of 'produced output' and that reference as **defined_product** a **product_definition**.

5.2.3.1.124 product_specification

A **product_specification** is a type of **product_identification** and **configurable_item** for which one or more **product_concept_feature** objects enhance the characterization provided for its associated **product_class**.

EXPRESS specification:

```
*)
ENTITY product_specification
  SUBTYPE OF (product_identification,configurable_item);
END_ENTITY;
(*
```

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5.2.3.1.125 rectangular_closed_profile

A **rectangular_closed_profile** is a type of **shape_aspect** that consists of an enclosed 2D area and a reference system for the parameters of the **rectangular_closed_profile**. The enclosed area is defined by four straight sides with opposite sides equal in length. The reference system is used to define location and orientation of the **rectangular_closed_profile** and consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Rectangular_closed_profile in paragraph 4.2.422 for more information.

EXPRESS specification:

```
*)
ENTITY rectangular_closed_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {3<= SIZEOF ( pdr.
     used_representation.items ) <=4} ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'length' , 'width' , 'corner radius' ] ) ) ) >0 ) ) ) =0;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
```

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```
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
     i ) ) =2 ) AND ( i.name ='width' ) ) ) =1 ) ) ) =1;
 WR7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
     i ) ) =2 ) AND ( i.name ='length' ) ) ) =1 ) ) ) =1;
 WR8: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'corner radius' ) )
     ) =1 ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
     i ) ) =2 ) ) ) =1 ) ) ) <=1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **rectangular_closed_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **rectangular_closed_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **rectangular_closed_profile** shall contain three or four **representation_item**s in its set of **items**.

WR4: The implicit representation of a **rectangular_closed_profile** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'length', 'width', or 'corner radius'.

WR5: Exactly one **representation_item** used for the implicit representation of a **rectangular_closed_profile** shall be of type **placement** with a **name** of 'orientation'.

WR6: Exactly one **representation_item** used for the implicit representation of a **rectangular_closed_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'width'.

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WR7: Exactly one **representation_item** used for the implicit representation of a **rectangular_closed_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'length'.

WR8: At most one **representation_item** used for the implicit representation of a **rectangular_closed_profile** shall have a **name** of 'corner radius'. If present, this **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

Informal propositions:

IP1: The **rectangular_closed_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **rectangular_closed_profile** is defined at the centre of the rectangle.

IP3: The length of the **rectangular_closed_profile** is defined in the X direction and the width is defined in the Y direction of the reference system.

5.2.3.1.126 rectangular_pattern

A **rectangular_pattern** is a type of **replicate_feature** representing a pattern where a number of occurrences of a base feature are equally arranged in rows and columns. See ARM definition for Rectangular_pattern in paragraph 4.2.426 for more information.

EXPRESS specification:

```
*)
ENTITY rectangular_pattern
  SUBTYPE OF (replicate_feature);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'row layout direction' ) ) ) =1;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+ 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'column layout direction' ) ) )
     =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =5 ) ) ) =1;
```

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```
 WR4: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'number of rows' )
      AND ( 'AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM'
      IN TYPEOF ( i ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
      'COUNT_MEASURE' IN TYPEOF ( i\measure_with_unit.
      value_component ) ) ) ) =1 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'number of columnws'
      ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM'
      IN TYPEOF ( i ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
      'COUNT_MEASURE' IN TYPEOF ( i\measure_with_unit.
      value_component ) ) ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'row spacing' ) AND (
      SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
      ) =1;
 WR7: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name= 'column spacing' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
      ) =1;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **rectangular_pattern** shall have exactly one **direction_shape_representation** with a **name** of 'row layout direction'.

WR2: The **rectangular_pattern** shall have exactly one **direction_shape_representation** with a **name** of 'column layout direction'.

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WR3: The implicit representation of the **rectangular_pattern** shall contain five **representation_item**s in its set of **items**.

WR4: The implicit representation of the **rectangular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'number of rows'.

WR5: The implicit representation of the **rectangular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** with a **value_component** of type **count_measure** and a **name** of 'number of columns'.

WR6: The implicit representation of the **rectangular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'row spacing'.

WR7: The implicit representation of the **rectangular_pattern** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'column spacing'.

Informal propositions:

IP1: The location of the **rectangular_pattern** shall be defined at the position of the first base feature.

IP2: The **rectangular_pattern** shall be defined in the X-Y plane.

5.2.3.1.127 rep_item_group

A **rep_item_group** is a type of **group** and **representation_item** that may be part of a layer or a template. See ARM definition for Group in paragraph 4.2.250 and for Structuring_method_hierarchy in paragraph 4.2.480 for more information.

EXPRESS specification:

```
*)
ENTITY rep_item_group
  SUBTYPE OF (group,representation_item);
WHERE
 WR1: SIZEOF ( USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'PRESENTATION_LAYER_ASSIGNMENT.'+
      'ASSIGNED_ITEMS' ) ) >0;
 WR2: SIZEOF ( QUERY ( r <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'REPRESENTATION.'+ 'ITEMS' ) | r.name
      = 'group representation' ) ) >0;
 WR3: SIZEOF ( QUERY ( ga <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.'+'GROUP_ASSIGNMENT.'+ 'ASSIGNED_GROUP'
      ) | ga. role.name<> 'group membership' ) ) =0;
 WR4: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'GEOMETRIC_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'TOPOLOGICAL_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM']*
     TYPEOF ( SELF ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: A **rep_item_group** shall be contained in the set of **assigned_item**s of a **presentation_layer_-assignment**.

WR2: A **rep_item_group** shall be contained in the set of **items** of a **representation** with a **name** of 'group representation'.

WR3: The **rep_item_group** shall only be referenced by **group_assignments** that reference as **role** an **object_role** that has a **name** of 'group membership'.

WR4: The items in a **rep_item_group** shall be of type **geometric_representation_item**, **topological_-representation_item**, **mapped_item**, or **styled_item**.

5.2.3.1.128 replicate_feature

A **replicate_feature** is a type of **feature_definition** representing a pattern or a modification of a pattern for the replication of features. See ARM definition for Replicate_feature in paragraph 4.2.433 for more information.

EXPRESS specification:

```
*)
ENTITY replicate_feature
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='orientation' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
```

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```
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'pattern basis' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_DEFINITION' IN TYPEOF ( sar.
     related_shape_aspect.of_shape. definition ) ) ) =1 ) ) )
     =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **replicate_feature** shall have exactly one implicit representation of type **shape_representation_with_parameters**.

WR2: The implicit representation of the **replicate_feature** shall contain exactly one **representation_item** that is of type **placement** and a **name** of 'orientation'

WR3: The basis shape of the **replicate_feature** shall have an aspect of shape that is the **relating_shape_aspect** of a **feature_component_relationship** with a **name** of 'pattern basis' and a **related_shape_aspect** that is an aspect of the basis shape of a **feature_definition**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **replicate_feature** entity:

– subtype_exclusiveness_replicate_feature (see 5.2.4.240).

5.2.3.1.129 retention

A **retention** is a type of **action** that defines a period of time that product data needs to be retained due to organizational policy or to legal requirements. See See ARM definition for Retention_period in paragraph 4.2.434 for more information.

EXPRESS specification:

```
*)
ENTITY retention
  SUBTYPE OF (action);
WHERE
 WR1: SIZEOF ( QUERY ( aa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ACTION_ASSIGNMENT.'+
     'ASSIGNED_ACTION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( aa ) ) AND ( aa.
     role.name ='retention' ) ) ) >=1;
 WR2: ( SIZEOF ( QUERY ( atia <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_TIME_INTERVAL_ASSIGNMENT.'+
     'ITEMS' ) | ( atia. role.name = 'minimum retention period'
```

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```
     ) ) ) =1 ) AND ( SIZEOF ( QUERY ( atia <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_TIME_INTERVAL_ASSIGNMENT.'+
     'ITEMS' ) | ( atia. role.name = 'maximum retention period'
     ) ) ) =1 ) AND ( SIZEOF ( QUERY ( atia1 <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_TIME_INTERVAL_ASSIGNMENT.'+
     'ITEMS' ) | ( atia1. role.name = 'minimum retention period'
     ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'TIME_INTERVAL_WITH_BOUNDS'
     IN TYPEOF ( atia1. assigned_time_interval ) ) AND ( EXISTS
     ( atia1. assigned_time_interval\time_interval_with_bounds.
     secondary_bound ) OR EXISTS ( atia1.
     assigned_time_interval\time_interval_with_bounds. duration
     ) ) AND ( SIZEOF ( QUERY ( atia2 <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_TIME_INTERVAL_ASSIGNMENT.'+
     'ITEMS' ) | ( atia2. role.name = 'maximum retention period'
     ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'TIME_INTERVAL_WITH_BOUNDS'
     IN TYPEOF ( atia2. assigned_time_interval ) ) AND ( EXISTS
     ( atia2. assigned_time_interval\time_interval_with_bounds.
     secondary_bound ) OR EXISTS ( atia2.
     assigned_time_interval\time_interval_with_bounds. duration
     ) ) AND ( atia1.
     assigned_time_interval\time_interval_with_bounds.
     primary_bound:=:atia2.
     assigned_time_interval\time_interval_with_bounds.
     primary_bound ) ) ) =1 ) ) ) =1 ) ;
 WR3: SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
     'RELATING_ACTION' ) ) + SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
     'RELATED_ACTION' ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **retention** shall be referenced as the **assigned_action** by at least one instance of **applied_action_assignment** that has a **role** with **name** 'retention'.

WR2: The **retention** shall be contained in the set of **items** of exactly one **applied_time_interval_assignment** that references as its **role** a **time_interval_role** with a **name** of 'minimum retention period', and shall be contained in the set of **items** of exactly one **applied_time_interval_assignment** that references as its **role** a **time_interval_role** with a **name** of 'maximum retention period'. Both **applied_time_interval_assignment** instances shall reference as **assigned_time_interval** a **time_interval_with_bounds** that has its **primary_bound** and either one of **secondary_bound** or **duration** attributes instantiated. Both **applied_time_interval_assignment** instances shall have the same **primary_bound**.

WR3: The **retention** shall not be referenced by an **action_relationship**.

Associated global rules:

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The following global rules defined in this part of ISO 10303 apply to the **retention** entity:

– dependent_instantiable_retention (see 5.2.4.42);

– retention_requires_retention_assignment (see 5.2.4.211).

5.2.3.1.130 rib

A **rib** is a type of **feature_definition** that is the representation of a volume that is added to a solid base shape in order to increase the stability of certain regions of the part. This added volume is represented by sweeping an open profile along a path represented by a **path_feature_component**. The walls of a **rib** may have an additional slope that is represented by a **taper**. See ARM definition for Rib_feature in paragraph 4.2.435 for more information.

EXPRESS specification:

```
*)
ENTITY rib
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {1<= SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'fillet radius' , 'shoulder radius' ] ) ) ) >0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'fillet radius' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) <=1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
      used_representation.items | ( i.name= 'shoulder radius' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
      ) <=1;
 WR5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
      description = 'swept shape occurrence' ) AND ( SIZEOF (
      QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      sar. description = 'profile usage' ) AND ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
      'AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' ,
      'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
      'AUTOMOTIVE_DESIGN.'+ 'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
      'VEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE']*
      TYPEOF ( sar. relating_shape_aspect ) ) =1 ) ) ) =1 ) ) )
      =1;
 WR6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
      description = 'course of travel occurrence' ) AND ( SIZEOF
      ( QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      sar. name = 'course of travel' ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
      sar. relating_shape_aspect ) ) ) =1 ) ) ) =1;
 WR7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
      description = 'change in boundary occurrence' ) AND (
      SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      sar. description = 'taper usage' ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
      relating_shape_aspect ) ) AND ( sar.
      relating_shape_aspect.description = 'directed taper' ) ) )
      =1 ) ) ) <=1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The implicit representation of the **rib** shall contain between one and three **representation_item**s in its set of **items**.

WR2: The implicit representation of a **rib** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'fillet radius', or 'shoulder radius'.

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WR3: At most one **representation_item** used for the implicit representation of the **rib** shall have a **name** of 'fillet radius'. If present, this **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR4: At most one **representation_item** used for the implicit representation of the **rib** shall have a **name** of 'shoulder radius'. If present, this **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR5: The **rib** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'swept shape occurrence'. This **shape_aspect** shall be the **replated_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'profile usage' and a **relating_shape_aspect** that is of type **partial_circular_profile**, **square_u_profile**, **rounded_u_profile**, **vee_profile**, **tee_profile**, or **open_path_profile**.

WR6: The **rib** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'course of travel occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'course of travel' and a **relating_shape_aspect** that is of type **path_feature_component**.

WR7: The **rib** shall be the basis shape for at most one **shape_aspect** with a **description** of 'change in boundary occurrence'. If present, this **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'taper usage' and a **relating_shape_aspect** that is of type **taper** with a **description** of 'directed taper'.

Informal propositions:

IP1: The ends of a **rib** shall disappear in the base shape.

5.2.3.1.131 round_hole

A **round_hole** is a type of **feature_definition** that is the representation of a cylindrical enclosed volume that is removed from a solid base shape. This removed volume is represented by sweeping a **circular_closed_profile** along a linear path represented by a **path_feature_component**. The bottom of the **round_hole** is represented by a **hole_bottom**. A **round_hole** may have a change in diameter that is represented by a **taper**. See ARM definition for Round_hole in paragraph 4.2.439 for more information.

EXPRESS specification:

```
*)
ENTITY round_hole
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'diameter occurrence' ) AND ( SIZEOF ( QUERY
     ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
```

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```
    sar. name ='diameter' ) AND ( sar. description =
    'profile usage' ) AND ( 'AUTOMOTIVE_DESIGN.'+
    'CIRCULAR_CLOSED_PROFILE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'hole depth occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. name = 'hole depth' ) AND ( sar. description =
    'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
    sar. relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description ='linear' ) ) ) =1 ) ) )
    =1;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'bottom condition occurrence' ) AND ( SIZEOF
    ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'hole bottom usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'HOLE_BOTTOM' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) <=1;
 WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description = 'change in diameter occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar. description = 'taper usage' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'TAPER' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) <>1 ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **round_hole** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'diameter occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_-defining_relationship** with a **name** of 'diameter', a **description** of 'profile usage', and a **relating_-shape_aspect** of type **circular_closed_profile**.

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WR2: The **round_hole** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'hole depth occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_-defining_relationship** with a **name** of 'hole depth', a **description** of 'path feature component usage' and a **relating_shape_aspect** that is of type **path_feature_component** with a **description** of 'linear'.

WR3: The **round_hole** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'bottom condition occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'hole bottom usage' and a **relating_shape_-aspect** of type **hole_bottom**.

WR4: The **round_hole** shall be the basis shape for at most one **shape_aspect** with a **description** of 'change in diameter occurrence'. If present, this **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'taper usage' and a **relating_shape_-aspect** of type **taper**.

WR5: The implicit representation of a **round_hole** shall contain exactly one **representation_item**.

5.2.3.1.132 rounded_u_profile

A **rounded_u_profile** is a type of **shape_aspect** that consists of an arc with connected straight lines at each end and a reference system. The reference system consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Rounded_U_profile in paragraph 4.2.440 for more information.

EXPRESS specification:

```
*)
ENTITY rounded_u_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF\shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['width' ,
```

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```
    'orientation'] ) ) ) >0 ) ) ) =0;
 WR5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
    ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM',
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name ='width' ) ) ) =1 ) ) ) =1;
 WR7: ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
    IN TYPEOF ( pdr. used_representation ) ) ) <=1 ) AND (
    SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
    IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
    used_representation.name = 'profile limit' ) ) ) <=1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **rounded_u_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **rounded_u_profile** shall have exactly one implicit representation defined by a relationship to a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **rounded_u_profile** shall contain exactly two **representation_item**s in its set of **items**.

WR4: The implicit representation of the **rounded_u_profile** shall only contain **representation_item**s that have a **name** of 'width' or 'orientation'.

WR5: Exactly one **representation_item** used for the implicit representation of a **rounded_u_profile** shall be of type **placement** with a **name** of 'orientation'.

WR6: Exactly one **representation_item** used for the implicit representation of a **rounded_u_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'width'.

WR7: The **rounded_u_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of 'profile limit'.

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Informal propositions:

IP1: The **rounded_u_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **rounded_u_profile** is defined at the midpoint of the arc.

IP3: The **rounded_u_profile** is defined with the X direction tangent to the arc at the midpoint, and the Y direction in the direction of the open end of the profile.

5.2.3.1.133 shape_aspect_transition

A **shape_aspect_transition** is a type of **shape_aspect_relationship** that specifies a relationship between two **shape_aspect**s that represent either two **edge**s or two **face**s of a product for the purpose of specifying the geometric continuity at the transition of those two **shape_aspect**s. See ARM definition for Edge_-transition in paragraph 4.2.178 and for Face_transition in paragraph 4.2.194 for more information.

EXPRESS specification:

```
*)
ENTITY shape_aspect_transition
  SUBTYPE OF (shape_aspect_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( pdr_1 <*
     get_shape_aspect_property_definition_representations (
     SELF.relating_shape_aspect ) | SIZEOF ( QUERY ( pdr_2 <*
     get_shape_aspect_property_definition_representations (
     SELF.related_shape_aspect ) | SIZEOF ( QUERY ( item_1 <*
     pdr_1. used_representation.items | SIZEOF ( QUERY ( item_2
     <* pdr_2. used_representation.items | NOT ( ( (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE' IN TYPEOF ( item_1 ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE' IN TYPEOF ( item_2 ) ) ) XOR (
     ( 'AUTOMOTIVE_DESIGN.'+ 'FACE' IN TYPEOF ( item_1 ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'FACE' IN TYPEOF ( item_2 ) ) ) ) ) )
     >0 ) ) >0 ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr_1 <*
     get_shape_aspect_property_definition_representations (
     SELF.relating_shape_aspect ) | SIZEOF ( QUERY ( pdr_2 <*
     get_shape_aspect_property_definition_representations (
     SELF.related_shape_aspect ) | SIZEOF ( QUERY ( item_1 <*
     pdr_1. used_representation.items | SIZEOF ( QUERY ( item_2
     <* pdr_2. used_representation.items | (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE' IN TYPEOF ( item_1 ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE' IN TYPEOF ( item_2 ) ) AND NOT
     ( ( item_1\ edge.edge_start:=:item_2\ edge.edge_start ) OR
     ( item_1\ edge.edge_start:=:item_2\ edge.edge_end ) OR (
     item_1\ edge.edge_end:=:item_2\ edge.edge_start ) OR (
     item_1\ edge.edge_end:=:item_2\ edge.edge_end ) ) ) ) >0 )
     ) >0 ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( pdr_1 <*
```

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```
      get_shape_aspect_property_definition_representations (
      SELF.relating_shape_aspect ) | SIZEOF ( QUERY ( pdr_2 <*
      get_shape_aspect_property_definition_representations (
      SELF.related_shape_aspect ) | SIZEOF ( QUERY ( item_1 <*
      pdr_1. used_representation.items | SIZEOF ( QUERY ( item_2
      <* pdr_2. used_representation.items | (
      'AUTOMOTIVE_DESIGN.'+ 'FACE' IN TYPEOF ( item_1 ) ) AND (
      'AUTOMOTIVE_DESIGN.'+ 'FACE' IN TYPEOF ( item_2 ) ) AND (
      SIZEOF ( QUERY ( f_1 <* item_1\ face.bounds | (
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( f_1. bound )
      ) AND ( SIZEOF ( QUERY ( f_2 <* item_2\ face.bounds | (
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( f_2. bound )
      ) AND ( SIZEOF ( QUERY ( oe_1 <* f_1. bound\path. edge_list
      | SIZEOF ( QUERY ( oe_2 <* f_2. bound\path. edge_list |
      oe_1. edge_element:=:oe_2. edge_element ) ) =0 ) ) =0 ) ) )
      =0 ) ) ) =0 ) ) ) =0 ) ) =0 ) ) =0 ) ) =0;
 WR4:SELF.name IN ['g0' , 'g1' , 'g2'];
END_ENTITY;
(*
```

Formal propositions:

WR1: The **shape_aspect**s that play the role of either **relating_shape_aspect** or **related_shape_aspect** shall be associated to **representation**s that contain either an **edge** in both or a **face** in both.

WR2: If the **representation**s contain **edge**s they shall share at least one instance of **vertex**.

WR3: If the **representation**s contain **face**s they shall share at least one instance of **edge**.

WR4: The **shape_aspect_transition** shall have a **name** of either 'g0','g1, or 'g2'.

5.2.3.1.134 shape_defining_relationship

A **shape_defining_relationship** is a type of **shape_aspect_relationship** that is used to relate features with components that define the basic shape of the feature such as profiles or sweep paths.

EXPRESS specification:

```
*)
ENTITY shape_defining_relationship
  SUBTYPE OF (shape_aspect_relationship);
WHERE
 WR1: ( SELF\shape_aspect_relationship. description<>
      'profile usage' ) OR ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'RECTANGULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
      'CIRCULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
      'NGON_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
      'CLOSED_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'OPEN_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'PARTIAL_CIRCULAR_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'ROUNDED_U_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'SQUARE_U_PROFILE' , 'AUTOMOTIVE_DESIGN.'+ 'TEE_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'VEE_PROFILE']* TYPEOF (
     SELF\shape_aspect_relationship. relating_shape_aspect ) )
     =1 ) ;
 WR2: ( SELF\shape_aspect_relationship. description<>
     'path feature component usage' ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'PATH_FEATURE_COMPONENT' IN TYPEOF (
     SELF\shape_aspect_relationship. relating_shape_aspect ) ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: If the **shape_defining_relationship** has a **description** of 'profile usage', the **relating_shape_aspect** shall be of type **rectangular_closed_profile**, **circular_closed_profile**, **ngon_closed_profile**, **closed_path_profile**, **open_path_profile**, **partial_circular_profile**, **rounded_u_profile**, **square_u_profile**, **tee_profile**, or **vee_profile**.

WR2: If the **shape_defining_relationship** has a **description** of 'path feature component usage', the **relating_shape_aspect** shall be of type **path_feature_component**.

5.2.3.1.135 shape_representation_with_parameters

A **shape_representation_with_parameters** is a type of **shape_representation** in which the shape of a **product_definition** or **shape_aspect** is defined implicitly using measurements and descriptive parameters.

EXAMPLE 1 The shape of a box may be specified by a **shape_representation_with_parameters** by giving measurements for its height, length, and width.

EXPRESS specification:

```
*)
ENTITY shape_representation_with_parameters
  SUBTYPE OF (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'PLACEMENT' , 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM']* TYPEOF ( i ) ) =1 ) ) =
     SIZEOF ( SELF.items ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The elements that specify the parameters for a **shape_representation_with_parameters** shall be of type **placement**, **measure_representation_item**, or **descriptive_representation_item**.

5.2.3.1.136 slot

A **slot** is a type of **feature_definition** that is the representation of a volume that is removed from a solid base shape. This removed volume is represented by sweeping an open profile along a path represented by a **path_feature_component**. Each end of the **slot** is represented by a **slot_end**. See ARM definition for Slot_feature in paragraph 4.2.458 for more information.

EXPRESS specification:

```
*)
ENTITY slot
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'swept shape occurrence' ) AND ( SIZEOF (
     QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. description = 'profile usage' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'VEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE']*
     TYPEOF ( sar. relating_shape_aspect ) ) =1 ) ) ) =1 ) ) )
     =1;
 WR3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'course of travel occurrence' ) AND ( SIZEOF
     ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'course of travel' ) AND ( sar. description =
     'path feature component usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
     sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
```

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```
 WR4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'course of travel occurrence' ) AND ( SIZEOF
     ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'course of travel' ) AND ( sar. description =
     'path feature component usage' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' IN TYPEOF (
     sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
 WR5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description = 'end condition occurrence' ) AND ( SIZEOF (
     QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name = 'course of travel end' ) AND ( sar. description
     = 'slot end usage' ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'SLOT_END'
     IN TYPEOF ( sar. relating_shape_aspect ) ) ) ) =1 ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The implicit representation of the **slot** shall contain exactly one **representation_item**s in its set of **items**.

WR2: The **slot** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'swept shape occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **description** of 'profile usage' and a **relating_shape_aspect** of type **square_u_profile**, **partial_circular_profile**, **rounded_u_profile**, **vee_profile**, **tee_profile**, or **open_path_profile**.

WR3: The **slot** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'course of travel occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **shape_defining_relationship** with a **name** of 'course of travel', a **description** of 'path feature component usage' and a **relating_shape_aspect** of type **path_feature_component**.

WR4: The **slot** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'end condition occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'slot end usage' and a a **name** of 'course of travel start' in which the **relating_shape_aspect** is a **slot_end**.

WR5: The **slot** shall be the basis shape for exactly one **shape_aspect** with a **description** of 'end condition occurrence'. This **shape_aspect** shall be the **related_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'slot end usage' and a **name** of 'course of travel end' in which the **relating_shape_aspect** is a **slot_end**.

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5.2.3.1.137 slot_end

A **slot_end** is a type of **shape_aspect** that is the representation of the end condition for a **slot**. For more information see ARM definition for Slot_end_type in paragraph 4.2.457, for Flat_slot_end_type in paragraph 4.2.208, for Open_slot_end_type in paragraph 4.2.330, for Radiused_slot_end_type in paragraph 4.2.419, and for Woodruff_slot_end_type in paragraph 4.2.563.

EXPRESS specification:

```
*)
ENTITY slot_end
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN ['open' , 'radiused' , 'flat',
     'woodruff'];
 WR3: ( SELF.description IN ['open' , 'radiused'] ) XOR ( SIZEOF
     ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =0 ) ) ;
 WR4: NOT ( SELF.description IN ['flat' , 'woodruff'] ) XOR (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) ;
 WR5: ( SELF.description<>'flat' ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =2 ) ) ) =1 ) ;
 WR6: ( SELF.description<>'flat' ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'first radius' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR7: ( SELF.description<>'flat' ) OR ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
```

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```
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'second radius' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR8: ( SELF.description<>'woodruff' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1 ) ;
 WR9: ( SELF.description<>'woodruff' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1 ) ;
 WR10: SIZEOF ( QUERY ( sar <* USEDIN ( SELF,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar. name IN [ 'course of travel start' ,
     'course of travel end' ] ) AND ( sar. description =
     'slot end usage' ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'SLOT' IN
     TYPEOF ( sar. related_shape_aspect.of_shape. definition ) )
     AND ( sar. related_shape_aspect.of_shape.
     definition\characterized_object. name = 'end condition' )
     AND ( sar. related_shape_aspect.of_shape.
     definition\characterized_object. description =
     'slot end occurrence' ) ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **slot_end** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** for the **slot_end** shall be either 'open', 'radiused', 'flat', or 'woodruff'.

WR3: If the **description** of the **slot_end** is 'open' or 'radiused', the **slot_end** shall not have any implicit representation.

WR4: If the **description** of the **slot_end** is 'flat' or 'woodruff' the **slot_end** shall have its implicit representation specified by exactly one **shape_representation_with_parameters**.

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WR5: If the **description** of the **slot_end** is 'flat', the **slot_end** shall have an implicit representation that contains exactly two **representation_item**s in its set of **items**.

WR6: If the **description** of the **slot_end** is 'flat', exactly one **representation_item** used for the implicit representation of the **slot_end** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'first radius'.

WR7: If the **description** of the **slot_end** is 'flat', exactly one **representation_item** used for the implicit representation of the **slot_end** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'second radius'.

WR8: If the **description** of the **slot_end** is 'woodruff', the **slot_end** shall have an implicit representation that contains exactly one **representation_item** in its set of **items**.

WR9: If the **description** of the **slot_end** is 'woodruff', exactly one **representation_item** used for the implicit representation of the **slot_end** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'radius'.

WR10: The **slot_end** shall be the **relating_shape_aspect** in exactly one **feature_component_relationship** with a **description** of 'slot end usage' and a **name** of either 'course of travel start' or 'course of travel end' in which the **related_shape_aspect** is an aspect of the shape of a **slot** with a **name** of 'end condition' and a **description** of 'slot end occurrence'.

5.2.3.1.138 square_u_profile

A **square_u_profile** is a type of **shape_aspect** that consists of three connected straight lines and a reference system for the parameters of the **square_u_profile**. The reference system is used to define location and orientation of the **square_u_profile** and consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Square_u_profile in paragraph 4.2.476 for more information.

EXPRESS specification:

```
*)
ENTITY square_u_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {4<= SIZEOF ( pdr.
```

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```
    used_representation.items ) <=6} ) ) =1;
WR4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN ['orientation'
    , 'width' , 'first angle' , 'second angle' , 'first radius'
    , 'second radius' ] ) ) ) >0 ) ) ) =0;
WR5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
    'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
    ) ) =1 ) ) ) =1;
WR6: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name ='width' ) ) ) =1 ) ) ) =1;
WR7: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
    i.name = 'first angle' ) ) ) =1 ) ) ) =1;
WR8: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
    i.name = 'second angle' ) ) ) =1 ) ) ) =1;
WR9: ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name = 'first radius' ) ) )
```

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```
      =1 ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
      i ) ) =2 ) AND ( i.name = 'first radius' ) ) ) =1 ) ) ) <=1
      ) ;
 WR10: ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name = 'second radius' ) )
      ) =1 ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
      i ) ) =2 ) AND ( i.name = 'second radius' ) ) ) =1 ) ) )
      <=1 ) ;
 WR11: ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr. used_representation ) ) ) ) <=1 ) AND (
      SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
      used_representation.name = 'profile limit' ) ) ) <=1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **square_u_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **square_u_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **square_u_profile** shall contain between four and six **representation_item**s in its set of **items**.

WR4: The implicit representation of a **square_u_profile** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'width', 'first angle', 'second angle', 'first radius', or 'second radius'.

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WR5: Exactly one **representation_item** used for the implicit representation of a **square_u_profile** shall be of type **placement** with a **name** of ‘orientation’.

WR6: Exactly one **representation_item** used for the implicit representation of a **square_u_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of ‘width’.

WR7: Exactly one **representation_item** used for the implicit representation of a **square_u_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of ‘first angle’.

WR8: Exactly one **representation_item** used for the implicit representation of a **square_u_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of ‘second angle’.

WR9: At most one **representation_item** used for the implicit representation of a **square_u_profile** shall have a **name** of ’first radius’. If present, this **representation_item** shall be of type **measure_-representation_item** and **length_measure_with_unit**.

WR10: At most one **representation_item** used for the implicit representation of a **square_u_profile** shall have a **name** of ’second radius’. If present, this **representation_item** shall be of type **measure_-representation_item** and **length_measure_with_unit**.

WR11: The **square_u_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of ’profile limit’.

Informal propositions:

IP1: The **square_u_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **square_u_profile** is defined at the midpoint of the base line.

IP3: The **square_u_profile** is defined with the base line in the X direction and the Y direction in the direction of the open end of the profile.

5.2.3.1.139 surface_condition_callout

A **surface_condition_callout** is a type of **draughting_callout** that presents a surface condition.

EXPRESS specification:

```
*)
ENTITY surface_condition_callout
  SUBTYPE OF (draughting_callout);
WHERE
 WR1: SIZEOF ( QUERY ( c <* SELF.contents | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_CURVE_OCCURRENCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL_OCCURRENCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_TEXT_OCCURRENCE']* TYPEOF
```

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```
     ( c ) ) <>1 ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The elements in the inherited attribute **contents** shall be of type **annotation_curve_occurrence**, **annotation_symbol_occurrence**, or **annotation_text_occurrence**.

5.2.3.1.140 surface_texture_representation

A **surface_texture_representation** is a type of **representation** that represents a surface texture such as roughness or waviness. The kind of surface texture that is represented is given in the **name**s of the **representation_item**s. The method or standard according to which the surface texture is represented is specified in the **description** of the **descriptive_representation_item**. For more information see ARM definition for Surface_texture in paragraph 4.2.500.

EXPRESS specification:

```
*)
ENTITY surface_texture_representation
  SUBTYPE OF (representation);
WHERE
 WR1: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE' , 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM']* TYPEOF ( i ) ) <>1 ) )
     =0;
 WR2: ( SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) =1 )
     AND ( SIZEOF ( QUERY ( i <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) AND ( i.name = 'measuring method' ) ) ) =1 )
     ;
 WR3: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE']* TYPEOF ( i ) ) =1 ) )
     >0;
 WR4: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
     'REP_1' ) ) <=1 ) AND ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
     'REP_2' ) ) =0 ) AND ( SIZEOF ( QUERY ( rr <* USEDIN ( SELF
     , 'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
     'REP_1' ) | rr. rep_2.name = 'measuring direction' ) ) =
     SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_RELATIONSHIP.'+
```

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```
     'REP_1' ) ) ) ;
 WR5: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN (
     pdr. definition ,
     'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
     'DERIVED_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'GENERAL_PROPERTY' IN TYPEOF ( gpa. base_definition ) ) AND
     ( gpa. base_definition.name ='surface_condition' ) ) ) =1 )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **surface_texture_representation** shall contain only **representation_item**s that are of type **measure_representation_item**, **value_range**, or **descriptive_representation_item**.

WR2: Each instance of **surface_texture_representation** shall contain exactly one **descriptive_representation_item**. The name of this **descriptive_representation_item** shall be 'measuring method'.

WR3: Each instance of **surface_texture_representation** shall contain at least one **measure_representation_item** or **value_range**.

WR4: Each instance of **surface_texture_representation** shall be referenced by at most one **representation_relationship**. If such a relationship is present, the **surface_texture_representation** shall be the **rep_1** and the **rep_2** shall be a **representation** whose name is 'measuring direction'.

WR5: Each instance of **surface_texture_representation** shall be referenced by exactly one **property_definition_representation**. This **property_definition_representation** shall relate the **representation** with a **property_definition** that is the **derived_definition** of a **general_property_association** that refers as **base_definition** to a **general_property** with a **name** of 'surface_condition'.

Informal propositions:

IP1: If the **surface_texture_representation** contains **qualified_representation_item**s that refer to a **type_qualifier** representing the value determination then all of the **representation_item**s except the **descriptive_representation_item** shall also be **qualified_representation_item**s that refer to the same instance of **type_qualifier**.

5.2.3.1.141 tactile_appearance_representation

A **tactile_appearance_representation** is a type of **representation** that representats the tactile appearance of an object. For more information see ARM definition for Tactile_appearance in paragraph 4.2.504.

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EXPRESS specification:

```
*)
ENTITY tactile_appearance_representation
  SUBTYPE OF (representation);
WHERE
 WR1: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE']* TYPEOF ( i ) ) <>1 )
     ) =0;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | name ='depth' ) ) <=1;
 WR3: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN (
     pdr. definition ,
     'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
     'DERIVED_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'GENERAL_PROPERTY' IN TYPEOF ( gpa. base_definition ) ) AND
     ( gpa. base_definition.name ='surface_condition' ) ) ) =1 )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **tactile_appearance_representation** shall only **representation_item**s of type **measure_representation_item** or **value_range** in its set of **items**.

WR2: At most one **representation_item** in the set of **items** shall have a **name** of 'depth'.

WR3: Each instance of **hardness_representation** shall be referenced by exactly one **property_definition_representation**. This **property_definition_representation** shall relate the **representation** with a **property_definition** that is the **derived_definition** of a **general_property_association** that refers as **base_definition** to a **general_property** with a **name** of 'surface_condition'.

Informal propositions:

IP1: If the **tactile_appearance_representation** contains **qualified_representation_item**s that refer to a **type_qualifier** representing the value determination then all of the **representation_item**s shall also be **qualified_representation_item**s that refer to the same instance of **type_qualifier**.

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5.2.3.1.142 taper

A **taper** is a type of **shape_aspect** which represents a linear change of shape applied to a feature. See ARM definition for Angle_taper in paragraph 4.2.12, for Diameter_taper in paragraph 4.2.146, and for Directed_taper in paragraph 4.2.154 for more information.

EXPRESS specification:

```
*)
ENTITY taper
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2:SELF.description IN [ 'angle taper' , 'diameter taper' ,
     'directed taper' ];
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =1 ) ) ) =1;
 WR5: ( SELF.description<> 'angle taper' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
     i.name = 'taper angle' ) ) ) =1 ) ) ) =1 ) ;
 WR6: ( SELF.description<> 'diameter taper' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
     i ) ) =2 ) AND ( i.name = 'taper diameter' ) ) ) =1 ) ) )
     =1 ) ;
 WR7: ( SELF.description<> 'directed taper' ) OR ( SIZEOF (
     QUERY ( pdr <*
```

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```
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
     i.name ='angle' ) ) ) =1 ) ) ) =1 ) ;
 WR8: ( SELF.description<> 'directed taper' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
     used_representation ) ) AND ( pdr. used_representation.name
     ='direction' ) ) ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **taper** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **description** of the **taper** shall be either 'angle taper', 'diameter taper', or 'directed taper'.

WR3: The **taper** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR4: The **shape_representation_with_parameters** that represents the shape of the **taper** shall contain exactly one **representation_item** in its set of **items**.

WR5: If the **description** of the **taper** is 'angle taper', the implicit representation of the **taper** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'taper angle'.

WR6: If the **description** of the **taper** is 'diameter taper', the implicit representation of the **taper** shall contain exactly one **representation_item** of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'taper diameter'.

WR7: If the **description** of the **taper** is 'directed taper', the implicit representation of the **taper** shall contain exactly one **representation_item** of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'angle'.

WR8: If the **description** of the **taper** is 'directed taper', its shape shall be represented by exactly one **direction_shape_representation**. This **direction_shape_representation** shall have a **name** of 'direction'.

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5.2.3.1.143 tee_profile

A **tee_profile** is a type of **shape_aspect** that consists of an upside down T shape and a reference system for the parameters of the **tee_profile**. The **tee_profile** consist of a stem and a perpendicular crossbar. The stem has two parallel lines connected at their ends by the crossbar. The crossbar is a rectangle. The profile is symmetric about the centreline of the stem. The reference system is used to define location and orientation of the **tee_profile** and consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Tee_profile in paragraph 4.2.511 for more information.

EXPRESS specification:

```
*)
ENTITY tee_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {9<= SIZEOF ( pdr.
     used_representation.items ) <=10} ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'width' , 'depth' , 'cross bar width' , 'cross bar depth'
     , 'first offset' , 'second offset' , 'first angle' ,
     'second angle' , 'radius'] ) ) ) >0 ) ) ) =0;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
```

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```
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name ='width' ) ) ) =1 ) ) ) =1;
WR7: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name ='depth' ) ) ) =1 ) ) ) =1;
WR8: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name = 'cross bar width' ) ) ) =1 ) ) )
    =1;
WR9: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name = 'cross bar depth' ) ) ) =1 ) ) )
    =1;
WR10: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name = 'first offset' ) ) ) =1 ) ) ) =1;
WR11: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name = 'second offset' ) ) ) =1 ) ) )
```

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```
    =1;
 WR12: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
    i.name = 'first angle' ) ) ) =1 ) ) ) =1;
 WR13: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+
    'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
    i.name = 'second angle' ) ) ) =1 ) ) ) =1;
 WR14: ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name ='radius' ) ) ) =1 ) )
    ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) AND ( i.name ='radius' ) ) ) =1 ) ) ) <=1 ) ;
 WR15: ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
    IN TYPEOF ( pdr. used_representation ) ) ) ) <=1 ) AND (
    SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
    IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
    used_representation.name = 'profile limit' ) ) ) <=1 ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **tee_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **tee_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **tee_profile** shall contain between nine and ten **representation_item**s in its set of **items**.

WR4: The implicit representation of a **tee_profile** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'width', 'depth', 'cross bar width', 'cross bar depth', 'first offset', 'second offset', 'first angle', 'second angle', or 'radius'.

WR5: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **placement** with a **name** of 'orientation'.

WR6: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'width'.

WR7: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'depth'.

WR8: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'cross bar width'.

WR9: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'cross bar depth'.

WR10: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'first offset'.

WR11: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'second offset'.

WR12: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'first angle'.

WR13: Exactly one **representation_item** used for the implicit representation of a **tee_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'second angle'.

WR14: At most one **representation_item** used for the implicit representation of a **tee_profile** shall have a **name** of 'radius'. If present, this **representation_item** shall be of type **measure_representation_item** and **length_measure_with_unit**.

WR15: The **tee_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of 'profile limit'.

Informal propositions:

IP1: The **tee_profile** shall be planar and shall lie in the X-Y plane of the reference system.

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IP2: The reference point of the **tee_profile** is defined at the midpoint of the side of the crossbar opposite the stem.

IP3: The **tee_profile** is defined with the side of the crossbar opposite the stem in the X direction and the profile symmetric with respect to the Y direction.

5.2.3.1.144 thread

A **thread** is a type of **feature_definition** that is the specification of a thread. See ARM definition for Thread_specification in paragraph 4.2.518 and for Defined_thread in paragraph 4.2.135 for more information.

EXPRESS specification:

```
*)
ENTITY thread
  SUBTYPE OF (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {7<= SIZEOF ( pdr.
     used_representation.items ) <=10} ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | (
     i\descriptive_representation_item. description IN
     ['internal' , 'external'] ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name= 'major diameter' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
     ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
    used_representation.items | ( i.name= 'minor diameter' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) <=1;
WR5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'pitch diameter' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) )
    ) =1;
WR6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name='crest' ) AND ( SIZEOF
    ( ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.'+ 'LENGTH_MEASURE_WITH_UNIT']*TYPEOF (
    i ) ) =2 ) ) ) =1 ) ) ) <=1;
WR7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'number of threads' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'RATIO_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) ) ) =1 ) ) )
    =1;
WR8: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name= 'fit class' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
    TYPEOF ( i ) ) ) ) =1 ) ) ) =1;
WR9: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.'+
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name='form' ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
    TYPEOF ( i ) ) ) ) =1 ) ) ) =1;
WR10: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
```

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```
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='hand' ) AND (
     i\descriptive_representation_item. description IN [
     'left hand' , 'right hand' ] ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) =1
     ) ) ) =1;
 WR11: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name='qualifier' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) ) ) =1 ) ) ) <=1;
 WR12: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN [ 'thread side'
     , 'major diameter' , 'minor diameter' , 'pitch diameter' ,
     'crest' , 'number of threads' , 'fit class' , 'form' ,
     'hand' , 'qualifier'] ) ) ) >0 ) ) ) =0;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **shape_representation_with_parameters** that represents the **thread** shall contain between seven and ten **representation_item**s in its set of **items**.

WR2: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **descriptive_representation_item** with a **name** of 'thread side' and a **description** of either 'internal' or 'external'.

WR3: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'major diameter'.

WR4: At most one **representation_item** used for the implicit representation of the **thread** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'minor diameter'.

WR5: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'pitch diameter'.

WR6: At most one **representation_item** used for the implicit representation of the **thread** shall be of type **measure_representation_item** and **length_measure_with_unit** with a **name** of 'crest'.

WR7: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **measure_representation_item** and **ratio_measure_with_unit** with a **name** of 'number of threads'.

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WR8: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **descriptive_representation_item** with a **name** of 'fit class'.

WR9: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **descriptive_representation_item** with a **name** of 'form'.

WR10: Exactly one **representation_item** used for the implicit representation of the **thread** shall be of type **descriptive_representation_item** with a **name** of 'hand'. The **descriptive_representation_item** shall have a **description** of either 'left hand' or 'right hand'.

WR11: The implicit representation of the **thread** shall contain at most one **representation_item** of type **descriptive_representation_item** that has a **name** of 'qualifier'.

WR12: The implicit representation of a **thread** shall contain only **representation_item**s with a **name** of either "thread side', 'major diameter', 'minor diameter', 'pitch diameter', 'crest', 'number of threads', 'fit class', 'form', 'hand', or 'qualifier'.

5.2.3.1.145 transition_feature

A **transition_feature** is a type of **shape_aspect** that is the representation of a transition between two surfaces. See ARM definition for Transition_feature in paragraph 4.2.537 for more information.

EXPRESS specification:

```
*)
ENTITY transition_feature
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.of_shape. definition ) ;
 WR2: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CHAMFER' ,
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_ROUND' , 'AUTOMOTIVE_DESIGN.'+
     'FILLET']* TYPEOF ( SELF ) ) =1;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **transition_feature** shall be an aspect of the shape of a **product_definition**.

WR2: Each instance of **transition_feature** shall be either a **chamfer**, an **edge_round**, or a **fillet**.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **transition_feature** entity:

– subtype_exclusiveness_transition_feature (see 5.2.4.251).

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5.2.3.1.146 value_range

A **value_range** is a type of **compound_representation_item** that specifies a range of values defined either by two **measure_representation_item**s, or two **value_representation_item**s. See ARM definition for Value_range in paragraph 4.2.547 for more information.

EXPRESS specification:

```
*)
ENTITY value_range
  SUBTYPE OF (compound_representation_item);
WHERE
 WR1: ( 'AUTOMOTIVE_DESIGN.'+ 'SET_REPRESENTATION_ITEM' IN
     TYPEOF ( item_element ) ) AND value_range_wr1 (
     item_element ) ;
 WR2:value_range_wr2 ( item_element ) ;
 WR3:value_range_wr3 ( item_element ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: The **value_range** shall have a **set_representation_item** as its **item_element**. This **set_representation_item** shall have exactly two **representation_item**s of the same type in its set that are either **measure_representation_item**s or **value_representation_item**s.

WR2: One of the **representation_item**s in the set specified by **item_element** shall have a **name** of 'upper limit', and the other a **name** of 'lower limit'.

WR3: If the set specified by **item_element** consists of **measure_representation_item**s, then the **measure_representation_item**s shall point to the same instance of **named_unit** or **derived_unit** as their respective **unit_component**.

5.2.3.1.147 vector_style

A **vector_style** is a type of **curve_style** and **pre_defined_terminator_symbol** that defines the visual appearance of a vector.

EXPRESS specification:

```
*)
ENTITY vector_style
  SUBTYPE OF (pre_defined_terminator_symbol,curve_style);
END_ENTITY;
(*
```

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5.2.3.1.148 vee_profile

A **vee_profile** is a type of **shape_aspect** that consists of two connected straight lines and a reference system for the parameters of the **vee_profile**. The reference system consists of two orthogonal reference axes X and Y that intersect in a reference point. See ARM definition for Vee_profile in paragraph 4.2.551 for more information.

EXPRESS specification:

```
*)
ENTITY vee_profile
  SUBTYPE OF (shape_aspect);
WHERE
 WR1:'AUTOMOTIVE_DESIGN.'+ 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape. definition ) ;
 WR2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =1;
 WR3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND {3<= SIZEOF ( pdr.
     used_representation.items ) <=4} ) ) =1;
 WR4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN ['orientation'
     , 'profile angle' , 'tilt angle' , 'profile radius' ] ) ) )
     >0 ) ) ) =0;
 WR5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name ='orientation' )
     ) ) =1 ) ) ) =1;
 WR6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
```

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```
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
     i.name = 'profile angle' ) ) ) =1 ) ) ) =1;
 WR7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_MEASURE_WITH_UNIT']*TYPEOF ( i ) ) =2 ) AND (
     i.name = 'tilt angle' ) ) ) =1 ) ) ) =1;
 WR8: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'profile radius' ) )
     ) =1 ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name = 'profile radius' )
     AND ( 'AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM'
     IN TYPEOF ( i ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_MEASURE_WITH_UNIT' IN TYPEOF ( i ) ) ) =1 ) ) )
     <=1 ) ;
 WR9: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) ) <=1 ) AND (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr. used_representation ) ) AND ( pdr.
     used_representation.name = 'profile limit' ) ) ) <=1 ) ;
END_ENTITY;
(*
```

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Formal propositions:

WR1: The **vee_profile** shall be an aspect of the shape of a **feature_component_definition**.

WR2: The **vee_profile** shall have exactly one implicit representation defined by a **shape_representation_with_parameters**.

WR3: The **shape_representation_with_parameters** that represents the **vee_profile** shall contain between three and four **representation_item**s in its set of **items**.

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WR4: The implicit representation of a **vee_profile** shall contain only **representation_item**s in its set of **items** that have a **name** of either 'orientation', 'profile angle', 'tilt angle', or 'profile radius'.

WR5: Exactly one **representation_item** used for the implicit representation of a **vee_profile** shall be of type **placement** with a **name** of 'orientation'.

WR6: Exactly one **representation_item** used for the implicit representation of a **vee_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'profile angle'.

WR7: Exactly one **representation_item** used for the implicit representation of a **vee_profile** shall be of type **measure_representation_item** and **plane_angle_measure_with_unit** with a **name** of 'tilt angle'.

WR8: At most one **representation_item** used for the implicit representation of a **vee_profile** shall have a **name** of 'profile radius'. If present, this **representation_item** shall be of type **measure_representation_item** with a **value_component** of type **length_measure_with_unit**.

WR9: The **vee_profile** shall be represented by at most one **planar_shape_representation**. If present, this **planar_shape_representation** shall have a **name** of 'profile limit'.

Informal propositions:

IP1: The **vee_profile** shall be planar and shall lie in the X-Y plane of the reference system.

IP2: The reference point of the **vee_profile** is defined at the position where the two lines connect.

5.2.3.1.149 visual_appearance_representation

A **visual_appearance_representation** is a type of **representation** that representats the visual appearance of an object. For more information see ARM definition for Visual_appearance in paragraph 4.2.560.

EXPRESS specification:

```
*)
ENTITY visual_appearance_representation
  SUBTYPE OF (representation);
WHERE
 WR1: ( {2<= SIZEOF ( SELF.items ) <=5} ) AND ( SIZEOF ( QUERY (
      i <* items | ( 'AUTOMOTIVE_DESIGN.'+
      'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
      i.name IN [ 'colour id' , 'colour name' , 'lustre' ,
      'pattern' , 'transparency'] ) ) ) = SIZEOF ( SELF.items ) )
      ;
 WR2: SIZEOF ( QUERY ( i <* SELF.items | i.name = 'colour id' )
      ) =1;
 WR3: SIZEOF ( QUERY ( i <* SELF.items | i.name ='lustre' ) )
      =1;
 WR4: SIZEOF ( QUERY ( i <* SELF.items | i.name = 'colour name'
```

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```
     ) ) <=1;
 WR5: SIZEOF ( QUERY ( i <* SELF.items | i.name ='pattern' ) )
     <=1;
 WR6: SIZEOF ( QUERY ( i <* SELF.items | i.name ='transparency'
     ) ) <=1;
 WR7: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr
     <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN (
     pdr. definition ,
     'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
     'DERIVED_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'GENERAL_PROPERTY' IN TYPEOF ( gpa. base_definition ) ) AND
     ( gpa. base_definition.name ='surface_condition' ) ) ) =1 )
     ) =1 ) ;
END_ENTITY;
(*
```

Formal propositions:

WR1: Each instance of **visual_appearance_representation** shall contain between two and five **representation_item**s in its set of **items**. These **representation_item**s shall be of type **descriptive_representation_item** and have a **name** of 'colour id', 'colour name', 'lustre', 'pattern', or 'transparency'.

WR2: Each instance of **visual_appearance_representation** shall contain exactly one **representation_item** in its set of **items** that has a **name** of 'colour id'.

WR3: Each instance of **visual_appearance_representation** shall contain exactly one **representation_item** in its set of **items** that has a **name** of 'lustre'.

WR4: Each instance of **visual_appearance_representation** shall contain at most one **representation_item** in its set of **items** that has a **name** of 'colour name'.

WR5: Each instance of **visual_appearance_representation** shall contain at most one **representation_item** in its set of **items** that has a **name** of 'pattern'.

WR6: Each instance of **visual_appearance_representation** shall contain at most one **representation_item** in its set of **items** that has a **name** of 'transparency'.

WR7: Each instance of **hardness_representation** shall be referenced by exactly one **property_definition_representation**. This **property_definition_representation** shall relate the **representation** with a **property_definition** that is the **derived_definition** of a **general_property_association** that refers as **base_definition** to a **general_property** with a **name** of 'surface_condition'.

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Informal propositions:

IP1: If the **visual_appearance_representation** contains **qualified_representation_item**s that refer to a **type_qualifier** representing the value determination then all of the **representation_item**s shall also be **qualified_representation_item**s that refer to the same instance of **type_qualifier**.

5.2.3.2 automotive_design imported entity modifications

5.2.3.2.1 action

The base definition of the **action** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **action** entity:

– restrict_action_resource_requirement_for_process_operation (see 5.2.4.76);

– restrict_multi_language_for_action (see 5.2.4.104);

– restrict_version_assignment_for_action (see 5.2.4.194);

– subtype_exclusiveness_action (see 5.2.4.216).

5.2.3.2.2 action_directive

The base definition of the **action_directive** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **action_directive** entity:

– dependent_instantiable_action_directive (see 5.2.4.9);

– restrict_multi_language_for_action_directive (see 5.2.4.105);

– restrict_version_assignment_for_action_directive (see 5.2.4.195).

5.2.3.2.3 action_method

The base definition of the **action_method** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **action_method** entity:

– restrict_multi_language_for_action_method (see 5.2.4.106);

– restrict_version_assignment_for_action_method (see 5.2.4.196).

5.2.3.2.4 action_property

The base definition of the **action_property** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **action_property** entity:

– full_model_change_completeness_for_action_property (see 5.2.4.61);

– restrict_multi_language_for_action_property (see 5.2.4.107).

5.2.3.2.5 action_relationship

The base definition of the **action_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **action_relationship** entity:

– restrict_multi_language_for_action_relationship (see 5.2.4.108).

5.2.3.2.6 action_request_status

The base definition of the **action_request_status** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **action_request_status** entity:

– versioned_action_request_requires_status (see 5.2.4.271).

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5.2.3.2.7 action_resource_requirement

The base definition of the **action_resource_requirement** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **action_resource_requirement** entity:

– restrict_action_resource_requirement_for_process_operation (see 5.2.4.76).

5.2.3.2.8 action_resource_type

The base definition of the **action_resource_type** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **action_resource_type** entity:

– dependent_instantiable_action_resource_type (see 5.2.4.10).

5.2.3.2.9 address

The base definition of the **address** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **address** entity:

– subtype_mandatory_address (see 5.2.4.252).

5.2.3.2.10 alternate_product_relationship

The base definition of the **alternate_product_relationship** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **alternate_product_relationship** entity:

– restrict_multi_language_for_alternate_product_relationship (see 5.2.4.109).

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5.2.3.2.11 annotation_occurrence

The base definition of the **annotation_occurrence** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **annotation_occurrence** entity:

– subtype_mandatory_annotation_occurrence (see 5.2.4.253).

5.2.3.2.12 application_context

The base definition of the **application_context** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **application_context** entity:

– application_protocol_definition_required (see 5.2.4.1);

– restrict_multi_language_for_application_context (see 5.2.4.110).

5.2.3.2.13 approval

The base definition of the **approval** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **approval** entity:

– approval_requires_approval_assignment (see 5.2.4.3);

– restrict_approval (see 5.2.4.83).

5.2.3.2.14 approval_date_time

The base definition of the **approval_date_time** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **approval_date_time** entity:

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– restrict_approval (see 5.2.4.83).

5.2.3.2.15 approval_person_organization

The base definition of the **approval_person_organization** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **approval_person_organization** entity:

– approval_person_organization_requires_date_time (see 5.2.4.2).

5.2.3.2.16 approval_relationship

The base definition of the **approval_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **approval_relationship** entity:

– restrict_multi_language_for_approval_relationship (see 5.2.4.111).

5.2.3.2.17 approval_role

The base definition of the **approval_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **approval_role** entity:

– dependent_instantiable_approval_role (see 5.2.4.11).

5.2.3.2.18 approval_status

The base definition of the **approval_status** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **approval_status** entity:

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– restrict_class_system_assignment_for_approval_status (see 5.2.4.86).

5.2.3.2.19 assembly_component_usage

The base definition of the **assembly_component_usage** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **assembly_component_usage** entity:

– restrict_product_definitions_for_product_definition_relationship (see 5.2.4.184);

– selected_instance_usage_requires_representation (see 5.2.4.213).

5.2.3.2.20 assembly_component_usage_substitute

The base definition of the **assembly_component_usage_substitute** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **assembly_component_usage_-substitute** entity:

– restrict_multi_language_for_assembly_component_usage_substitute (see 5.2.4.112).

5.2.3.2.21 attribute_value_role

The base definition of the **attribute_value_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **attribute_value_role** entity:

– dependent_instantiable_attribute_value_role (see 5.2.4.12).

5.2.3.2.22 camera_image

The base definition of the **camera_image** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

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The following global rules defined in this part of ISO 10303 apply to the **camera_image** entity:

– restrict_camera_image_in_view (see 5.2.4.84);

– subtype_mandatory_camera_image (see 5.2.4.254).

5.2.3.2.23 camera_model

The base definition of the **camera_model** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **camera_model** entity:

– subtype_mandatory_camera_model (see 5.2.4.255).

5.2.3.2.24 certification

The base definition of the **certification** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **certification** entity:

– restrict_multi_language_for_certification (see 5.2.4.113).

5.2.3.2.25 characterized_object

The base definition of the **characterized_object** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **characterized_object** entity:

– subtype_exclusiveness_characterized_object (see 5.2.4.217).

5.2.3.2.26 classification_assignment

The base definition of the **classification_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **classification_assignment** entity:

– subtype_exclusiveness_classification_assignment (see 5.2.4.218).

5.2.3.2.27 classification_role

The base definition of the **classification_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **classification_role** entity:

– dependent_instantiable_classification_role (see 5.2.4.13).

5.2.3.2.28 colour

The base definition of the **colour** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **colour** entity:

– subtype_exclusiveness_colour (see 5.2.4.219).

5.2.3.2.29 colour_rgb

The base definition of the **colour_rgb** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **colour_rgb** entity:

– dependent_instantiable_colour_rgb (see 5.2.4.14).

5.2.3.2.30 colour_specification

The base definition of the **colour_specification** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **colour_specification** entity:

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– subtype_mandatory_colour_specification (see 5.2.4.256).

5.2.3.2.31 compound_representation_item

The base definition of the **compound_representation_item** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **compound_representation_item** entity:

– subtype_exclusiveness_compound_representation_item (see 5.2.4.220).

5.2.3.2.32 concept_feature_operator

The base definition of the **concept_feature_operator** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **concept_feature_operator** entity:

– restrict_concept_feature_operator (see 5.2.4.92).

5.2.3.2.33 configurable_item

The base definition of the **configurable_item** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **configurable_item** entity:

– subtype_mandatory_configurable_item (see 5.2.4.257).

5.2.3.2.34 configuration_design

The base definition of the **configuration_design** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **configuration_design** entity:

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– restrict_configuration_design_for_product_class (see 5.2.4.93);

– restrict_multi_language_for_configuration_design (see 5.2.4.114).

5.2.3.2.35 configuration_item

The base definition of the **configuration_item** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **configuration_item** entity:

– restrict_multi_language_for_configuration_item (see 5.2.4.115);

– restrict_version_assignment_for_configuration_item (see 5.2.4.199).

5.2.3.2.36 contract

The base definition of the **contract** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **contract** entity:

– restrict_multi_language_for_contract (see 5.2.4.116).

5.2.3.2.37 contract_type

The base definition of the **contract_type** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **contract_type** entity:

– dependent_instantiable_contract_type (see 5.2.4.15).

5.2.3.2.38 curve_style

The base definition of the **curve_style** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **curve_style** entity:

– dependent_instantiable_curve_style (see 5.2.4.16).

5.2.3.2.39 curve_style_font

The base definition of the **curve_style_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **curve_style_font** entity:

– curve_font_usage (see 5.2.4.8).

5.2.3.2.40 data_environment

The base definition of the **data_environment** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **data_environment** entity:

– restrict_multi_language_for_data_environment (see 5.2.4.117).

5.2.3.2.41 date

The base definition of the **date** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **date** entity:

– dependent_instantiable_date (see 5.2.4.17).

5.2.3.2.42 date_and_time

The base definition of the **date_and_time** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **date_and_time** entity:

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– dependent_instantiable_date_and_time (see 5.2.4.18).

5.2.3.2.43 date_role

The base definition of the **date_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **date_role** entity:

– dependent_instantiable_date_role (see 5.2.4.19);

– restrict_multi_language_for_date_role (see 5.2.4.118).

5.2.3.2.44 date_time_role

The base definition of the **date_time_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **date_time_role** entity:

– dependent_instantiable_date_time_role (see 5.2.4.20);

– restrict_multi_language_for_date_time_role (see 5.2.4.119).

5.2.3.2.45 derived_unit

The base definition of the **derived_unit** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **derived_unit** entity:

– dependent_instantiable_derived_unit (see 5.2.4.21).

5.2.3.2.46 descriptive_representation_item

The base definition of the **descriptive_representation_item** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rules:

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The following global rules defined in this part of ISO 10303 apply to the **descriptive_representation_item** entity:

– restrict_class_system_assignment_for_descriptive_representation_item (see 5.2.4.88);

– restrict_multi_language_for_descriptive_representation_item (see 5.2.4.120).

5.2.3.2.47 dimensional_size

The base definition of the **dimensional_size** entity is given in ISO 10303 – 47. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **dimensional_size** entity:

– dependent_instantiable_dimensional_size (see 5.2.4.22).

5.2.3.2.48 document_product_association

The base definition of the **document_product_association** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **document_product_association** entity:

– subtype_mandatory_document_product_association (see 5.2.4.258).

5.2.3.2.49 document_reference

The base definition of the **document_reference** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **document_reference** entity:

– subtype_exclusiveness_document_reference (see 5.2.4.221).

5.2.3.2.50 document_relationship

The base definition of the **document_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **document_relationship** entity:

– restrict_multi_language_for_document_relationship (see 5.2.4.121).

5.2.3.2.51 document_type

The base definition of the **document_type** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **document_type** entity:

– restrict_class_system_assignment_for_document_type (see 5.2.4.89).

5.2.3.2.52 document_usage_role

The base definition of the **document_usage_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **document_usage_role** entity:

– dependent_instantiable_document_usage_role (see 5.2.4.23).

5.2.3.2.53 draughting_callout

The base definition of the **draughting_callout** entity is given in ISO 10303 – 101. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **draughting_callout** entity:

– subtype_mandatory_draughting_callout (see 5.2.4.259).

5.2.3.2.54 draughting_model

The base definition of the **draughting_model** entity is given in ISO 10303 – 520. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **draughting_model** entity:

– restrict_version_assignment_for_draughting_model (see 5.2.4.201).

5.2.3.2.55 draughting_subfigure_representation

The base definition of the **draughting_subfigure_representation** entity is given in ISO 10303 – 504. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **draughting_subfigure_representation** entity:

– draughting_subfigure_representation_layers (see 5.2.4.53).

5.2.3.2.56 draughting_title

The base definition of the **draughting_title** entity is given in ISO 10303 – 101. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **draughting_title** entity:

– restrict_drawing (see 5.2.4.96);

– restrict_multi_language_for_draughting_title (see 5.2.4.122).

5.2.3.2.57 drawing_revision

The base definition of the **drawing_revision** entity is given in ISO 10303 – 101. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **drawing_revision** entity:

– restrict_drawing (see 5.2.4.96).

5.2.3.2.58 drawing_sheet_revision

The base definition of the **drawing_sheet_revision** entity is given in ISO 10303 – 101. The following modifications apply to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **drawing_sheet_revision** entity:

– drawing_sheet_annotation_layers (see 5.2.4.54);

– sheets_belong_to_one_drawing (see 5.2.4.214).

5.2.3.2.59 effectivity

The base definition of the **effectivity** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **effectivity** entity:

– restrict_effectivity_usage (see 5.2.4.99);

– restrict_multi_language_for_effectivity (see 5.2.4.123);

– restrict_version_assignment_for_effectivity (see 5.2.4.202);

– subtype_exclusiveness_effectivity (see 5.2.4.222).

5.2.3.2.60 effectivity_assignment

The base definition of the **effectivity_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **effectivity_assignment** entity:

– subtype_exclusiveness_effectivity_assignment (see 5.2.4.223).

5.2.3.2.61 effectivity_context_assignment

The base definition of the **effectivity_context_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **effectivity_context_assignment** entity:

– subtype_exclusiveness_effectivity_context_assignment (see 5.2.4.224).

5.2.3.2.62 effectivity_context_role

The base definition of the **effectivity_context_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **effectivity_context_role** entity:

– dependent_instantiable_effectivity_context_role (see 5.2.4.24).

5.2.3.2.63 effectivity_relationship

The base definition of the **effectivity_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **effectivity_relationship** entity:

– restrict_effectivity_for_effectivity_relationship (see 5.2.4.98);

– restrict_multi_language_for_effectivity_relationship (see 5.2.4.124).

5.2.3.2.64 event_occurrence

The base definition of the **event_occurrence** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **event_occurrence** entity:

– event_occurrence_requires_event_occurrence_assignment (see 5.2.4.57);

– restrict_multi_language_for_event_occurrence (see 5.2.4.125).

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5.2.3.2.65 event_occurrence_assignment

The base definition of the **event_occurrence_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **event_occurrence_assignment** entity:

– event_occurrence_requires_event_occurrence_assignment (see 5.2.4.57).

5.2.3.2.66 event_occurrence_role

The base definition of the **event_occurrence_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **event_occurrence_role** entity:

– dependent_instantiable_event_occurrence_role (see 5.2.4.25).

5.2.3.2.67 executed_action

The base definition of the **executed_action** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **executed_action** entity:

– executed_action_requires_action_status (see 5.2.4.58).

5.2.3.2.68 external_source

The base definition of the **external_source** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **external_source** entity:

– restrict_multi_language_for_external_source (see 5.2.4.126).

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5.2.3.2.69 externally_defined_curve_font

The base definition of the **externally_defined_curve_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **externally_defined_curve_font** entity:

– curve_font_usage (see 5.2.4.8).

5.2.3.2.70 externally_defined_item

The base definition of the **externally_defined_item** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **externally_defined_item** entity:

– subtype_exclusiveness_externally_defined_item (see 5.2.4.225);

– subtype_mandatory_externally_defined_item (see 5.2.4.260).

5.2.3.2.71 externally_defined_item_relationship

The base definition of the **externally_defined_item_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **externally_defined_item_relationship** entity:

– restrict_externally_defined_item_relationship (see 5.2.4.100).

5.2.3.2.72 externally_defined_symbol

The base definition of the **externally_defined_symbol** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

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The following global rule defined in this part of ISO 10303 applies to the **externally_defined_symbol** entity:

– dependent_instantiable_externally_defined_symbol (see 5.2.4.26).

5.2.3.2.73 externally_defined_text_font

The base definition of the **externally_defined_text_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **externally_defined_text_font** entity:

– text_font_usage (see 5.2.4.269).

5.2.3.2.74 fill_area_style

The base definition of the **fill_area_style** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **fill_area_style** entity:

– dependent_instantiable_fill_area_style (see 5.2.4.27).

5.2.3.2.75 fill_area_style_colour

The base definition of the **fill_area_style_colour** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **fill_area_style_colour** entity:

– dependent_instantiable_fill_area_style_colour (see 5.2.4.28).

5.2.3.2.76 fill_area_style_tile_symbol_with_style

The base definition of the **fill_area_style_tile_symbol_with_style** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **fill_area_style_tile_symbol_-with_style** entity:

– fill_area_style_tile_symbol_constraint (see 5.2.4.60).

5.2.3.2.77 founded_item

The base definition of the **founded_item** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **founded_item** entity:

– subtype_exclusiveness_founded_item (see 5.2.4.228);

– subtype_mandatory_founded_item (see 5.2.4.261).

5.2.3.2.78 general_property

The base definition of the **general_property** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **general_property** entity:

– restrict_multi_language_for_general_property (see 5.2.4.127);

– restrict_version_assignment_for_general_property (see 5.2.4.203).

5.2.3.2.79 general_property_association

The base definition of the **general_property_association** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **general_property_association** entity:

– restrict_general_property_association_for_externally_defined_general_property (see 5.2.4.101);

– restrict_product_definition_context_for_external_properties (see 5.2.4.180).

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5.2.3.2.80 general_property_relationship

The base definition of the **general_property_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **general_property_relationship** entity:

– restrict_multi_language_for_general_property_relationship (see 5.2.4.128).

5.2.3.2.81 geometric_representation_context

The base definition of the **geometric_representation_context** entity is given in ISO 10303 – 42. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **geometric_representation_context** entity:

– dimensionality_is_two_or_three (see 5.2.4.52).

5.2.3.2.82 geometric_representation_item

The base definition of the **geometric_representation_item** entity is given in ISO 10303 – 42. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **geometric_representation_item** entity:

– restrict_multi_language_for_geometric_representation_item (see 5.2.4.129).

5.2.3.2.83 geometric_tolerance

The base definition of the **geometric_tolerance** entity is given in ISO 10303 – 47. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **geometric_tolerance** entity:

– restrict_multi_language_for_geometric_tolerance (see 5.2.4.130);

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– restrict_viewing_plane_usage (see 5.2.4.209);

– subtype_exclusiveness_geometric_tolerance (see 5.2.4.229);

– subtype_mandatory_geometric_tolerance (see 5.2.4.262).

5.2.3.2.84 global_uncertainty_assigned_context

The base definition of the **global_uncertainty_assigned_context** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **global_uncertainty_assigned_context** entity:

– consistent_uncertainty (see 5.2.4.6).

5.2.3.2.85 global_unit_assigned_context

The base definition of the **global_unit_assigned_context** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **global_unit_assigned_context** entity:

– global_length_and_angle_units_2d_or_3d (see 5.2.4.63).

5.2.3.2.86 group

The base definition of the **group** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **group** entity:

– restrict_multi_language_for_group (see 5.2.4.131);

– subtype_exclusiveness_group (see 5.2.4.230).

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5.2.3.2.87 group_assignment

The base definition of the **group_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **group_assignment** entity:

– subtype_exclusiveness_group_assignment (see 5.2.4.231).

5.2.3.2.88 group_relationship

The base definition of the **group_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **group_relationship** entity:

– restrict_group_relationship_for_general_classification_hierarchy (see 5.2.4.102);

– restrict_group_relationship_for_specification_category (see 5.2.4.103);

– restrict_multi_language_for_group_relationship (see 5.2.4.132).

5.2.3.2.89 identification_assignment

The base definition of the **identification_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **identification_assignment** entity:

– subtype_exclusiveness_identification_assignment (see 5.2.4.232).

5.2.3.2.90 identification_role

The base definition of the **identification_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **identification_role** entity:

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– dependent_instantiable_identification_role (see 5.2.4.29);

– restrict_multi_language_for_identification_role (see 5.2.4.133).

5.2.3.2.91 kinematic_joint

The base definition of the **kinematic_joint** entity is given in ISO 10303 – 105. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **kinematic_joint** entity:

– restrict_name_assignment_for_kinematic_joint (see 5.2.4.172).

5.2.3.2.92 kinematic_link

The base definition of the **kinematic_link** entity is given in ISO 10303 – 105. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **kinematic_link** entity:

– restrict_name_assignment_for_kinematic_link (see 5.2.4.173).

5.2.3.2.93 kinematic_pair

The base definition of the **kinematic_pair** entity is given in ISO 10303 – 105. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **kinematic_pair** entity:

– restrict_multi_language_for_kinematic_pair (see 5.2.4.134).

5.2.3.2.94 kinematic_structure

The base definition of the **kinematic_structure** entity is given in ISO 10303 – 105. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **kinematic_structure** entity:

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– restrict_name_assignment_for_kinematic_structure (see 5.2.4.174).

5.2.3.2.95 mapped_item

The base definition of the **mapped_item** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **mapped_item** entity:

– drawing_sheet_layout_usage (see 5.2.4.55);

– restrict_multi_language_for_mapped_item (see 5.2.4.135);

– subtype_exclusiveness_mapped_item (see 5.2.4.233).

5.2.3.2.96 measure_with_unit

The base definition of the **measure_with_unit** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **measure_with_unit** entity:

– dependent_instantiable_measure_with_unit (see 5.2.4.30).

5.2.3.2.97 mechanical_design_geometric_presentation_representation

The base definition of the **mechanical_design_geometric_presentation_representation** entity is given in ISO 10303 – 517. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **mechanical_design_geometric_presentation_representation** entity:

– restrict_version_assignment_for_mechanical_design_geometric_presentation_representation (see 5.2.4.204).

5.2.3.2.98 name_assignment

The base definition of the **name_assignment** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **name_assignment** entity:

– restrict_multi_language_for_name_assignment (see 5.2.4.136).

5.2.3.2.99 named_unit

The base definition of the **named_unit** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **named_unit** entity:

– dependent_instantiable_named_unit (see 5.2.4.31).

5.2.3.2.100 next_assembly_usage_occurrence

The base definition of the **next_assembly_usage_occurrence** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **next_assembly_usage_occurrence** entity:

– coordinated_assembly_and_shape (see 5.2.4.7).

5.2.3.2.101 object_role

The base definition of the **object_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **object_role** entity:

– dependent_instantiable_object_role (see 5.2.4.32);

– restrict_applied_action_assignment (see 5.2.4.78);

– restrict_applied_action_request_assignment (see 5.2.4.79);

– restrict_applied_organizational_project_assignment (see 5.2.4.82).

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5.2.3.2.102 organization_relationship

The base definition of the **organization_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **organization_relationship** entity:

– restrict_multi_language_for_organization_relationship (see 5.2.4.137).

5.2.3.2.103 organization_role

The base definition of the **organization_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **organization_role** entity:

– dependent_instantiable_organization_role (see 5.2.4.33);

– restrict_multi_language_for_organization_role (see 5.2.4.138).

5.2.3.2.104 organizational_project

The base definition of the **organizational_project** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **organizational_project** entity:

– restrict_multi_language_for_organizational_project (see 5.2.4.139).

5.2.3.2.105 organizational_project_relationship

The base definition of the **organizational_project_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **organizational_project_-relationship** entity:

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– restrict_multi_language_for_organizational_project_relationship (see 5.2.4.140).

5.2.3.2.106 organizational_project_role

The base definition of the **organizational_project_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **organizational_project_role** entity:

– dependent_instantiable_organizational_project_role (see 5.2.4.34).

5.2.3.2.107 pair_actuator

The base definition of the **pair_actuator** entity is given in ISO 10303 – 105. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **pair_actuator** entity:

– restrict_multi_language_for_pair_actuator (see 5.2.4.141).

5.2.3.2.108 person

The base definition of the **person** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **person** entity:

– person_requires_person_and_organization (see 5.2.4.64).

5.2.3.2.109 person_and_organization_role

The base definition of the **person_and_organization_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **person_and_organization_role** entity:

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– dependent_instantiable_person_and_organization_role (see 5.2.4.35);

– restrict_multi_language_for_person_and_organization_role (see 5.2.4.142).

5.2.3.2.110 planar_extent

The base definition of the **planar_extent** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **planar_extent** entity:

– restrict_class_system_assignment_for_planar_extent (see 5.2.4.90).

5.2.3.2.111 pre_defined_colour

The base definition of the **pre_defined_colour** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **pre_defined_colour** entity:

– dependent_instantiable_pre_defined_colour (see 5.2.4.36);

– subtype_mandatory_pre_defined_colour (see 5.2.4.263).

5.2.3.2.112 pre_defined_curve_font

The base definition of the **pre_defined_curve_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **pre_defined_curve_font** entity:

– curve_font_usage (see 5.2.4.8);

– subtype_mandatory_pre_defined_curve_font (see 5.2.4.264).

5.2.3.2.113 pre_defined_item

The base definition of the **pre_defined_item** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **pre_defined_item** entity:

– subtype_exclusiveness_pre_defined_item (see 5.2.4.234);

– subtype_mandatory_pre_defined_item (see 5.2.4.265).

5.2.3.2.114 pre_defined_symbol

The base definition of the **pre_defined_symbol** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **pre_defined_symbol** entity:

– dependent_instantiable_pre_defined_symbol (see 5.2.4.37);

– subtype_exclusiveness_pre_defined_symbol (see 5.2.4.235);

– subtype_mandatory_pre_defined_symbol (see 5.2.4.266).

5.2.3.2.115 pre_defined_text_font

The base definition of the **pre_defined_text_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **pre_defined_text_font** entity:

– subtype_mandatory_pre_defined_text_font (see 5.2.4.267);

– text_font_usage (see 5.2.4.269).

5.2.3.2.116 precision_qualifier

The base definition of the **precision_qualifier** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **precision_qualifier** entity:

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– dependent_instantiable_precision_qualifier (see 5.2.4.38).

5.2.3.2.117 presentation_area

The base definition of the **presentation_area** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **presentation_area** entity:

– restrict_version_assignment_for_presentation_area (see 5.2.4.205);

– subtype_exclusiveness_presentation_area (see 5.2.4.236).

5.2.3.2.118 presentation_layer_assignment

The base definition of the **presentation_layer_assignment** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **presentation_layer_assignment** entity:

– presentation_layer_assignment_constraint_2d_or_3d (see 5.2.4.69);

– restrict_multi_language_for_presentation_layer_assignment (see 5.2.4.143).

5.2.3.2.119 presentation_representation

The base definition of the **presentation_representation** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **presentation_representation** entity:

– subtype_exclusiveness_presentation_representation (see 5.2.4.237).

5.2.3.2.120 presentation_style_by_context

The base definition of the **presentation_style_by_context** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **presentation_style_by_context** entity:

– dependent_instantiable_presentation_style_by_context (see 5.2.4.39).

5.2.3.2.121 presentation_view

The base definition of the **presentation_view** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **presentation_view** entity:

– drawing_view_annotation_layers (see 5.2.4.56);

– presentation_view_presented_once (see 5.2.4.70);

– restrict_camera_image_in_view (see 5.2.4.84).

5.2.3.2.122 process_product_association

The base definition of the **process_product_association** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **process_product_association** entity:

– restrict_multi_language_for_process_product_association (see 5.2.4.144);

– restrict_process_product_association (see 5.2.4.177).

5.2.3.2.123 product

The base definition of the **product** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product** entity:

– product_requires_category (see 5.2.4.73);

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– product_requires_person_organization (see 5.2.4.74);

– product_requires_version (see 5.2.4.75);

– restrict_multi_language_for_product (see 5.2.4.145);

– restrict_product_category_for_product (see 5.2.4.179).

5.2.3.2.124 product_concept

The base definition of the **product_concept** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_concept** entity:

– restrict_multi_language_for_product_concept (see 5.2.4.146);

– restrict_version_assignment_for_product_concept (see 5.2.4.206).

5.2.3.2.125 product_concept_feature

The base definition of the **product_concept_feature** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_concept_feature** entity:

– product_concept_feature_requires_category (see 5.2.4.71);

– restrict_multi_language_for_product_concept_feature (see 5.2.4.147);

– restrict_version_assignment_for_product_concept_feature (see 5.2.4.207).

5.2.3.2.126 product_concept_feature_association

The base definition of the **product_concept_feature_association** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_concept_feature_-association** entity:

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– restrict_multi_language_for_product_concept_feature_association (see 5.2.4.148).

5.2.3.2.127 product_concept_relationship

The base definition of the **product_concept_relationship** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_concept_relationship** entity:

– restrict_multi_language_for_product_concept_relationship (see 5.2.4.149).

5.2.3.2.128 product_definition

The base definition of the **product_definition** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition** entity:

– complex_product_requires_product_definition (see 5.2.4.4);

– design_constraint_requires_product_definition (see 5.2.4.51);

– physical_instance_requires_product_definition (see 5.2.4.65);

– restrict_alternative_definition (see 5.2.4.77);

– restrict_multi_language_for_product_definition (see 5.2.4.150);

– restrict_part_occurrence (see 5.2.4.176);

– restrict_product_definition_context_for_external_properties (see 5.2.4.180);

– restrict_product_definition_context_for_product (see 5.2.4.181);

– restrict_product_definition_for_mating_tree (see 5.2.4.182);

– restrict_properties_of_document_representation (see 5.2.4.186).

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5.2.3.2.129 product_definition_context

The base definition of the **product_definition_context** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_definition_context** entity:

– restrict_alternative_definition (see 5.2.4.77).

5.2.3.2.130 product_definition_context_role

The base definition of the **product_definition_context_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_definition_context_role** entity:

– dependent_instantiable_product_definition_context_role (see 5.2.4.40).

5.2.3.2.131 product_definition_formation

The base definition of the **product_definition_formation** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_formation** entity:

– complex_product_requires_product_definition (see 5.2.4.4);

– design_constraint_requires_product_definition (see 5.2.4.51);

– physical_instance_requires_product_definition (see 5.2.4.65);

– restrict_multi_language_for_product_definition_formation (see 5.2.4.151).

5.2.3.2.132 product_definition_formation_relationship

The base definition of the **product_definition_formation_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_definition_formation_relationship** entity:

– restrict_multi_language_for_product_definition_formation_relationship (see 5.2.4.152).

5.2.3.2.133 product_definition_occurrence_relationship

The base definition of the **product_definition_occurrence_relationship** entity is given in ISO 10303 – 44. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **product_definition_occurrence_relationship** entity:

– restrict_part_occurrence (see 5.2.4.176).

5.2.3.2.134 product_definition_relationship

The base definition of the **product_definition_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_relationship** entity:

– product_definition_replacement_requires_effectivity_assignment (see 5.2.4.72);

– restrict_multi_language_for_product_definition_relationship (see 5.2.4.153);

– restrict_product_categories_for_tool_part_relationship (see 5.2.4.178);

– restrict_product_definitions_for_product_definition_relationship (see 5.2.4.184).

5.2.3.2.135 product_definition_substitute

The base definition of the **product_definition_substitute** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_definition_substitute** entity:

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– restrict_multi_language_for_product_definition_substitute (see 5.2.4.154);

– restrict_product_definition_substitute (see 5.2.4.183).

5.2.3.2.136 product_related_product_category

The base definition of the **product_related_product_category** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **product_related_product_-category** entity:

– complex_product_requires_product_definition (see 5.2.4.4);

– design_constraint_requires_product_definition (see 5.2.4.51);

– physical_instance_requires_product_definition (see 5.2.4.65);

– product_requires_category (see 5.2.4.73);

– restrict_multi_language_for_product_related_product_category (see 5.2.4.155);

– restrict_product_definition_context_for_product (see 5.2.4.181).

5.2.3.2.137 property_definition

The base definition of the **property_definition** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **property_definition** entity:

– full_model_change_completeness_for_property_definition (see 5.2.4.62);

– restrict_multi_language_for_property_definition (see 5.2.4.156);

– restrict_representation_for_document_properties (see 5.2.4.190);

– subtype_exclusiveness_property_definition (see 5.2.4.238).

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5.2.3.2.138 property_definition_relationship

The base definition of the **property_definition_relationship** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **property_definition_relationship** entity:

– restrict_multi_language_for_property_definition_relationship (see 5.2.4.157).

5.2.3.2.139 property_definition_representation

The base definition of the **property_definition_representation** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **property_definition_representation** entity:

– subtype_exclusiveness_property_definition_representation (see 5.2.4.239).

5.2.3.2.140 qualified_representation_item

The base definition of the **qualified_representation_item** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **qualified_representation_item** entity:

– consistent_uncertainty (see 5.2.4.6).

5.2.3.2.141 relative_event_occurrence

The base definition of the **relative_event_occurrence** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **relative_event_occurrence** entity:

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– event_occurrence_requires_event_occurrence_assignment (see 5.2.4.57).

5.2.3.2.142 representation

The base definition of the **representation** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **representation** entity:

– restrict_centre_of_mass_representation (see 5.2.4.85);

– restrict_default_settings (see 5.2.4.94);

– restrict_default_thickness (see 5.2.4.95);

– restrict_multi_language_for_representation (see 5.2.4.158);

– restrict_representation_for_document_content_property (see 5.2.4.187);

– restrict_representation_for_document_creation_property (see 5.2.4.188);

– restrict_representation_for_document_format_property (see 5.2.4.189);

– restrict_representation_for_document_properties (see 5.2.4.190);

– restrict_representation_for_document_size_property (see 5.2.4.191);

– restrict_treatment_result (see 5.2.4.193);

– selected_instance_usage_requires_representation (see 5.2.4.213);

– subtype_exclusiveness_representation (see 5.2.4.241).

5.2.3.2.143 representation_context

The base definition of the **representation_context** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **representation_context** entity:

– restrict_representation_for_document_properties (see 5.2.4.190).

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5.2.3.2.144 representation_item

The base definition of the **representation_item** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **representation_item** entity:

– restrict_representation_for_document_content_property (see 5.2.4.187);

– restrict_representation_for_document_creation_property (see 5.2.4.188);

– restrict_representation_for_document_format_property (see 5.2.4.189);

– restrict_representation_for_document_size_property (see 5.2.4.191);

– subtype_exclusiveness_representation_item (see 5.2.4.242).

5.2.3.2.145 representation_map

The base definition of the **representation_map** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **representation_map** entity:

– subtype_exclusiveness_representation_map (see 5.2.4.243).

5.2.3.2.146 representation_relationship

The base definition of the **representation_relationship** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **representation_relationship** entity:

– restrict_multi_language_for_representation_relationship (see 5.2.4.159);

– subtype_exclusiveness_representation_relationship (see 5.2.4.244).

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5.2.3.2.147 representation_relationship_with_transformation

The base definition of the **representation_relationship_with_transformation** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **representation_relationship_with_transformation** entity:

– subtype_exclusiveness_representation_relationship_with_transformation (see 5.2.4.245).

5.2.3.2.148 requirement_for_action_resource

The base definition of the **requirement_for_action_resource** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **requirement_for_action_resource** entity:

– restrict_multi_language_for_requirement_for_action_resource (see 5.2.4.160).

5.2.3.2.149 resource_property

The base definition of the **resource_property** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **resource_property** entity:

– restrict_multi_language_for_resource_property (see 5.2.4.161).

5.2.3.2.150 resource_requirement_type

The base definition of the **resource_requirement_type** entity is given in ISO 10303 – 49. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **resource_requirement_type** entity:

– dependent_instantiable_resource_requirement_type (see 5.2.4.41);

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– restrict_multi_language_for_resource_requirement_type (see 5.2.4.162).

5.2.3.2.151 security_classification

The base definition of the **security_classification** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **security_classification** entity:

– restrict_multi_language_for_security_classification (see 5.2.4.163);

– security_classification_requires_security_classification_assignment (see 5.2.4.212).

5.2.3.2.152 security_classification_level

The base definition of the **security_classification_level** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **security_classification_level** entity:

– restrict_class_system_assignment_for_security_classification_level (see 5.2.4.91).

5.2.3.2.153 shape_aspect

The base definition of the **shape_aspect** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **shape_aspect** entity:

– restrict_multi_language_for_shape_aspect (see 5.2.4.164);

– subtype_exclusiveness_shape_aspect (see 5.2.4.246).

5.2.3.2.154 shape_aspect_relationship

The base definition of the **shape_aspect_relationship** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

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Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **shape_aspect_relationship** entity:

– compound_features_of_equal_type (see 5.2.4.5);

– restrict_multi_language_for_shape_aspect_relationship (see 5.2.4.165);

– subtype_exclusiveness_shape_aspect_relationship (see 5.2.4.247).

5.2.3.2.155 shape_representation

The base definition of the **shape_representation** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **shape_representation** entity:

– restrict_representation_item_for_hybrid_geometric_model_3d (see 5.2.4.192);

– restrict_version_assignment_for_shape_representation (see 5.2.4.208);

– subtype_exclusiveness_shape_representation_feature_geometry (see 5.2.4.248);

– subtype_exclusiveness_shape_representation_geometry (see 5.2.4.249).

5.2.3.2.156 standard_uncertainty

The base definition of the **standard_uncertainty** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **standard_uncertainty** entity:

– dependent_instantiable_standard_uncertainty (see 5.2.4.43).

5.2.3.2.157 styled_item

The base definition of the **styled_item** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rules:

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The following global rules defined in this part of ISO 10303 apply to the **styled_item** entity:

– restrict_multi_language_for_styled_item (see 5.2.4.166);

– styled_curve (see 5.2.4.215).

5.2.3.2.158 symbol_colour

The base definition of the **symbol_colour** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **symbol_colour** entity:

– dependent_instantiable_symbol_colour (see 5.2.4.44).

5.2.3.2.159 symbol_representation

The base definition of the **symbol_representation** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **symbol_representation** entity:

– subtype_exclusiveness_symbol_representation (see 5.2.4.250).

5.2.3.2.160 terminator_symbol

The base definition of the **terminator_symbol** entity is given in ISO 10303 – 101. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **terminator_symbol** entity:

– terminator_symbol_constraint (see 5.2.4.268).

5.2.3.2.161 text_style

The base definition of the **text_style** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **text_style** entity:

– dependent_instantiable_text_style (see 5.2.4.45).

5.2.3.2.162 text_style_for_defined_font

The base definition of the **text_style_for_defined_font** entity is given in ISO 10303 – 46. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **text_style_for_defined_font** entity:

– dependent_instantiable_text_style_for_defined_font (see 5.2.4.46).

5.2.3.2.163 time_interval_role

The base definition of the **time_interval_role** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **time_interval_role** entity:

– dependent_instantiable_time_interval_role (see 5.2.4.47);

– restrict_multi_language_for_time_interval_role (see 5.2.4.167).

5.2.3.2.164 tolerance_value

The base definition of the **tolerance_value** entity is given in ISO 10303 – 47. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **tolerance_value** entity:

– dependent_instantiable_tolerance_value (see 5.2.4.48).

5.2.3.2.165 tolerance_zone_definition

The base definition of the **tolerance_zone_definition** entity is given in ISO 10303 – 47. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **tolerance_zone_definition** entity:

– restrict_zone_boundary (see 5.2.4.210).

5.2.3.2.166 topological_representation_item

The base definition of the **topological_representation_item** entity is given in ISO 10303 – 42. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **topological_representation_item** entity:

– restrict_multi_language_for_topological_representation_item (see 5.2.4.168).

5.2.3.2.167 type_qualifier

The base definition of the **type_qualifier** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **type_qualifier** entity:

– dependent_instantiable_type_qualifier (see 5.2.4.49).

5.2.3.2.168 uncertainty_assigned_representation

The base definition of the **uncertainty_assigned_representation** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **uncertainty_assigned_representation** entity:

– consistent_uncertainty (see 5.2.4.6).

5.2.3.2.169 uncertainty_measure_with_unit

The base definition of the **uncertainty_measure_with_unit** entity is given in ISO 10303 – 43. The following modifications apply to this part of ISO 10303.

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Associated global rule:

The following global rule defined in this part of ISO 10303 applies to the **uncertainty_measure_with_-unit** entity:

– restrict_multi_language_for_uncertainty_measure_with_unit (see 5.2.4.169).

5.2.3.2.170 uncertainty_qualifier

The base definition of the **uncertainty_qualifier** entity is given in ISO 10303 – 45. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **uncertainty_qualifier** entity:

– dependent_instantiable_uncertainty_qualifier (see 5.2.4.50);

– restrict_multi_language_for_uncertainty_qualifier (see 5.2.4.170).

5.2.3.2.171 versioned_action_request

The base definition of the **versioned_action_request** entity is given in ISO 10303 – 41. The following modifications apply to this part of ISO 10303.

Associated global rules:

The following global rules defined in this part of ISO 10303 apply to the **versioned_action_request** entity:

– restrict_multi_language_for_versioned_action_request (see 5.2.4.171);

– versioned_action_request_requires_date_and_person_or_organization (see 5.2.4.270);

– versioned_action_request_requires_status (see 5.2.4.271).

5.2.4 automotive_design rule definitions

5.2.4.1 application_protocol_definition_required

The **application_protocol_definition_required** rule ensures that at least one **application_protocol_-definition** is specified that provides the designator 'automotive_design' of this application protocol.

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EXPRESS specification:

```
*)
RULE application_protocol_definition_required FOR
    (application_context);
WHERE
 WR1: SIZEOF ( QUERY ( ac <* application_context | ( SIZEOF (
     QUERY ( apd <* USEDIN ( ac ,
     'AUTOMOTIVE_DESIGN.APPLICATION_PROTOCOL_DEFINITION.APPLICATION'
     ) | apd. application_interpreted_model_schema_name
     ='automotive_design' ) ) >0 ) ) ) >0;
END_RULE;
(*
```

Argument definitions:

application_context: the set of all instances of **application_context**.

Formal propositions:

WR1: At least one instance of **application_context** shall be refered by one instance of **application_protocol_definition** which contains the instance of **application_context** as its application attribute and has a **application_interpreted_model_schema_name** of 'automotive_design'.

5.2.4.2 approval_person_organization_requires_date_time

The **approval_person_organization_requires_date_time** rule specifies that each instance of **approval_person_organization** shall be referenced by exactly one of either **applied_date_assignment** or **applied_date_and_time_assignment** where the assigned date or date and time specifies the sign off date of the approval. This rule enforces the requirement for every Approval, that in case the approving person or organization is specified, also the sign off date of the Approval has to be given.

EXPRESS specification:

```
*)
RULE approval_person_organization_requires_date_time FOR
    (approval_person_organization);
WHERE
 WR1: SIZEOF ( QUERY ( apo <* approval_person_organization |   (
     SIZEOF ( QUERY ( u <* USEDIN ( apo ,
     'AUTOMOTIVE_DESIGN.'+ 'APPLIED_DATE_ASSIGNMENT.'+ 'ITEMS'
     ) |   ( u.role. name = 'sign off' ) ) ) +  SIZEOF ( QUERY (
     u <* USEDIN ( apo ,
     'AUTOMOTIVE_DESIGN.'+ 'APPLIED_DATE_AND_TIME_ASSIGNMENT.'+
```

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```
     'ITEMS' ) |   ( u.role. name = 'sign off' ) )   ) ) <>1 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

approval_person_organization: the set of all instances of **approval_person_organization**.

Formal propositions:

WR1: There shall be exactly one instance of either **applied_date_assignment** or **applied_date_and_-time_assignment** associated to an **approval_person_organization** where the **name** of **date_role** / **date_-time_role** is 'sign off'.

5.2.4.3 approval_requires_approval_assignment

The **approval_requires_approval_assignment** rule specifies that each instance of **approval** is referenced by at least one instance of **approval_assignment** as the **assigned_approval**. This rule enforces the requirement for every approval to be applied at least once.

EXPRESS specification:

```
*)
RULE approval_requires_approval_assignment FOR
    (approval);
WHERE
 WR1: SIZEOF ( QUERY ( a <* approval | SIZEOF ( USEDIN ( a ,
     'AUTOMOTIVE_DESIGN.APPROVAL_ASSIGNMENT.ASSIGNED_APPROVAL' )
     ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

approval: the set of all instances of **approval**.

Formal propositions:

WR1: Each instance of **approval** shall be referenced at least once as the **assigned_approval** by an instance of **approval_assignment**.

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5.2.4.4 complex_product_requires_product_definition

The **complex_product_requires_product_definition** rule ensures that each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'functionality', 'conceptual product', or 'alternative solution', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'functional definition', 'conceptual definition', or 'alternative definition', respectively.

EXPRESS specification:

```
*)
RULE complex_product_requires_product_definition FOR
    (product_definition,
     product_definition_formation,
     product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( pdf <* product_definition_formation | ( (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pdf. of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name ='functionality' ) ) =1 ) AND (
     SIZEOF ( QUERY ( pd <* USEDIN ( pdf ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION.'+ 'FORMATION' ) |
     pd. frame_of_reference.name = 'functional definition' ) )
     <>1 ) ) OR ( ( SIZEOF ( QUERY ( prpc <* USEDIN ( pdf.
     of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name = 'conceptual design' ) ) =1 )
     AND ( SIZEOF ( QUERY ( pd <* USEDIN ( pdf ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION.'+ 'FORMATION' ) |
     pd. frame_of_reference.name = 'conceptual definition' ) )
     <>1 ) ) OR ( ( SIZEOF ( QUERY ( prpc <* USEDIN ( pdf.
     of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name = 'alternative solution' ) ) =1 )
     AND ( SIZEOF ( QUERY ( pd <* USEDIN ( pdf ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION.'+ 'FORMATION' ) |
     pd. frame_of_reference.name = 'alternative definition' ) )
     <>1 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

product_definition_formation: the set of all instances of **product_definition_formation**.

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product_related_product_category: the set of all instances of **product_related_product_category**.

Formal propositions:

WR1: Each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'functionality', 'conceptual definition', or 'alternative solution', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'functional definition', 'conceptual definition', or 'alternative definition', respectively.

5.2.4.5 compound_features_of_equal_type

The **compound_features_of_equal_type** rule ensures that each instance of **shape_aspect_relationship** relates compound features of equal type, i.e. that panel features and solid features are not mixed.

EXPRESS specification:

```
*)
RULE compound_features_of_equal_type FOR
    (compound_feature,
     shape_aspect_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( sar <* shape_aspect_relationship | ( sar.
     name = 'compound feature ordering' ) AND ( SIZEOF ( QUERY (
     fcr <* USEDIN ( sar. relating_shape_aspect ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( fcr ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     fcr. relating_shape_aspect ) ) AND ( fcr.
     relating_shape_aspect.name IN [ 'compound feature in solid'
     , 'compound feature in panel' ] ) ) ) =0 ) OR ( SIZEOF (
     QUERY ( fcr <* USEDIN ( sar. related_shape_aspect ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( fcr ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF (
     fcr. relating_shape_aspect ) ) AND ( fcr.
     relating_shape_aspect.name IN [ 'compound feature in solid'
     , 'compound feature in panel' ] ) ) ) =0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

compound_feature: the set of all instances of **compound_feature**.

shape_aspect_relationship: the set of all instances of **shape_aspect_relationship**.

Formal propositions:

WR1: For each instance of **shape_aspect_relationship** that has a **name** of 'compound feature ordering', the **relating_shape_aspect** and the **related_shape_aspect** shall be both **related_shape_aspect** in a **feature_component_relationship** that refer as **relating_shape_aspect** to a **composite_shape_aspect** that has a **name** of either 'compound feature in solid' or 'compound feature in panel'.

5.2.4.6 consistent_uncertainty

The **consistent_uncertainty** rule specifies that any instance of **global_uncertainty_assigned_context** or **uncertainty_assigned_representation** shall not contain two instances of **uncertainty_measure_with_unit** with the same **name** in their respective **uncertainty** set. It also specifies that any **qualified_representation_item** shall not have any two instances of **uncertainty_qualifier** with the same **measure_name** in its set of **qualifiers**.

EXPRESS specification:

```
*)
RULE consistent_uncertainty FOR
    (global_uncertainty_assigned_context,
     qualified_representation_item,
     uncertainty_assigned_representation);
WHERE
 WR1: ( SIZEOF ( QUERY ( guac <*
     global_uncertainty_assigned_context | SIZEOF ( QUERY ( u1
     <* guac.uncertainty | SIZEOF ( QUERY ( u2 <*
     guac.uncertainty | u2.name =u1.name ) ) >0 ) ) >0 ) ) =0 )
     OR ( SIZEOF ( global_uncertainty_assigned_context ) =1 ) ;
 WR2: SIZEOF ( QUERY ( uar <*
     uncertainty_assigned_representation | SIZEOF ( QUERY ( u1
     <* uar. uncertainty | SIZEOF ( QUERY ( u2 <* uar.
     uncertainty | u2. name =u1. name ) ) >0 ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( qri <* qualified_representation_item |
     SIZEOF ( QUERY ( u1 <* qri. qualifiers | (
     'AUTOMOTIVE_DESIGN.'+ 'UNCERTAINTY_QUALIFIER' IN TYPEOF (
     u1 ) ) AND ( SIZEOF ( QUERY ( u2 <* qri. qualifiers | (
     'AUTOMOTIVE_DESIGN.'+ 'UNCERTAINTY_QUALIFIER' IN TYPEOF (
     u2 ) ) AND ( u2\ uncertainty_qualifier.measure_name =u1\
     uncertainty_qualifier.measure_name ) ) ) >0 ) ) ) >0 ) )
     =0;
END_RULE;
```

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```
(*
```

Argument definitions:

global_uncertainty_assigned_context: the set of all instances of **global_uncertainty_assigned_context**.

qualified_representation_item: the set of all instances of **qualified_representation_item**.

uncertainty_assigned_representation: the set of all instances of **uncertainty_assigned_representation**.

Formal propositions:

WR1: Each instance of **global_uncertainty_assigned_context** shall not contain two instances of **uncertainty_measure_with_unit** with the same **name** in its **uncertainty** set.

WR2: Each instance of **uncertainty_assigned_representation** shall not contain two instances of **uncertainty_measure_with_unit** with the same **name** in its **uncertainty** set.

WR3: Each instance of **qualified_representation_item** shall not have any two instances of **uncertainty_qualifier** with the same **measure_name** in its set of **qualifiers**.

5.2.4.7 coordinated_assembly_and_shape

The **coordinated_assembly_and_shape** rule specifies that the relationship between two **product_definition** entities which are an assembly and a component in a **next_assembly_usage_occurrence** and the relationship between two **shape_representation** entities which contain the representation of the shapes of the assembly and the component in a **shape_representation_relationship** must be explicitly related through the **context_dependent_shape_representation**. This rule calls the function **assembly_shape_is_defined** which returns true if the assembly relationship and shape relationship are explicitly related.

EXPRESS specification:

```
*)
RULE coordinated_assembly_and_shape FOR
   (next_assembly_usage_occurrence);
WHERE
 WR1: SIZEOF ( QUERY ( nauo <* next_assembly_usage_occurrence |
     NOT ( assembly_shape_is_defined ( nauo ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

next_assembly_usage_occurrence: the set of all instances of **next_assembly_usage_occurrence**.

Formal propositions:

WR1: For each instance of **next_assembly_usage_occurrence**, the **assembly_shape_is_defined** function shall be true.

5.2.4.8 curve_font_usage

The **curve_font_usage** rule ensures that each **curve_style_font**, **pre_defined_curve_font**, and **externally_defined_curve_font** shall define the curve font of at least one **curve_style**.

EXPRESS specification:

```
*)
RULE curve_font_usage FOR
    (curve_style_font,
     externally_defined_curve_font,
     pre_defined_curve_font);
WHERE
 WR1: SIZEOF ( QUERY ( csf <* curve_style_font | ( SIZEOF (
     USEDIN ( csf , 'AUTOMOTIVE_DESIGN.CURVE_STYLE.CURVE_FONT' )
     ) =0 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdcf <* pre_defined_curve_font | ( SIZEOF
     ( USEDIN ( pdcf ,
     'AUTOMOTIVE_DESIGN.CURVE_STYLE.CURVE_FONT' ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( edcf <* externally_defined_curve_font |
     NOT ( SIZEOF ( USEDIN ( edcf ,
     'AUTOMOTIVE_DESIGN.'+'CURVE_STYLE.'+ 'CURVE_FONT' ) ) >=1 )
     ) ) =0;
END_RULE;
(*
```

Argument definitions:

curve_style_font: the set of all instances of **curve_style_font**.

externally_defined_curve_font: the set of all instances of **externally_defined_curve_font**.

pre_defined_curve_font: the set of all instances of **pre_defined_curve_font**.

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Formal propositions:

WR1: Each **curve_style_font** shall participate in the definition of at least one **curve_style**.

WR2: Each **pre_defined_curve_font** shall participate in the definition of at least one **curve_style**.

WR3: Each **externally_defined_curve_font** shall participate in the definition of at least one **curve_style**.

5.2.4.9 dependent_instantiable_action_directive

The **dependent_instantiable_action_directive** rule specifies that each instance of **action_directive** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_action_directive FOR
    (action_directive);
WHERE
 WR1: SIZEOF ( QUERY ( a <* action_directive | NOT ( SIZEOF (
     USEDIN ( a , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_directive: identifies the set of all instances of **action_directive**.

Formal propositions:

WR1: For each instance of **action_directive**, there shall be a reference to the **action_directive** instance from an attribute of another entity.

5.2.4.10 dependent_instantiable_action_resource_type

The **dependent_instantiable_action_resource_type** rule specifies that each instance of **action_resource_type** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_action_resource_type FOR
```

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```
    (action_resource_type);
WHERE
 WR1: SIZEOF ( QUERY ( a <* action_resource_type | NOT ( SIZEOF
     ( USEDIN ( a , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_resource_type: identifies the set of all instances of **action_resource_type**.

Formal propositions:

WR1: For each instance of **action_resource_type**, there shall be a reference to the **action_resource_type** instance from an attribute of another entity.

5.2.4.11 dependent_instantiable_approval_role

The **dependent_instantiable_approval_role** rule specifies that each instance of **approval_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_approval_role FOR
    (approval_role);
WHERE
 WR1: SIZEOF ( QUERY ( a <* approval_role | NOT ( SIZEOF (
     USEDIN ( a , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

approval_role: identifies the set of all instances of **approval_role**.

Formal propositions:

WR1: For each instance of **approval_role**, there shall be a reference to the **approval_role** instance from an attribute of another entity.

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5.2.4.12 dependent_instantiable_attribute_value_role

The **dependent_instantiable_attribute_value_role** rule specifies that each instance of **attribute_value_-role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_attribute_value_role FOR
    (attribute_value_role);
WHERE
 WR1: SIZEOF ( QUERY ( a <* attribute_value_role | NOT ( SIZEOF
     ( USEDIN ( a , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

attribute_value_role: identifies the set of all instances of **attribute_value_role**.

Formal propositions:

WR1: For each instance of **attribute_value_role**, there shall be a reference to the **attribute_value_role** instance from an attribute of another entity.

5.2.4.13 dependent_instantiable_classification_role

The **dependent_instantiable_classification_role** rule specifies that each instance of **classification_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_classification_role FOR
    (classification_role);
WHERE
 WR1: SIZEOF ( QUERY ( c <* classification_role | NOT ( SIZEOF (
     USEDIN ( c , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

classification_role: identifies the set of all instances of **classification_role**.

Formal propositions:

WR1: For each instance of **classification_role**, there shall be a reference to the **classification_role** instance from an attribute of another entity.

5.2.4.14 dependent_instantiable_colour_rgb

The **dependent_instantiable_colour_rgb** rule specifies that each instance of **colour_rgb** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_colour_rgb FOR
    (colour_rgb);
WHERE
 WR1: SIZEOF ( QUERY ( c <* colour_rgb | NOT ( SIZEOF ( USEDIN (
     c , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

colour_rgb: identifies the set of all instances of **colour_rgb**.

Formal propositions:

WR1: For each instance of **colour_rgb**, there shall be a reference to the **colour_rgb** instance from an attribute of another entity.

5.2.4.15 dependent_instantiable_contract_type

The **dependent_instantiable_contract_type** rule specifies that each instance of **contract_type** is dependent on the usage to define another entity.

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EXPRESS specification:

```
*)
RULE dependent_instantiable_contract_type FOR
    (contract_type);
WHERE
 WR1: SIZEOF ( QUERY ( c <* contract_type | NOT ( SIZEOF (
     USEDIN ( c , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

contract_type: identifies the set of all instances of **contract_type**.

Formal propositions:

WR1: For each instance of **contract_type**, there shall be a reference to the **contract_type** instance from an attribute of another entity.

5.2.4.16 dependent_instantiable_curve_style

The **dependent_instantiable_curve_style** rule specifies that each instance of **curve_style** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_curve_style FOR
    (curve_style);
WHERE
 WR1: SIZEOF ( QUERY ( c <* curve_style | NOT ( SIZEOF ( USEDIN
     ( c , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

curve_style: identifies the set of all instances of **curve_style**.

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Formal propositions:

WR1: For each instance of **curve_style**, there shall be a reference to the **curve_style** instance from an attribute of another entity.

5.2.4.17 dependent_instantiable_date

The **dependent_instantiable_date** rule specifies that each instance of **date** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_date FOR
    (date);
WHERE
 WR1: SIZEOF ( QUERY ( d <* date | NOT ( SIZEOF ( USEDIN ( d ,
     '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

date: identifies the set of all instances of **date**.

Formal propositions:

WR1: For each instance of **date**, there shall be a reference to the **date** instance from an attribute of another entity.

5.2.4.18 dependent_instantiable_date_and_time

The **dependent_instantiable_date_and_time** rule specifies that each instance of **date_and_time** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_date_and_time FOR
    (date_and_time);
WHERE
 WR1: SIZEOF ( QUERY ( d <* date_and_time | NOT ( SIZEOF (
```

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```
     USEDIN ( d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

date_and_time: identifies the set of all instances of **date_and_time**.

Formal propositions:

WR1: For each instance of **date_and_time**, there shall be a reference to the **date_and_time** instance from an attribute of another entity.

5.2.4.19 dependent_instantiable_date_role

The **dependent_instantiable_date_role** rule specifies that each instance of **date_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_date_role FOR
    (date_role);
WHERE
 WR1: SIZEOF ( QUERY ( d <* date_role | NOT ( SIZEOF ( USEDIN (
     d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

date_role: identifies the set of all instances of **date_role**.

Formal propositions:

WR1: For each instance of **date_role**, there shall be a reference to the **date_role** instance from an attribute of another entity.

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5.2.4.20 dependent_instantiable_date_time_role

The **dependent_instantiable_date_time_role** rule specifies that each instance of **date_time_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_date_time_role FOR
    (date_time_role);
WHERE
 WR1: SIZEOF ( QUERY ( d <* date_time_role | NOT ( SIZEOF (
     USEDIN ( d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

date_time_role: identifies the set of all instances of **date_time_role**.

Formal propositions:

WR1: For each instance of **date_time_role**, there shall be a reference to the **date_time_role** instance from an attribute of another entity.

5.2.4.21 dependent_instantiable_derived_unit

The **dependent_instantiable_derived_unit** rule specifies that each instance of **derived_unit** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_derived_unit FOR
    (derived_unit);
WHERE
 WR1: SIZEOF ( QUERY ( d <* derived_unit | NOT ( SIZEOF ( USEDIN
     ( d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

derived_unit: identifies the set of all instances of **derived_unit**.

Formal propositions:

WR1: For each instance of **derived_unit**, there shall be a reference to the **derived_unit** instance from an attribute of another entity.

5.2.4.22 dependent_instantiable_dimensional_size

The **dependent_instantiable_dimensional_size** rule specifies that each instance of **dimensional_size** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_dimensional_size FOR
    (dimensional_size);
WHERE
 WR1: SIZEOF ( QUERY ( d <* dimensional_size | NOT ( SIZEOF (
     USEDIN ( d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

dimensional_size: identifies the set of all instances of **dimensional_size**.

Formal propositions:

WR1: For each instance of **dimensional_size**, there shall be a reference to the **dimensional_size** instance from an attribute of another entity.

5.2.4.23 dependent_instantiable_document_usage_role

The **dependent_instantiable_document_usage_role** rule specifies that each instance of **document_usage_role** is dependent on the usage to define another entity.

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EXPRESS specification:

```
*)
RULE dependent_instantiable_document_usage_role FOR
    (document_usage_role);
WHERE
 WR1: SIZEOF ( QUERY ( d <* document_usage_role | NOT ( SIZEOF (
     USEDIN ( d , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

document_usage_role: identifies the set of all instances of **document_usage_role**.

Formal propositions:

WR1: For each instance of **document_usage_role**, there shall be a reference to the **document_usage_role** instance from an attribute of another entity.

5.2.4.24 dependent_instantiable_effectivity_context_role

The **dependent_instantiable_effectivity_context_role** rule specifies that each instance of **effectivity_context_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_effectivity_context_role FOR
    (effectivity_context_role);
WHERE
 WR1: SIZEOF ( QUERY ( e <* effectivity_context_role | NOT (
     SIZEOF ( USEDIN ( e , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

effectivity_context_role: identifies the set of all instances of **effectivity_context_role**.

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Formal propositions:

WR1: For each instance of **effectivity_context_role**, there shall be a reference to the **effectivity_context_role** instance from an attribute of another entity.

5.2.4.25 dependent_instantiable_event_occurrence_role

The **dependent_instantiable_event_occurrence_role** rule specifies that each instance of **event_occurrence_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_event_occurrence_role FOR
    (event_occurrence_role);
WHERE
 WR1: SIZEOF ( QUERY ( e <* event_occurrence_role | NOT ( SIZEOF
     ( USEDIN ( e , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

event_occurrence_role: identifies the set of all instances of **event_occurrence_role**.

Formal propositions:

WR1: For each instance of **event_occurrence_role**, there shall be a reference to the **event_occurrence_role** instance from an attribute of another entity.

5.2.4.26 dependent_instantiable_externally_defined_symbol

The **dependent_instantiable_externally_defined_symbol** rule specifies that each instance of **externally_defined_symbol** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_externally_defined_symbol FOR
    (externally_defined_symbol);
WHERE
 WR1: SIZEOF ( QUERY ( e <* externally_defined_symbol | NOT (
```

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```
     SIZEOF ( USEDIN ( e , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_symbol: identifies the set of all instances of **externally_defined_symbol**.

Formal propositions:

WR1: For each instance of **externally_defined_symbol**, there shall be a reference to the **externally_-defined_symbol** instance from an attribute of another entity.

5.2.4.27 dependent_instantiable_fill_area_style

The **dependent_instantiable_fill_area_style** rule specifies that each instance of **fill_area_style** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_fill_area_style FOR
    (fill_area_style);
WHERE
 WR1: SIZEOF ( QUERY ( f <* fill_area_style | NOT ( SIZEOF (
     USEDIN ( f , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

fill_area_style: identifies the set of all instances of **fill_area_style**.

Formal propositions:

WR1: For each instance of **fill_area_style**, there shall be a reference to the **fill_area_style** instance from an attribute of another entity.

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5.2.4.28 dependent_instantiable_fill_area_style_colour

The **dependent_instantiable_fill_area_style_colour** rule specifies that each instance of **fill_area_style_colour** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_fill_area_style_colour FOR
    (fill_area_style_colour);
WHERE
 WR1: SIZEOF ( QUERY ( f <* fill_area_style_colour | NOT (
     SIZEOF ( USEDIN ( f , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

fill_area_style_colour: identifies the set of all instances of **fill_area_style_colour**.

Formal propositions:

WR1: For each instance of **fill_area_style_colour**, there shall be a reference to the **fill_area_style_colour** instance from an attribute of another entity.

5.2.4.29 dependent_instantiable_identification_role

The **dependent_instantiable_identification_role** rule specifies that each instance of **identification_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_identification_role FOR
    (identification_role);
WHERE
 WR1: SIZEOF ( QUERY ( i <* identification_role | NOT ( SIZEOF (
     USEDIN ( i , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

identification_role: identifies the set of all instances of **identification_role**.

Formal propositions:

WR1: For each instance of **identification_role**, there shall be a reference to the **identification_role** instance from an attribute of another entity.

5.2.4.30 dependent_instantiable_measure_with_unit

The **dependent_instantiable_measure_with_unit** rule specifies that each instance of **measure_with_unit** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_measure_with_unit FOR
    (measure_with_unit);
WHERE
 WR1: SIZEOF ( QUERY ( m <* measure_with_unit | NOT ( SIZEOF (
     USEDIN ( m , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

measure_with_unit: identifies the set of all instances of **measure_with_unit**.

Formal propositions:

WR1: For each instance of **measure_with_unit**, there shall be a reference to the **measure_with_unit** instance from an attribute of another entity.

5.2.4.31 dependent_instantiable_named_unit

The **dependent_instantiable_named_unit** rule specifies that each instance of **named_unit** is dependent on the usage to define another entity.

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EXPRESS specification:

```
*)
RULE dependent_instantiable_named_unit FOR
    (named_unit);
WHERE
 WR1: SIZEOF ( QUERY ( n <* named_unit | NOT ( SIZEOF ( USEDIN (
     n , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

named_unit: identifies the set of all instances of **named_unit**.

Formal propositions:

WR1: For each instance of **named_unit**, there shall be a reference to the **named_unit** instance from an attribute of another entity.

5.2.4.32 dependent_instantiable_object_role

The **dependent_instantiable_object_role** rule specifies that each instance of **object_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_object_role FOR
    (object_role);
WHERE
 WR1: SIZEOF ( QUERY ( o <* object_role | NOT ( SIZEOF ( USEDIN
     ( o, '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

object_role: identifies the set of all instances of **object_role**.

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Formal propositions:

WR1: For each instance of **object_role**, there shall be a reference to the **object_role** instance from an attribute of another entity.

5.2.4.33 dependent_instantiable_organization_role

The **dependent_instantiable_organization_role** rule specifies that each instance of **organization_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_organization_role FOR
    (organization_role);
WHERE
 WR1: SIZEOF ( QUERY ( o <* organization_role | NOT ( SIZEOF (
     USEDIN ( o , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

organization_role: identifies the set of all instances of **organization_role**.

Formal propositions:

WR1: For each instance of **organization_role**, there shall be a reference to the **organization_role** instance from an attribute of another entity.

5.2.4.34 dependent_instantiable_organizational_project_role

The **dependent_instantiable_organizational_project_role** rule specifies that each instance of **organizational_project_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_organizational_project_role FOR
    (organizational_project_role);
WHERE
 WR1: SIZEOF ( QUERY ( o <* organizational_project_role | NOT (
```

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```
     SIZEOF ( USEDIN ( o , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

organizational_project_role: identifies the set of all instances of **organizational_project_role**.

Formal propositions:

WR1: For each instance of **organizational_project_role**, there shall be a reference to the **organizational_project_role** instance from an attribute of another entity.

5.2.4.35 dependent_instantiable_person_and_organization_role

The **dependent_instantiable_person_and_organization_role** rule specifies that each instance of **person_and_organization_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_person_and_organization_role FOR
    (person_and_organization_role);
WHERE
 WR1: SIZEOF ( QUERY ( p <* person_and_organization_role | NOT (
     SIZEOF ( USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

person_and_organization_role: identifies the set of all instances of **person_and_organization_role**.

Formal propositions:

WR1: For each instance of **person_and_organization_role**, there shall be a reference to the **person_and_organization_role** instance from an attribute of another entity.

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5.2.4.36 dependent_instantiable_pre_defined_colour

The **dependent_instantiable_pre_defined_colour** rule specifies that each instance of **pre_defined_-colour** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_pre_defined_colour FOR
    (pre_defined_colour);
WHERE
 WR1: SIZEOF ( QUERY ( p <* pre_defined_colour | NOT ( SIZEOF (
     USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_colour: identifies the set of all instances of **pre_defined_colour**.

Formal propositions:

WR1: For each instance of **pre_defined_colour**, there shall be a reference to the **pre_defined_colour** instance from an attribute of another entity.

5.2.4.37 dependent_instantiable_pre_defined_symbol

The **dependent_instantiable_pre_defined_symbol** rule specifies that each instance of **pre_defined_-symbol** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_pre_defined_symbol FOR
    (pre_defined_symbol);
WHERE
 WR1: SIZEOF ( QUERY ( p <* pre_defined_symbol | NOT ( SIZEOF (
     USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

pre_defined_symbol: identifies the set of all instances of **pre_defined_symbol**.

Formal propositions:

WR1: For each instance of **pre_defined_symbol**, there shall be a reference to the **pre_defined_symbol** instance from an attribute of another entity.

5.2.4.38 dependent_instantiable_precision_qualifier

The **dependent_instantiable_precision_qualifier** rule specifies that each instance of **precision_qualifier** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_precision_qualifier FOR
    (precision_qualifier);
WHERE
 WR1: SIZEOF ( QUERY ( p <* precision_qualifier | NOT ( SIZEOF (
     USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

precision_qualifier: identifies the set of all instances of **precision_qualifier**.

Formal propositions:

WR1: For each instance of **precision_qualifier**, there shall be a reference to the **precision_qualifier** instance from an attribute of another entity.

5.2.4.39 dependent_instantiable_presentation_style_by_context

The **dependent_instantiable_presentation_style_by_context** rule specifies that each instance of **presentation_style_by_context** is dependent on the usage to define another entity.

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EXPRESS specification:

```
*)
RULE dependent_instantiable_presentation_style_by_context FOR
    (presentation_style_by_context);
WHERE
 WR1: SIZEOF ( QUERY ( p <* presentation_style_by_context | NOT
     ( SIZEOF ( USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

presentation_style_by_context: identifies the set of all instances of **presentation_style_by_context**.

Formal propositions:

WR1: For each instance of **presentation_style_by_context**, there shall be a reference to the **presentation_style_by_context** instance from an attribute of another entity.

5.2.4.40 dependent_instantiable_product_definition_context_role

The **dependent_instantiable_product_definition_context_role** rule specifies that each instance of **product_definition_context_role** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_product_definition_context_role FOR
    (product_definition_context_role);
WHERE
 WR1: SIZEOF ( QUERY ( p <* product_definition_context_role |
     NOT ( SIZEOF ( USEDIN ( p , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition_context_role: identifies the set of all instances of **product_definition_context_role**.

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Formal propositions:

WR1: For each instance of **product_definition_context_role**, there shall be a reference to the **product_definition_context_role** instance from an attribute of another entity.

5.2.4.41 dependent_instantiable_resource_requirement_type

The **dependent_instantiable_resource_requirement_type** rule specifies that each instance of **resource_requirement_type** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_resource_requirement_type FOR
    (resource_requirement_type);
WHERE
 WR1: SIZEOF ( QUERY ( r <* resource_requirement_type | NOT (
     SIZEOF ( USEDIN ( r , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

resource_requirement_type: identifies the set of all instances of **resource_requirement_type**.

Formal propositions:

WR1: For each instance of **resource_requirement_type**, there shall be a reference to the **resource_requirement_type** instance from an attribute of another entity.

5.2.4.42 dependent_instantiable_retention

The **dependent_instantiable_retention** rule specifies that each instance of **retention** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_retention FOR
    (retention);
WHERE
 WR1: SIZEOF ( QUERY ( r <* retention | NOT ( SIZEOF ( USEDIN (
```

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```
     r , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

retention: identifies the set of all instances of **retention**.

Formal propositions:

WR1: For each instance of **retention**, there shall be a reference to the **retention** instance from an attribute of another entity.

5.2.4.43 dependent_instantiable_standard_uncertainty

The **dependent_instantiable_standard_uncertainty** rule specifies that each instance of **standard_uncertainty** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_standard_uncertainty FOR
    (standard_uncertainty);
WHERE
 WR1: SIZEOF ( QUERY ( s <* standard_uncertainty | NOT ( SIZEOF
     ( USEDIN ( s , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

standard_uncertainty: identifies the set of all instances of **standard_uncertainty**.

Formal propositions:

WR1: For each instance of **standard_uncertainty**, there shall be a reference to the **standard_uncertainty** instance from an attribute of another entity.

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5.2.4.44 dependent_instantiable_symbol_colour

The **dependent_instantiable_symbol_colour** rule specifies that each instance of **symbol_colour** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_symbol_colour FOR
    (symbol_colour);
WHERE
 WR1: SIZEOF ( QUERY ( s <* symbol_colour | NOT ( SIZEOF (
     USEDIN ( s , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

symbol_colour: identifies the set of all instances of **symbol_colour**.

Formal propositions:

WR1: For each instance of **symbol_colour**, there shall be a reference to the **symbol_colour** instance from an attribute of another entity.

5.2.4.45 dependent_instantiable_text_style

The **dependent_instantiable_text_style** rule specifies that each instance of **text_style** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_text_style FOR
    (text_style);
WHERE
 WR1: SIZEOF ( QUERY ( t <* text_style | NOT ( SIZEOF ( USEDIN (
     t , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

text_style: identifies the set of all instances of **text_style**.

Formal propositions:

WR1: For each instance of **text_style**, there shall be a reference to the **text_style** instance from an attribute of another entity.

5.2.4.46 dependent_instantiable_text_style_for_defined_font

The **dependent_instantiable_text_style_for_defined_font** rule specifies that each instance of **text_style_for_defined_font** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_text_style_for_defined_font FOR
    (text_style_for_defined_font);
WHERE
 WR1: SIZEOF ( QUERY ( t <* text_style_for_defined_font | NOT (
     SIZEOF ( USEDIN ( t , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

text_style_for_defined_font: identifies the set of all instances of **text_style_for_defined_font**.

Formal propositions:

WR1: For each instance of **text_style_for_defined_font**, there shall be a reference to the **text_style_for_defined_font** instance from an attribute of another entity.

5.2.4.47 dependent_instantiable_time_interval_role

The **dependent_instantiable_time_interval_role** rule specifies that each instance of **time_interval_role** is dependent on the usage to define another entity.

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EXPRESS specification:

```
*)
RULE dependent_instantiable_time_interval_role FOR
    (time_interval_role);
WHERE
 WR1: SIZEOF ( QUERY ( t <* time_interval_role | NOT ( SIZEOF (
     USEDIN ( t , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

time_interval_role: identifies the set of all instances of **time_interval_role**.

Formal propositions:

WR1: For each instance of **time_interval_role**, there shall be a reference to the **time_interval_role** instance from an attribute of another entity.

5.2.4.48 dependent_instantiable_tolerance_value

The **dependent_instantiable_tolerance_value** rule specifies that each instance of **tolerance_value** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_tolerance_value FOR
    (tolerance_value);
WHERE
 WR1: SIZEOF ( QUERY ( t <* tolerance_value | NOT ( SIZEOF (
     USEDIN ( t , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

tolerance_value: identifies the set of all instances of **tolerance_value**.

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Formal propositions:

WR1: For each instance of **tolerance_value**, there shall be a reference to the **tolerance_value** instance from an attribute of another entity.

5.2.4.49 dependent_instantiable_type_qualifier

The **dependent_instantiable_type_qualifier** rule specifies that each instance of **type_qualifier** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_type_qualifier FOR
    (type_qualifier);
WHERE
 WR1: SIZEOF ( QUERY ( t <* type_qualifier | NOT ( SIZEOF (
     USEDIN ( t , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

type_qualifier: identifies the set of all instances of **type_qualifier**.

Formal propositions:

WR1: For each instance of **type_qualifier**, there shall be a reference to the **type_qualifier** instance from an attribute of another entity.

5.2.4.50 dependent_instantiable_uncertainty_qualifier

The **dependent_instantiable_uncertainty_qualifier** rule specifies that each instance of **uncertainty_qualifier** is dependent on the usage to define another entity.

EXPRESS specification:

```
*)
RULE dependent_instantiable_uncertainty_qualifier FOR
    (uncertainty_qualifier);
WHERE
 WR1: SIZEOF ( QUERY ( u <* uncertainty_qualifier | NOT ( SIZEOF
```

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```
     ( USEDIN ( u , '' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

uncertainty_qualifier: identifies the set of all instances of **uncertainty_qualifier**.

Formal propositions:

WR1: For each instance of **uncertainty_qualifier**, there shall be a reference to the **uncertainty_qualifier** instance from an attribute of another entity.

5.2.4.51 design_constraint_requires_product_definition

The **design_constraint_requires_product_definition** rule ensures that each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'requirement', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'design constraint definition'.

EXPRESS specification:

```
*)
RULE design_constraint_requires_product_definition FOR
    (product_definition,
     product_definition_formation,
     product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( pdf <* product_definition_formation | (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pdf. of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name ='requirement' ) ) >0 ) AND (
     SIZEOF ( QUERY ( pd <* USEDIN ( pdf ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION.'+ 'FORMATION' ) |
     pd. frame_of_reference.name =
     'design constraint definition' ) ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

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product_definition_formation: the set of all instances of **product_definition_formation**.

product_related_product_category: the set of all instances of **product_related_product_category**.

Formal propositions:

WR1: Each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'requirement', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'design constraint definition'.

5.2.4.52 dimensionality_is_two_or_three

The **dimensionality_is_two_or_three** rule ensures that all **representations** with a **geometric_representation_context** are defined in a two-dimensional or three-dimensional coordinate system.

EXPRESS specification:

```
*)
RULE dimensionality_is_two_or_three FOR
    (geometric_representation_context);
WHERE
 WR1: SIZEOF ( QUERY ( g <* geometric_representation_context |
     NOT ( ( g.coordinate_space_dimension =2 ) OR (
     g.coordinate_space_dimension =3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

geometric_representation_context: the set of all instances of **geometric_representation_context**.

Formal propositions:

WR1: Each **geometric_representation_context** shall have a **coordinate_space_dimension** equal to two or three.

5.2.4.53 draughting_subfigure_representation_layers

The **draughting_subfigure_representation_layers** rule ensures that every **annotation_occurrence** that is an item in a **draughting_subfigure_representation** is assigned to at least one layer.

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EXPRESS specification:

```
*)
RULE draughting_subfigure_representation_layers FOR
    (draughting_subfigure_representation);
WHERE
 WR1: SIZEOF ( QUERY ( dsr <*
     draughting_subfigure_representation | NOT ( SIZEOF ( QUERY
     ( item <* dsr\ representation.items | (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_OCCURRENCE' IN TYPEOF (
     item ) ) AND ( SIZEOF ( USEDIN ( item ,
     'AUTOMOTIVE_DESIGN.'+'PRESENTATION_LAYER_ASSIGNMENT.'+'ASSIGNED_ITEMS'
     ) ) =0 ) ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

draughting_subfigure_representation: the set of all instances of **draughting_subfigure_representation**.

Formal propositions:

WR1: Every item of each **draughting_subfigure_representation** that is an **annotation_occurrence** shall be one of the **assigned_items** of at least one **presentation_layer_assignment**.

5.2.4.54 drawing_sheet_annotation_layers

The **drawing_sheet_annotation_layers** rule ensures that every **annotation_occurrence** that is an item in a **drawing_sheet_revision** is assigned to at least one layer.

EXPRESS specification:

```
*)
RULE drawing_sheet_annotation_layers FOR
    (drawing_sheet_revision);
WHERE
 WR1: SIZEOF ( QUERY ( dsr <* drawing_sheet_revision | NOT (
     SIZEOF ( QUERY ( ao <* QUERY ( it <* dsr\
     representation.items | ( 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_OCCURRENCE' IN TYPEOF ( it ) ) ) | NOT ( SIZEOF
     ( USEDIN ( ao ,
     'AUTOMOTIVE_DESIGN.'+'PRESENTATION_LAYER_ASSIGNMENT.'+'ASSIGNED_ITEMS'
     ) ) >=1 ) ) ) =0 ) ) ) =0;
END_RULE;
```

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```
(*
```

Argument definitions:

drawing_sheet_revision: the set of all instances of **drawing_sheet_revision**.

Formal propositions:

WR1: Every item of each **drawing_sheet_revision** that is an **annotation_occurrence** shall be one of the **assigned_items** of at least one **presentation_layer_assignment**.

5.2.4.55 drawing_sheet_layout_usage

The **drawing_sheet_layout_usage** rule ensures that a **drawing_sheet_layout** is mapped as one of the **items** of a **drawing_sheet_revision**.

EXPRESS specification:

```
*)
RULE drawing_sheet_layout_usage FOR
    (mapped_item);
WHERE
 WR1: SIZEOF ( QUERY ( dsl <* QUERY ( mi <* mapped_item | (
     'AUTOMOTIVE_DESIGN.'+ 'DRAWING_SHEET_LAYOUT' IN TYPEOF (
     mi. mapping_source.mapped_representation ) ) ) | NOT (
     SIZEOF ( USEDIN ( dsl, '' ) ) = SIZEOF ( QUERY ( dsr <*
     USEDIN ( dsl , 'AUTOMOTIVE_DESIGN.'+'REPRESENTATION.'+
     'ITEMS' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'DRAWING_SHEET_REVISION' IN TYPEOF ( dsr ) ) ) ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

mapped_item: the set of all instances of **mapped_item**.

Formal propositions:

WR1: Each **mapped_item** that is the mapping of a **drawing_sheet_layout** shall be one of the items in a **drawing_sheet_revision**.

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5.2.4.56 drawing_view_annotation_layers

The **drawing_view_annotation_layers** rule ensures that every **annotation_occurrence** that is an item in a **presentation_view** is assigned to at least one layer.

EXPRESS specification:

```
*)
RULE drawing_view_annotation_layers FOR
    (presentation_view);
WHERE
 WR1: SIZEOF ( QUERY ( pv <* presentation_view | NOT ( SIZEOF (
     QUERY ( ao <* QUERY ( it <* pv\ representation.items |(
     'AUTOMOTIVE_DESIGN.'+'ANNOTATION_OCCURRENCE' IN TYPEOF ( it
     ) ) ) | NOT ( SIZEOF ( USEDIN ( ao ,
     'AUTOMOTIVE_DESIGN.'+'PRESENTATION_LAYER_ASSIGNMENT.'+'ASSIGNED_ITEMS'
     ) ) >=1 ) ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

presentation_view: the set of all instances of **presentation_view**.

Formal propositions:

WR1: Every item of each **presentation_view** that is an **annotation_occurrence** shall be one of the **assigned_items** of at least one **presentation_layer_assignment**.

5.2.4.57 event_occurrence_requires_event_occurrence_assignment

The **event_occurrence_requires_event_occurrence_assignment** rule ensures that each instance of **event_occurrence** that serves not as a base for another instance of **event_occurrence** is referenced by at least one instance of **event_occurrence_assignment** as the **assigned_event_occurrence**. This rule enforces the requirement for every **event_reference** to be assigned to product data at least once.

EXPRESS specification:

```
*)
RULE event_occurrence_requires_event_occurrence_assignment FOR
    (event_occurrence,
     event_occurrence_assignment,
     relative_event_occurrence);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( eo <* event_occurrence | ( SIZEOF (
     USEDIN ( eo ,
     'AUTOMOTIVE_DESIGN.'+'RELATIVE_EVENT_OCCURRENCE.'+
     'BASE_EVENT' ) ) =0 ) AND ( SIZEOF ( USEDIN ( eo ,
     'AUTOMOTIVE_DESIGN.'+'EVENT_OCCURRENCE_ASSIGNMENT.'+
     'ASSIGNED_EVENT_OCCURRENCE' ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

event_occurrence: the set of all instances of **event_occurrence**.

event_occurrence_assignment: the set of all instances of **event_occurrence_assignment**.

relative_event_occurrence: the set of all instances of **relative_event_occurrence**.

Formal propositions:

WR1: Each **event_occurrence** that is not used as a **base_event** by an instance of **relative_event_-occurrence** shall be used at least once as the **assigned_event_occurrence** of an instance of **event_-occurrence_assignment**.

5.2.4.58 executed_action_requires_action_status

The **executed_action_requires_action_status** rule specifies that each instance of **executed_action** shall be referenced by exactly one instance of **action_status** as **assigned_action**.

EXPRESS specification:

```
*)
RULE executed_action_requires_action_status FOR
    (executed_action);
WHERE
 WR1: SIZEOF ( QUERY ( ea <* executed_action | SIZEOF ( USEDIN (
     ea , 'AUTOMOTIVE_DESIGN.'+'ACTION_STATUS.'+
     'ASSIGNED_ACTION' ) ) <>1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

executed_action: the set of all instances of **executed_action**.

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Formal propositions:

WR1: Each instance of **executed_action** shall be referenced by exactly one instance of **action_status** as **assigned_action**.

5.2.4.59 externally_defined_class_with_known_source_requirement

The **externally_defined_class_with_known_source_requirement** rule specifies that each instance of **externally_defined_class** which references as the **source** a **known_source** is contained in the set of **items** of exactly one **applied_organization_assignment** which references as its **role** an **organization_role** with a **name** of 'class supplier'. This rule enforces the requirement for every Plib_class_reference to have a **supplier_bsu**.

EXPRESS specification:

```
*)
RULE externally_defined_class_with_known_source_requirement FOR
    (externally_defined_class);
WHERE
 WR1: SIZEOF ( QUERY ( edc <* externally_defined_class | (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edc.
     source ) ) AND ( SIZEOF ( QUERY ( aoa <* USEDIN ( edc ,
     'AUTOMOTIVE_DESIGN.APPLIED_ORGANIZATION_ASSIGNMENT.ITEMS' )
     | aoa. role.name = 'class supplier' ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_class: the set of all instances of **externally_defined_class**.

Formal propositions:

WR1: Each instance of **externally_defined_class** which references as the **source** a **known_source** shall be member in the set of **items** of an **applied_organization_assignment**. This **organization_assignment** shall reference as its **role** an **organization_role** with a **name** of 'class supplier'.

5.2.4.60 fill_area_style_tile_symbol_constraint

The **fill_area_style_tile_symbol_constraint** rule ensures that a **pre_defined_symbol** does not participate in the definition of a **fill_area_style_tile_symbol_with_style**.

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EXPRESS specification:

```
*)
RULE fill_area_style_tile_symbol_constraint FOR
    (fill_area_style_tile_symbol_with_style);
WHERE
 WR1: SIZEOF ( QUERY ( fast <*
     fill_area_style_tile_symbol_with_style | ( (
     'AUTOMOTIVE_DESIGN.'+ 'DEFINED_SYMBOL' IN TYPEOF ( fast.
     symbol\styled_item. item ) ) AND NOT (
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_SYMBOL' IN TYPEOF
     ( fast. symbol\styled_item.item\ defined_symbol.definition
     ) ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

fill_area_style_tile_symbol_with_style: the set of all instances of **fill_area_style_tile_symbol_with_-style**.

Formal propositions:

WR1: Each **fill_area_style_tile_symbol_with_style** that has an implicit definition shall be defined by an **externally_defined_symbol**.

5.2.4.61 full_model_change_completeness_for_action_property

The **full_model_change_completeness_for_action_property** rule specifies that each instance of **action_property** with a **name** of 'full model change' shall be referenced as the **property** by two **action_-property_representation**s specifying as **representation**s the original **representation** and the replacement **representation**. The one specifying the original **representation** shall have the **name** 'original representation', the other the **name** 'replacement representation'. If an additional instance of **action_-property_representation** with **name** 'added elements' references this instance of **action_property** as **property**, the **representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the replacement representation. If an additional instance of **action_property_representation** with **name** 'deleted elements' references this instance of **action_property** as **property**, the **representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the original representation.

EXPRESS specification:

```
*)
RULE full_model_change_completeness_for_action_property FOR
```

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```
    (action_property);
WHERE
 WR1: SIZEOF ( QUERY ( ap <* action_property | ( ap. name =
      'full model change' ) AND ( SIZEOF ( QUERY ( apr <* USEDIN
      ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | apr. name = 'original representation' ) ) =0
      ) ) ) =0;
 WR2: SIZEOF ( QUERY ( ap <* action_property | ( ap. name =
      'full model change' ) AND ( SIZEOF ( QUERY ( apr <* USEDIN
      ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | apr. name = 'replacement representation' ) )
      =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( ap <* action_property | SIZEOF ( QUERY (
      apr1 <* USEDIN ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | ( apr1. name = 'added elements' ) AND (
      SIZEOF ( QUERY ( apr2 <* USEDIN ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | ( apr2. name = 'replacement representation'
      ) AND ( SIZEOF ( QUERY ( i1 <* apr1. representation.items |
      SIZEOF ( QUERY ( i2 <* apr2. representation.items | i1:=:i2
      ) ) >0 ) ) <> SIZEOF ( apr1. representation.items ) ) ) )
      >0 ) ) ) >0 ) ) =0;
 WR4: SIZEOF ( QUERY ( ap <* action_property | SIZEOF ( QUERY (
      apr1 <* USEDIN ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | ( apr1. name = 'deleted elements' ) AND (
      SIZEOF ( QUERY ( apr2 <* USEDIN ( ap ,
      'AUTOMOTIVE_DESIGN.'+'ACTION_PROPERTY_REPRESENTATION.'+
      'PROPERTY' ) | ( apr2. name = 'original representation' )
      AND ( SIZEOF ( QUERY ( i1 <* apr1. representation.items |
      SIZEOF ( QUERY ( i2 <* apr2. representation.items | i1:=:i2
      ) ) >0 ) ) <> SIZEOF ( apr1. representation.items ) ) ) )
      >0 ) ) ) >0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_property: the set of all instances of **action_property**.

Formal propositions:

WR1: Each instance of **action_property** with a **name** of 'full model change' shall be referenced as **property** by a **action_property_representation** with a **name** of 'original representation'.

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WR2: Each instance of **action_property** with a **name** of 'full model change' shall be referenced as **property** by a **action_property_representation** with a **name** of 'replacement representation'.

WR3: For an instance of **action_property_representation** with **name** 'added elements' referencing this instance of **action_property** as **property**, the **representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the **representation** that is refered by a **action_property_representation** that has a **name** of 'replacement representation' and refers to this instance of **action_property**.

WR4: For an instance of **action_property_representation** with **name** 'deleted elements' referencing this instance of **action_property** as **property** the **representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the **representation** that is refered by a **action_property_representation** that has a **name** of 'original representation' and refers to this instance of **action_property**.

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5.2.4.62 full_model_change_completeness_for_property_definition

The **full_model_change_completeness_for_property_definition** rule specifies that each instance of **property_definition** with a **name** of 'full model change' shall be referenced as the **definition** by two **property_definition_representation**s specifying as **used_representation**s the original **representation** and the replacement **representation**. The one specifying the original **representation** shall have the **name** 'original representation', the other the **name** 'replacement representation'. If an additional instance of **property_definition_representation** with **name** 'added elements' references this instance of **property_definition** as **definition**, the **used_representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the replacement representation. If an additional instance of **property_definition_representation** with **name** 'deleted elements' references this instance of **property_definition** as **definition**, the **used_representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the original representation.

EXPRESS specification:

```
*)
RULE full_model_change_completeness_for_property_definition FOR
    (property_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* property_definition | ( pd. name =
     'full model change' ) AND ( SIZEOF ( QUERY ( pdr <* USEDIN
     ( pd ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.DEFINITION'
     ) | pdr. name = 'original representation' ) ) =0 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pd <* property_definition | ( pd. name =
     'full model change' ) AND ( SIZEOF ( QUERY ( pdr <* USEDIN
     ( pd ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.DEFINITION'
     ) | pdr. name = 'replacement representation' ) ) =0 ) ) )
     =0;
 WR3: SIZEOF ( QUERY ( pd <* property_definition | ( SIZEOF (
```

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```
     QUERY ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'DEFINITION' ) | ( pdr. name = 'added elements' ) AND (
     SIZEOF ( QUERY ( i <* pdr. used_representation.items |
     SIZEOF ( QUERY ( pdr1 <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'DEFINITION' ) | ( pdr1. name =
     'replacement representation' ) AND ( NOT ( i IN pdr1.
     used_representation.items ) ) ) ) >0 ) ) >0 ) ) ) >0 ) ) )
     =0;
 WR4: SIZEOF ( QUERY ( pd <* property_definition | ( SIZEOF (
     QUERY ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'DEFINITION' ) | ( pdr. name = 'deleted elements' ) AND (
     SIZEOF ( QUERY ( i <* pdr. used_representation.items |
     SIZEOF ( QUERY ( pdr1 <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'DEFINITION' ) | ( pdr1. name = 'original representation' )
     AND ( NOT ( i IN pdr1. used_representation.items ) ) ) ) >0
     ) ) >0 ) ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

property_definition: the set of all instances of **property_definition**.

Formal propositions:

WR1: Each instance of **property_definition** with a **name** of 'full model change' shall be referenced as **definition** by a **property_definition_representation** with a **name** of 'original representation'.

WR2: Each instance of **property_definition** with a **name** of 'full model change' shall be referenced as **definition** by a **property_definition_representation** with a **name** of 'replacement representation'.

WR3: For an instance of **property_definition_representation** with **name** 'added elements' referencing this instance of **property_definition** as **definition** the **used_representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the **representation** that is refered by a **property_definition_representation** that has a **name** of 'replacement representation' and refers to this instance of **property_definition**.

WR4: For an instance of **property_definition_representation** with **name** 'deleted elements' referencing this instance of **property_definition** as **definition** the **used_representation** shall contain in its set of **items** only **representation_item**s that are also in the set of **items** in the **representation** that is refered by a **property_definition_representation** that has a **name** of 'original representation' and refers to this instance of **property_definition**.

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5.2.4.63 global_length_and_angle_units_2d_or_3d

The **global_length_and_angle_units_2d_or_3d** rule ensures that units of length and plane angle are given for every **global_unit_assigned_context**.

EXPRESS specification:

```
*)
RULE global_length_and_angle_units_2d_or_3d FOR
    (global_unit_assigned_context);
WHERE
 WR1: SIZEOF ( QUERY ( guac <* global_unit_assigned_context |
     SIZEOF ( guac. units ) <2 ) ) =0;
 WR2: SIZEOF ( QUERY ( guac <* global_unit_assigned_context | (
     SIZEOF ( QUERY ( x <* guac. units | 'AUTOMOTIVE_DESIGN.'+
     'LENGTH_UNIT' IN TYPEOF ( x ) ) ) <>1 ) OR ( SIZEOF ( QUERY
     ( x <* guac. units | 'AUTOMOTIVE_DESIGN.'+
     'PLANE_ANGLE_UNIT' IN TYPEOF ( x ) ) ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

global_unit_assigned_context: the set of all instances of **global_unit_assigned_context**.

Formal propositions:

WR1: Each **global_unit_assigned_context** shall have at least two elements in its set of **unit**s.

WR2: Each **global_unit_assigned_context** shall have exactly one **length_unit** and exactly one **plane_angle_unit**.

5.2.4.64 person_requires_person_and_organization

The **person_requires_person_and_organization** rule ensures that each instance of **person** shall be referenced by at least one instance of **person_and_organization** as **the_person**. This rule enforces the requirement for each person to have at least one organization specified the person belongs to.

EXPRESS specification:

```
*)
RULE person_requires_person_and_organization FOR
    (person);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( p <* person |   SIZEOF ( USEDIN ( p ,
     'AUTOMOTIVE_DESIGN.PERSON_AND_ORGANIZATION.THE_PERSON' )
     ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

person: the set of all instances of **person**.

Formal propositions:

WR1: Each instance of **person** shall be referenced by at least one instance of **person_and_organization** as **the_person**.

5.2.4.65 physical_instance_requires_product_definition

The **physical_instance_requires_product_definition** rule ensures that each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'physically realized product', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence'.

EXPRESS specification:

```
*)
RULE physical_instance_requires_product_definition FOR
    (product_definition,
     product_definition_formation,
     product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( pdf <* product_definition_formation | (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pdf. of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name = 'physically realized product' )
     ) >0 ) AND ( SIZEOF ( QUERY ( pd <* USEDIN ( pdf ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION.'+ 'FORMATION' ) |
     pd. frame_of_reference.name = 'physical occurrence' ) ) <>1
     ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

product_definition: the set of all instances of **product_definition**.

product_definition_formation: the set of all instances of **product_definition_formation**.

product_related_product_category: the set of all instances of **product_related_product_category**.

Formal propositions:

WR1: Each instance of **product_definition_formation** which has an associated **of_product** that is referenced by a **product_related_product_category** with a **name** of 'physically realized product', is referenced as **formation** by exactly one instance of **product_definition** that references as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence'.

5.2.4.66 plib_class_reference_requires_version

The **plib_class_reference_requires_version** rule specifies that each instance of **externally_defined_class** that has as its source a **known_source** is contained in the set of **items** of exactly one **applied_external_identification_assignment** which references as its **role** an **identification_role** with a **name** of 'version'. This rule enforces the requirement for every Plib_class_reference to have exactly one version.

EXPRESS specification:

```
*)
RULE plib_class_reference_requires_version FOR
    (externally_defined_class);
WHERE
 WR1: SIZEOF ( QUERY ( edc <* externally_defined_class | (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edc.
     source ) ) AND ( SIZEOF ( QUERY ( aei <* USEDIN ( edc ,
     'AUTOMOTIVE_DESIGN.APPLIED_EXTERNAL_IDENTIFICATION_ASSIGNMENT.ITEMS'
     ) | aei. role.name ='version' ) ) <>1 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( edc <* externally_defined_class | (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edc.
     source ) ) AND ( SIZEOF ( QUERY ( aei <* USEDIN ( edc ,
     'AUTOMOTIVE_DESIGN.APPLIED_IDENTIFICATION_ASSIGNMENT.ITEMS'
     ) | aei. role.name ='version' ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_class: the set of all instances of **externally_defined_class**.

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Formal propositions:

WR1: Each instance of **externally_defined_class** that has as its source a **known_source** is contained in the set of **items** of exactly one **applied_external_identification_assignment** which references as its **role** an **identification_role** with a **name** of 'version'.

WR2: An instance of **externally_defined_class** that has as its source a **known_source** may not be contained in the set of **items** of an **applied_identification_assignment** which references as its **role** an **identification_role** with a **name** of 'version'.

5.2.4.67 plib_property_reference_requires_name_scope

The **plib_property_reference_requires_name_scope** rule specifies that each instance of **externally_-defined_general_property** that has as its source a **known_source** is referenced as the **relating_item** by exactly one instance of **externally_defined_item_relationship** which has a **name** of 'name scope' and which references as the **related_item** an **externally_defined_class** that has as its source a **known_-source**. This rule enforces the requirement for every Plib_property_reference to have a **name_scope**.

EXPRESS specification:

```
*)
RULE plib_property_reference_requires_name_scope FOR
    (externally_defined_general_property);
WHERE
 WR1: SIZEOF ( QUERY ( edgp <*
     externally_defined_general_property | (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edgp.
     source ) ) AND ( SIZEOF ( QUERY ( edir <* USEDIN ( edgp ,
     'AUTOMOTIVE_DESIGN.'+'EXTERNALLY_DEFINED_ITEM_RELATIONSHIP.'+
     'RELATING_ITEM' ) | ( edir. name = 'name scope' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CLASS' IN TYPEOF
     ( edir. related_item ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'KNOWN_SOURCE' IN TYPEOF ( edir. related_item.source ) ) )
     ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_general_property: the set of all instances of **externally_defined_general_prop-erty**.

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Formal propositions:

WR1: Each instance of **externally_defined_general_property** that has as its source a **known_source** is referenced as the **relating_item** by exactly one instance of **externally_defined_item_relationship** which has a **name** of 'name scope' and which references as the **related_item** an **externally_defined_class** that has as its source a **known_source**.

5.2.4.68 plib_property_reference_requires_version

The **plib_property_reference_requires_version** rule specifies that each instance of **externally_defined_general_property** that has as its **source** a **known_source** is contained in the set of **items** of exactly one **applied_external_identification_assignment** which references as its **role** an **identification_role** with a **name** of 'version'. This rule enforces the requirement for every Plib_property_reference to have a version.

EXPRESS specification:

```
*)
RULE plib_property_reference_requires_version FOR
    (externally_defined_general_property);
WHERE
 WR1: SIZEOF ( QUERY ( edgp <*
     externally_defined_general_property | (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edgp.
     source ) ) AND ( SIZEOF ( QUERY ( edir <* USEDIN ( edgp ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_EXTERNAL_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ( edir. role.name ='version' ) ) ) <>1 ) ) )
     =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_general_property: the set of all instances of **externally_defined_general_property**.

Formal propositions:

WR1: Each instance of **externally_defined_general_property** that has as its **source** a **known_source** is contained in the set of **items** of exactly one **applied_external_identification_assignment** which references as its **role** an **identification_role** with a **name** of 'version'.

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5.2.4.69 presentation_layer_assignment_constraint_2d_or_3d

The **presentation_layer_assignment_constraint_2d_or_3d** rule ensures that every element of a layer that is a **point**, **curve**, or **surface** is an element in a **shape_representation** and that every element of a layer that is an **annotation_occurrence** is one of the items in an **draughting_subfigure_representation**, **draughting_model**, **presentation_area**, or **presentation_view**.

EXPRESS specification:

```
*)
RULE presentation_layer_assignment_constraint_2d_or_3d FOR
    (presentation_layer_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( pla <* presentation_layer_assignment |
     NOT ( SIZEOF ( QUERY ( pnt <* QUERY ( item <* pla.
     assigned_items | ( 'AUTOMOTIVE_DESIGN.'+ 'POINT' IN TYPEOF
     ( item ) ) ) | NOT ( SIZEOF ( QUERY ( rep <* USEDIN ( pnt ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | (
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' IN TYPEOF (
     rep ) ) ) ) =0 ) ) ) =0 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pla <* presentation_layer_assignment |
     NOT ( SIZEOF ( QUERY ( crv <* QUERY ( item <* pla.
     assigned_items | ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF
     ( item ) ) ) | NOT ( SIZEOF ( QUERY ( rep <* USEDIN ( crv ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | (
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' IN TYPEOF (
     rep ) ) ) ) =0 ) ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pla <* presentation_layer_assignment |
     NOT ( SIZEOF ( QUERY ( srf <* QUERY ( item <* pla.
     assigned_items | ( 'AUTOMOTIVE_DESIGN.'+ 'SURFACE' IN
     TYPEOF ( item ) ) ) | NOT ( SIZEOF ( QUERY ( rep <* USEDIN
     ( srf , 'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | (
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' IN TYPEOF (
     rep ) ) ) ) =0 ) ) ) =0 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pla <* presentation_layer_assignment |
     NOT ( SIZEOF ( QUERY ( ao <* QUERY ( item <* pla.
     assigned_items | ( 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_OCCURRENCE' IN TYPEOF ( item ) ) ) | NOT (
     SIZEOF ( QUERY ( ur <* using_representations ( ao ) | NOT (
     SIZEOF ( TYPEOF ( ur )
     *['AUTOMOTIVE_DESIGN.'+'DRAUGHTING_SUBFIGURE_REPRESENTATION'
     , 'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_AREA' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW'] ) =1 ) ) ) =0 )
     ) ) =0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

presentation_layer_assignment: the set of all instances of **presentation_layer_assignment**.

Formal propositions:

WR1: Every **point** that is one of the **assigned_items** of a **presentation_layer_assignment** shall also be a member of the set of **items** of a **shape_representation**.

WR2: Every **curve** that is one of the **assigned_items** of a **presentation_layer_assignment** shall also be a member of the set of **items** of a **shape_representation**.

WR3: Every **surface** that is one of the **assigned_items** of a **presentation_layer_assignment** shall also be a member of the set of **items** of a **shape_representation**.

WR4: Every **annotation_occurrence** that is one of the **assigned_items** of a **presentation_layer_assignment** shall also be a member of the set of **items** of an **draughting_subfigure_representation**, **draughting_model**, **presentation_area**, or **presentation_view**.

5.2.4.70 presentation_view_presented_once

The **presentation_view_presented_once** rule ensures that each **presentation_view** is participating in exactly one **presentation_area**.

EXPRESS specification:

```
*)
RULE presentation_view_presented_once FOR
    (presentation_view);
WHERE
 WR1: SIZEOF ( QUERY ( pv <* presentation_view | ( SIZEOF (
     QUERY ( rm <* USEDIN ( pv ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION_MAP.'+'MAPPED_REPRESENTATION'
     ) | ( SIZEOF ( USEDIN ( rm ,
     'AUTOMOTIVE_DESIGN.MAPPED_ITEM.MAPPING_SOURCE' ) ) <>1 ) OR
     ( SIZEOF ( QUERY ( mi <* USEDIN ( rm ,
     'AUTOMOTIVE_DESIGN.MAPPED_ITEM.MAPPING_SOURCE' ) | ( SIZEOF
     ( USEDIN ( mi , 'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' )
     ) <>1 ) OR ( SIZEOF ( QUERY ( r <* USEDIN ( mi ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_AREA' IN TYPEOF ( r ) )
     ) ) <>0 ) ) ) <>0 ) ) ) <>0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

presentation_view: the set of all instances of **presentation_view**.

Formal propositions:

WR1: Each instance of **presentation_view** shall be the **mapped_representation** of exactly one **representation_map**. This **representation_map** shall be the **mapping_source** of exactly one **mapped_item** that is one of the **items** of a **presentation_area**.

5.2.4.71 product_concept_feature_requires_category

The **product_concept_feature_requires_category** rule specifies that each instance of **product_concept_feature** is contained in the set of **items** of exactly one **applied_group_assignment** which has as the **role** an **object_role** with a **name** of 'specification category member' and which references as the **assigned_group** a **product_concept_feature_category**. This rule enforces the requirement for every Specification to have one Specification_category.

EXPRESS specification:

```
*)
RULE product_concept_feature_requires_category FOR
    (product_concept_feature,
     product_concept_feature_category);
WHERE
 WR1: SIZEOF ( QUERY ( pcf <* product_concept_feature | SIZEOF (
     QUERY ( aga <* USEDIN ( pcf ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_GROUP_ASSIGNMENT.'+ 'ITEMS' )
     | ( aga. role.name = 'specification category member' ) AND
     ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY'
     IN TYPEOF ( aga. assigned_group ) ) ) ) <>1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_concept_feature: the set of all instances of **product_concept_feature**.

product_concept_feature_category: the set of all instances of **product_concept_feature_category**.

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Formal propositions:

WR1: Each instance of **product_concept_feature** is contained in the set of **items** of exactly one **applied_group_assignment** which has as the **role** an **object_role** with a **name** of 'specification category member' and which references as the **assigned_group** a **product_concept_feature_category**.

5.2.4.72 product_definition_replacement_requires_effectivity_-assignment

The **product_definition_replacement_requires_effectivity_assignment** rule specifies that each instance of **product_definition_relationship** with a **name** of 'definition replacement' shall be referenced by at least one instance of **applied_effectivity_assignment** specifying the start of the validity.

This rule enforces the requirement for every instance of Replaced_definition_relationship to have at least one Effectivity applied to it specifiying the start of the validity of the replacement.

EXPRESS specification:

```
*)
RULE product_definition_replacement_requires_effectivity_assignment FOR
    (applied_effectivity_assignment,
     product_definition_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( pdr. name = 'definition replacement' ) AND ( SIZEOF (
     USEDIN ( pdr ,
     'AUTOMOTIVE_DESIGN.APPLIED_EFFECTIVITY_ASSIGNMENT.ITEMS' )
     ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_effectivity_assignment: the set of all instances of **applied_effectivity_assignment**.

product_definition_relationship: the set of all instances of **product_definition_relationship**.

Formal propositions:

WR1: For each instance of **product_definition_relationship** with a **name** of 'definition replacement', there shall be at least one instance of **applied_effectivity_assignment** that contains the instance in its set of **items**.

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5.2.4.73 product_requires_category

The **product_requires_category** rule specifies that each instance of **product** shall be referenced by at least one **product_related_product_category**.

EXPRESS specification:

```
*)
RULE product_requires_category FOR
    (product,
     product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( p <* product | SIZEOF ( USEDIN ( p,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

product: the set of all instances of **product**.

product_related_product_category: the set of all instances of **product_related_product_category**.

Formal propositions:

WR1: Each instance of **product** shall be referenced by at least one **product_related_product_category**.

5.2.4.74 product_requires_person_organization

The **product_requires_person_organization** rule specifies that each instance of **product** that is referenced by an **product_related_product_category** with a **name** of 'part', 'tool', or 'raw material' shall be referenced by an instance of **applied_person_and_organization_assignment**. This rule enforces the requirement that for every Item an owner shall be specified for its id.

EXPRESS specification:

```
*)
RULE product_requires_person_organization FOR
    (product);
WHERE
 WR1: SIZEOF ( QUERY ( prod <* product | ( SIZEOF ( QUERY ( prpc
```

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```
     <* USEDIN ( prod ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name IN ['part' , 'tool' , 'raw material' ] ) )
     >0 ) AND ( SIZEOF ( QUERY ( apoa <* USEDIN ( prod ,
     'AUTOMOTIVE_DESIGN.APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.ITEMS'
     ) | apoa\ person_and_organization_assignment.role. name<>
     'id owner' ) ) =1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product: the set of all instances of **product**.

Formal propositions:

WR1: Each instance of **product** that is referenced by an **product_related_product_category** with a **name** of 'part', 'tool', or 'raw material' is contained in the set of **items** of exactly one **applied_person_-and_organization_assignment** which references as its role an **person_and_organization_role** with a **name** of 'id owner'.

5.2.4.75 product_requires_version

The **product_requires_version** rule ensures that each instance of **product** is referenced by at least one instance of **product_definition_formation**. This rule enforces the requirement for every Item to have at least one Item version associated to it.

EXPRESS specification:

```
*)
RULE product_requires_version FOR
    (product);
WHERE
 WR1: SIZEOF ( QUERY ( prod <* product | ( SIZEOF ( USEDIN (
    prod ,
    'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_FORMATION.'+
    'OF_PRODUCT' ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product: the set of all instances of **product**.

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Formal propositions:

WR1: For each instance of **product** there shall be one or more instances of **product_definition_formation** that refers as **of_product** attribute to this instance of **product**.

5.2.4.76 restrict_action_resource_requirement_for_process_operation

The **restrict_action_resource_requirement_for_process_operation** rule specifies that each instance of **action** with a **name** of 'process operation' shall only be referenced by at most one instance of **action_resource_requirement** with a **name** of 'reference tool'. Each instance of **action_resource_requirement** with a **name** of 'reference tool' shall be of type **requirement_for_action_resource** and shall have exactly one item in its set of **resources** that references an instance of **action_resource** which is a **product_definition_resource**. The only **name**s permitted for **action_resource_requirement** shall be 'reference tool' or 'non reference tool'. This rule enforces the requirement for every Process operation to have at most one resource as the reference tool associated to it where the reference tool has to be associated to an Item version.

EXPRESS specification:

```
*)
RULE restrict_action_resource_requirement_for_process_operation FOR
    (action,
     action_resource_requirement);
WHERE
 WR1: SIZEOF ( QUERY ( a <* action | ( a.name =
     'process operation' ) AND ( SIZEOF ( QUERY ( arr <* USEDIN
     ( a , 'AUTOMOTIVE_DESIGN.'+'ACTION_RESOURCE_REQUIREMENT.'+
     'OPERATIONS' ) | arr. name = 'reference tool' ) ) >1 ) ) )
     =0;
 WR2: SIZEOF ( QUERY ( arr <* action_resource_requirement | (
     arr. name = 'reference tool' ) AND ( NOT (
     'AUTOMOTIVE_DESIGN.'+ 'REQUIREMENT_FOR_ACTION_RESOURCE' IN
     TYPEOF ( arr ) ) ) AND ( SIZEOF ( QUERY ( ar <* arr\
     requirement_for_action_resource.resources |
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_RESOURCE' IN
     TYPEOF ( ar ) ) ) <>1 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( arr <* action_resource_requirement | (
     arr. name<> 'reference tool' ) AND ( arr. name<>
     'non reference tool' ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

action: the set of all instances of **action**.

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action_resource_requirement: the set of all instances of **action_resource_requirement**.

Formal propositions:

WR1: For each instance of **action** with a **name** of 'process operation' there shall be at most one instance of **action_resource_requirement** with a **name** of 'reference tool' that references the action in its set of operations.

WR2: Each instance of **action_resource_requirement** with a **name** of 'reference tool' shall be a **requirement_for_action_resource** and shall have exactly one item in its set of **resources** that references an instance of **action_resource** which is a **product_definition_resource**.

WR3: For each instance of **action_resource_requirement** the value of the **name** attribute shall be either 'reference tool' or 'non reference tool'.

5.2.4.77 restrict_alternative_definition

The **restrict_alternative_definition** rule specifies the restrictions that apply to **product_definition**s which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition'.

EXPRESS specification:

```
*)
RULE restrict_alternative_definition FOR
    (product_definition,
     product_definition_context);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'alternative definition' ) AND (
     SIZEOF ( QUERY ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
     'RELATED_PRODUCT_DEFINITION' ) | pdr. name =
     'solution alternative definition' ) ) <>1 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'alternative definition' ) AND
     NOT ( pd. name IN ['technical' , 'supplier' , 'final' ,
     'technical supplier' , 'technical final' , 'supplier final'
     , 'technical supplier final' , ''] ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'alternative definition' ) AND (
     pd. name IN ['supplier' , 'technical supplier' ,
     'supplier final' , 'technical supplier final' ] ) AND (
     SIZEOF ( QUERY ( aoa <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_ORGANIZATION_ASSIGNMENT.'+
     'ITEMS' ) | aoa. role.name ='supplier' ) ) <>1 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
```

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```
      frame_of_reference.name = 'alternative definition' ) AND (
      pd. name IN ['final' , 'technical final' , 'supplier final'
      , 'technical supplier final' ] ) AND ( SIZEOF ( QUERY ( pdr
      <* USEDIN ( pd ,
      'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
      'RELATING_PRODUCT_DEFINITION' ) | pdr. name =
      'final specification' ) ) =0 ) AND ( SIZEOF ( QUERY ( pd <*
      USEDIN ( pd , 'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION.'+
      'DEFINITION' ) | SIZEOF ( QUERY ( pdr <* USEDIN ( pd ,
      'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
      'DEFINITION' ) | ( pdr. used_representation.name =
      'final item characteristics' ) AND ( SIZEOF ( QUERY ( i <*
      pdr. used_representation.items | 'AUTOMOTIVE_DESIGN.'+
      'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) =
      SIZEOF ( pdr. used_representation.items ) ) AND ( SIZEOF (
      pdr. used_representation.items ) >=2 ) AND ( SIZEOF ( QUERY
      ( i <* pdr. used_representation.items | i.name =
      'final item status' ) ) =1 ) ) ) >0 ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

product_definition_context: the set of all instances of **product_definition_context**.

Formal propositions:

WR1: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition' shall participate as the **related_product_definition** in exactly one **product_definition_relationship** with a **name** of 'solution alternative definition'.

WR2: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition' shall have a **name** of 'technical', 'supplier', 'final', 'technical supplier', 'technical final', 'supplier final', 'technical supplier final', or ''.

WR3: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition' and which has a **name** of 'supplier', 'technical supplier', 'supplier final', or 'technical supplier final' shall be in the set of **items** of exactly one **applied_organization_assignment** which has as **role** an **organization_role** with a **name** of 'supplier'.

WR4: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition' and which has a **name** of 'final', 'technical final', 'supplier final', or 'technical supplier final' shall either participate as the **relating_product_definition** in at least one **product_definition_relationship** with a **name** of 'final specification', or shall be referenced by a **property_definition** which is referenced as **definition** by a **property_definition_representation** which has as **used_representation** a **representation** which has a **name** of 'final item

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characteristics'. This **representation** shall only contain **representation_item**s in its set of **items** which are of type **descriptive_representation_item**. This **representation** shall contain at least two **representation_items**s in its set of **items**. One **representation_item** shall have a **name** of 'final item status'.

5.2.4.78 restrict_applied_action_assignment

The **restrict_applied_action_assignment** rule enforces the correct correlation between the types of items in the set of **items** of an **applied_action_assignment** and the type of the **assigned_action**, and its associated **object_role** .

EXPRESS specification:

```
*)
RULE restrict_applied_action_assignment FOR
    (applied_action_assignment,
     object_role);
WHERE
 WR1: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.description = 'activity element' ) AND NOT (
     'AUTOMOTIVE_DESIGN.'+ 'EXECUTED_ACTION' IN TYPEOF ( aaa.
     assigned_action ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.description = 'activity element' ) AND NOT
     item_correlation ( aaa. items, ['ACTION' , 'ACTION_METHOD'
     , 'ACTION_PROPERTY' , 'ASSEMBLY_COMPONENT_USAGE_SUBSTITUTE'
     , 'CONFIGURATION_ITEM' , 'CONFIGURATION_EFFECTIVITY' ,
     'CONFIGURED_EFFECTIVITY_ASSIGNMENT' , 'DOCUMENT_FILE' ,
     'DRAUGHTING_MODEL' , 'DRAWING_REVISION' ,
     'GENERAL_PROPERTY' , 'MATERIAL_DESIGNATION' ,
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
     'PRESENTATION_AREA' , 'PRODUCT' , 'PRODUCT_CONCEPT' ,
     'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_ASSOCIATION' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' ,
     'PRODUCT_DEFINITION' , 'PRODUCT_DEFINITION_FORMATION' ,
     'PRODUCT_DEFINITION_RELATIONSHIP' ,
     'PRODUCT_DEFINITION_SUBSTITUTE' , 'PROPERTY_DEFINITION' ,
     'RESOURCE_PROPERTY' , 'SHAPE_ASPECT' ,
     'SHAPE_REPRESENTATION'] ) ) ) =0;
 WR3: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( NOT
     EXISTS ( aaa. role ) OR ( aaa. role.description =
     'activity element' ) ) AND ( SIZEOF ( QUERY ( i <* aaa.
     items | 'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ACTION_ASSIGNMENT'
     IN TYPEOF ( i ) ) ) >0 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.name = 'deliverable element' ) AND ( NOT (
     'AUTOMOTIVE_DESIGN.'+ 'ELEMENT_DELIVERY' IN TYPEOF ( aaa.
     assigned_action ) ) OR ( SIZEOF ( QUERY ( i <* aaa. items |
```

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```
     'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF
     ( i ) ) ) >1 ) OR ( SIZEOF ( QUERY ( i <* aaa. items | (
     'AUTOMOTIVE_DESIGN.'+ 'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF
     ( i ) ) AND ( i\action_assignment. role.description<>
     'activity element' ) ) ) >0 ) ) ) ) =0;
 WR5: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.name ='retention' ) AND NOT ( 'AUTOMOTIVE_DESIGN.'+
     'RETENTION' IN TYPEOF ( aaa. assigned_action ) ) ) ) =0;
 WR6: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.name ='retention' ) AND NOT item_correlation ( aaa.
     items , ['ACTION' , 'ACTION_DIRECTIVE' , 'ACTION_PROPERTY'
     , 'ACTION_RELATIONSHIP' , 'APPLIED_ACTION_ASSIGNMENT' ,
     'APPLIED_CLASSIFICATION_ASSIGNMENT' ,
     'ASSEMBLY_COMPONENT_USAGE_SUBSTITUTE' , 'CERTIFICATION' ,
     'CLASS_SYSTEM' , 'CONFIGURATION_EFFECTIVITY' ,
     'CONFIGURATION_ITEM' , 'CONFIGURED_EFFECTIVITY_ASSIGNMENT'
     , 'DOCUMENT_FILE' , 'DRAUGHTING_MODEL' , 'DRAWING_REVISION'
     , 'GENERAL_PROPERTY' , 'MATERIAL_DESIGNATION' ,
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
     'ORGANIZATIONAL_PROJECT' , 'PRESENTATION_AREA' , 'PRODUCT'
     , 'PRODUCT_CONCEPT' , 'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_ASSOCIATION' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' ,
     'PRODUCT_DEFINITION' , 'PRODUCT_DEFINITION_FORMATION' ,
     'PRODUCT_DEFINITION_RELATIONSHIP',
     'PRODUCT_DEFINITION_SUBSTITUTE', 'PROPERTY_DEFINITION' ,
     'RESOURCE_PROPERTY' , 'SHAPE_REPRESENTATION' ,
     'VERSIONED_ACTION_REQUEST'] ) ) ) =0;
 WR7: SIZEOF ( QUERY ( aaa <* applied_action_assignment | ( aaa.
     role.name = 'test activity' ) AND NOT item_correlation (
     aaa. items , ['PROPERTY_DEFINITION'] ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_action_assignment: the set of all instances of **applied_action_assignment**.

object_role: the set of all instances of **object_role**.

Formal propositions:

WR1: If the **applied_action_assignment** has an associated **object_role** with a **description** of 'activity element', the **assigned_action** shall be of type **executed_action**.

WR2: If the **role** has a **description** of 'activity element', only items of type **action**, **action_method**, **action_property**, **assembly_component_usage_substitute**, **configuration_item**, **configuration_effectivity**, **configured_effectivity_assignment**, **document_file**, **draughting_model**, **drawing_revision**, **gen-**

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eral_property, **material_designation**, **mechanical_design_geometric_presentation_representation**, **presentation_area**, **product**, **product_concept**, **product_concept_feature**, **product_concept_feature_association**, **product_concept_feature_category**, **product_concept_feature_category_usage**, **product_definition**, **product_definition_formation**, **product_definition_relationship**, **product_definition_substitute**, **property_definition**, **resource_property**, **shape_aspect**, or **shape_representation** shall be in the set of **items**.

WR3: If the **applied_action_assignment** has no associated **object_role** or has an associated **object_role** with a **description** of 'activity element', the set of **items** shall not contain items of type **applied_action_assignment**.

WR4: If the **applied_action_assignment** has an associated **object_role** with a **name** of 'deliverable element', the **assigned_action** shall be of type **element_delivery**, and only one item of type **applied_action_assignment** shall be in the set of **items**. This **applied_action_assignment** in the set of **items** shall have an associated **object_role** with a **description** of 'activity element'.

WR5: If the **applied_action_assignment** has an associated **object_role** with a **name** of 'retention', the **assigned_action** shall be of type **retention**.

WR6: If the **role** has a **name** of 'retention', only items of type **action**, **action_directive**, **action_property**, **action_relationship**, **applied_action_assignment**, **applied_classification_assignment**, **assembly_component_usage_substitute**, **certification**, **class_system**, **configuration_effectivity**, **configuration_item**, **configured_effectivity_assignment**, **document_file**, **draughting_model**, **drawing_revision**, **general_property**, **material_designation**, **mechanical_design_geometric_presentation_representation**, **organizational_project**, **presentation_area**, **product**, **product_concept**, **product_concept_feature**, **product_concept_feature_association**, **product_concept_feature_category**, **product_concept_feature_category_usage**, **product_definition**, **product_definition_formation**, **product_definition_relationship**, **product_definition_substitute**, **property_definition**, **resource_property**, **shape_representation**, or **versioned_action_request** shall be in the set of **items**.

WR7: If the **role** has a **name** of 'test activity', only items of type **property_definition** shall be in the set of **items**.

5.2.4.79 restrict_applied_action_request_assignment

The **restrict_applied_action_request_assignment** rule enforces the correct correlation between the types of items in the set of **items** of an **applied_action_request_assignment** and its associated **object_role** .

EXPRESS specification:

```
*)
RULE restrict_applied_action_request_assignment FOR
    (applied_action_request_assignment,
     object_role);
WHERE
 WR1: SIZEOF ( QUERY ( aara <* applied_action_request_assignment
     | aara. role.name<>'scope' ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

applied_action_request_assignment:

object_role:

Formal propositions:

WR1: The **applied_action_request_assignment** shall only be referenced by **object_role** instances that have a **name** of 'scope'.

5.2.4.80 restrict_applied_classification_assignment_role

The **restrict_applied_classification_assignment_role** rule ensures the correct correlation between the **assigned_class** of the **applied_classification_assignment** and the **name** of the **classification_role** referenced as the **role**.

EXPRESS specification:

```
*)
RULE restrict_applied_classification_assignment_role FOR
    (applied_classification_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( aca <* applied_classification_assignment
     | ( 'AUTOMOTIVE_DESIGN.'+ 'CLASS' IN TYPEOF ( aca.
     assigned_class ) ) AND NOT ( aca. role.name IN
     ['definitional' , 'non-definitional' , ''] ) ) ) =0;
 WR2: SIZEOF ( QUERY ( aca <* applied_classification_assignment
     | ( aca. role.name IN ['definitional' , 'non-definitional'
     , ''] ) AND NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CLASS' IN TYPEOF (
     aca. assigned_class ) ) ) ) =0;
 WR3: SIZEOF ( QUERY ( aca <* applied_classification_assignment
     | ( 'AUTOMOTIVE_DESIGN.'+ 'CLASS_SYSTEM' IN TYPEOF ( aca.
     assigned_class ) ) AND ( aca. role.name<>
     'class system membership' ) ) ) =0;
 WR4: SIZEOF ( QUERY ( aca <* applied_classification_assignment
     | ( aca. role.name = 'class system membership' ) AND NOT (
     'AUTOMOTIVE_DESIGN.'+ 'CLASS_SYSTEM' IN TYPEOF ( aca.
     assigned_class ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

Formal propositions:

WR1: If the **assigned_class** of an **applied_classification_assignment** is of type **class**, the **classification_role** referenced by the **role** attribute has a value of either 'definitional', 'non-definitional', or ''.

WR2: If an **applied_classification_assignment** references as its **role** a **classification_role** with a **name** of either 'definitional', 'non-definitional', or '', the **assigned_class** shall be of type **class**.

WR3: If the **assigned_class** of an **applied_classification_assignment** is of type **class_system**, the **classification_role** referenced by the **role** attribute has a value of 'class system membership'.

WR4: If an **applied_classification_assignment** references as its **role** a **classification_role** with a **name** of 'class system membership', the **assigned_class** shall be of type **class_system**.

5.2.4.81 restrict_applied_event_occurrence_assignment

The **restrict_applied_event_occurrence_assignment** rule ensures that each instance of **applied_event_occurrence_assignment** that provides the context for an **event_occurrence** contains exactly one element in its set of **items**.

EXPRESS specification:

```
*)
RULE restrict_applied_event_occurrence_assignment FOR
    (applied_event_occurrence_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( eo <* applied_event_occurrence_assignment
     | ( eo\ event_occurrence_assignment.role. name =
     'event context' ) AND ( SIZEOF ( eo. items ) >1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_event_occurrence_assignment: the set of all instances of **applied_event_occurrence_assignment**.

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Formal propositions:

WR1: Each **applied_event_occurrence_assignment** that has a **role** with a **name** of 'event context' shall contain exactly one element in its set of **items**.

5.2.4.82 restrict_applied_organizational_project_assignment

The **restrict_applied_organizational_project_assignment** rule enforces the correct correlation between the types of items in the set of **items** of an **applied_organizational_project_assignment** and its associated **object_role** .

EXPRESS specification:

```
*)
RULE restrict_applied_organizational_project_assignment FOR
    (applied_organizational_project_assignment,
     object_role);
WHERE
 WR1: SIZEOF ( QUERY ( aopa <*
     applied_organizational_project_assignment | ( aopa.
     role.name = 'affecting project' ) AND NOT item_correlation
     ( aopa. items , ['PRODUCT_CONCEPT'] ) ) ) =0;
 WR2: SIZEOF ( QUERY ( aopa <*
     applied_organizational_project_assignment | ( aopa.
     role.name = 'work program' ) AND NOT item_correlation (
     aopa. items , ['EXECUTED_ACTION'] ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_organizational_project_assignment:

object_role:

Formal propositions:

WR1: If the **role** has a **name** of 'affecting project', only items of type **product_concept** shall be in the set of **items**.

WR2: If the **role** has a **name** of 'work program', only items of type **executed_action** shall be in the set of **items**.

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5.2.4.83 restrict_approval

The **restrict_approval** rule specifies the constraints that apply to an **approval** and to an **approval_date_time** in the context of automotive design.

EXPRESS specification:

```
*)
RULE restrict_approval FOR
    (approval,
     approval_date_time);
WHERE
 WR1: SIZEOF ( QUERY ( a <* approval | SIZEOF ( USEDIN ( a ,
     'AUTOMOTIVE_DESIGN.APPROVAL_DATE_TIME.DATED_APPROVAL' ) )
     >2 ) ) =0;
 WR2: SIZEOF ( QUERY ( adt <* approval_date_time | ( NOT EXISTS
     ( adt. role ) ) OR ( NOT ( adt. role.name IN ['actual' ,
     'planned'] ) ) ) ) =0;
 WR3: SIZEOF ( QUERY ( a <* approval | SIZEOF ( QUERY ( adt <*
     USEDIN ( a , 'AUTOMOTIVE_DESIGN.'+'APPROVAL_DATE_TIME.'+
     'DATED_APPROVAL' ) | adt. role.name ='actual' ) ) >1 ) )
     =0;
 WR4: SIZEOF ( QUERY ( a <* approval | SIZEOF ( QUERY ( adt <*
     USEDIN ( a , 'AUTOMOTIVE_DESIGN.'+'APPROVAL_DATE_TIME.'+
     'DATED_APPROVAL' ) | adt. role.name ='planned' ) ) >1 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

approval: the set of all instances of **approval**.

approval_date_time: the set of all instances of **approval_date_time**.

Formal propositions:

WR1: Each **approval** shall be referenced by at most two **approval_date_time**.

WR2: Each **approval_date_time** shall have an **object_role**. This **object_role** shall have a **name** of either 'actual' or 'planned'.

WR3: Each **approval** shall be referenced by at most one **approval_date_time** that has a **name** of 'actual'.

WR4: Each **approval** shall be referenced by at most one **approval_date_time** that has a **name** of 'planned'.

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5.2.4.84 restrict_camera_image_in_view

The **restrict_camer_image_in_view** rule ensures that each **camera_image** is contained in exactly one **presentation_view** and that each **presentation_view** contains at most one **camera_image**. For more information see definition of Model_image in paragraph 4.2.316 and definition of View in paragraph 4.2.554.

EXPRESS specification:

```
*)
RULE restrict_camera_image_in_view FOR
    (camera_image,
     presentation_view);
WHERE
 WR1: SIZEOF ( QUERY ( ci <* camera_image | ( SIZEOF ( QUERY ( r
     <* USEDIN ( ci , 'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' )
     | ( 'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW' IN TYPEOF ( r
     ) ) ) ) ) <>1 ) ) =0;
 WR2: SIZEOF ( QUERY ( pv <* presentation_view | ( SIZEOF (
     QUERY ( ri <* pv\ representation.items |
     'AUTOMOTIVE_DESIGN.'+ 'CAMERA_IMAGE' IN TYPEOF ( ri ) ) ) )
     >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

camera_image: the set of all instances of **camera_image**.

presentation_view: the set of all instances of **presentation_view**.

Formal propositions:

WR1: Each **camera_image** shall be included in exactly one **presentation_view**.

WR2: Each **presentation_view** shall contain at most one **camera_image**.

5.2.4.85 restrict_centre_of_mass_representation

The **restrict_centre_of_mass_representation** rule specifies that each instance of **representation** with a **name** of 'centre of mass' shall contain exactly one item in its set of **items**. This **representation_item** shall be of type **point** and shall have a **name** of 'centre point'. This rule enforces the requirement for every Centre_of_mass to have exactly one Centre_point.

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EXPRESS specification:

```
*)
RULE restrict_centre_of_mass_representation FOR
    (representation);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'centre of mass' ) AND ( ( SIZEOF ( r.items ) <>1 ) OR (
     SIZEOF ( QUERY ( i <* r.items | ( 'AUTOMOTIVE_DESIGN.'+
     'POINT' IN TYPEOF ( i ) ) AND ( i.name = 'centre point' ) )
     ) <>1 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of **representation** with a **name** of 'centre of mass' shall contain exactly one item in its set of **items**. This **representation_item** shall be of type **point** and shall have a **name** of 'centre point'.

5.2.4.86 restrict_class_system_assignment_for_approval_status

The **restrict_class_system_assignment_for_approval_status** rule specifies that each instance of **approval_status** shall be referenced by at most one instance of **applied_classification_assignment** that specifies the classification system for the **approval_status**.

EXPRESS specification:

```
*)
RULE restrict_class_system_assignment_for_approval_status FOR
    (applied_classification_assignment,
     approval_status);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* approval_status | SIZEOF ( QUERY (
     ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_CLASSIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name = 'class system membership' ) )
     >1 ) ) =0;
END_RULE;
(*
```

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Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

approval_status: The set of all instances of **approval_status**.

Formal propositions:

WR1: For each instance of **approval_status** there shall be only at most one instance of **applied_classification_assignment** with a role name of 'class system membership'.

5.2.4.87 restrict_class_system_assignment_for_class

The **restrict_class_system_assignment_for_class** rule specifies that each instance of **class** shall be referenced by at most one instance of **applied_classification_assignment** that specifies the classification system for the **class**.

EXPRESS specification:

```
*)
RULE restrict_class_system_assignment_for_class FOR
    (applied_classification_assignment,
     class);
WHERE
 WR1: SIZEOF ( QUERY ( c <* class | SIZEOF ( QUERY ( aca <*
     USEDIN ( c ,
     'AUTOMOTIVE_DESIGN.'+'CLASSIFICATION_ASSIGNMENT.'+
     'ASSIGNED_CLASS' ) | ( ( aca. role.name =
     'class system membership' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'APPLIED_CLASSIFICATION_ASSIGNMENT' IN TYPEOF ( aca ) ) ) )
     ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

class: the set of all instances of **class**.

Formal propositions:

WR1: For each instance of **class** there shall be only at most one instance of **applied_classification_assignment** with a role name of 'class system membership' that references that instance of **class**.

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5.2.4.88 restrict_class_system_assignment_for_descriptive_-representation_item

The **restrict_class_system_assignment_for_descriptive_representation_item** rule specifies that each instance of **descriptive_representation_item** shall be referenced by at most one instance of **applied_-classification_assignment** that specifies the classification system for the **descriptive_representation_-item**.

EXPRESS specification:

```
*)
RULE restrict_class_system_assignment_for_descriptive_representation_item FOR
    (applied_classification_assignment,
     descriptive_representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* descriptive_representation_item |
     SIZEOF ( QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_CLASSIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name = 'class system membership' ) )
     >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

descriptive_representation_item: The set of all instances of **descriptive_representation_item**.

Formal propositions:

WR1: For each instance of **descriptive_representation_item** there shall be only at most one instance of **applied_classification_assignment** with a role name of 'class system membership'.

5.2.4.89 restrict_class_system_assignment_for_document_type

The **restrict_class_system_assignment_for_document_type** rule specifies that each instance of **document_type** shall be referenced by at most one instance of **applied_classification_assignment** that specifies the classification system for the **document_type**.

EXPRESS specification:

```
*)
```

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```
RULE restrict_class_system_assignment_for_document_type FOR
    (applied_classification_assignment,
     document_type);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* document_type | SIZEOF ( QUERY (
     ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_CLASSIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name = 'class system membership' ) )
     >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

document_type: The set of all instances of **document_type**.

Formal propositions:

WR1: For each instance of **document_type** there shall be only at most one instance of **applied_classification_assignment** with a role name of 'class system membership'.

5.2.4.90 restrict_class_system_assignment_for_planar_extent

The **restrict_class_system_assignment_for_planar_extent** rule specifies that each instance of **planar_extent** with a **name** of 'size format' shall be referenced by at most one instance of **applied_classification_assignment** that specifies the referenced standard for the Named_size, see 4.2.321.

EXPRESS specification:

```
*)
RULE restrict_class_system_assignment_for_planar_extent FOR
    (applied_classification_assignment,
     planar_extent);
WHERE
 WR1: SIZEOF ( QUERY ( pe <* planar_extent | ( pe\
     representation_item.name = 'size format' ) AND ( SIZEOF (
     QUERY ( aca <* USEDIN ( pe ,
     'AUTOMOTIVE_DESIGN.APPLIED_CLASSIFICATION_ASSIGNMENT.ITEMS'
     ) | aca\ classification_assignment.role. name =
     'class system membership' ) ) >1 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

planar_extent: the set of all instances of **planar_extent**.

Formal propositions:

WR1: For each instance of **planar_extent** with a **name** of 'size format' there shall be at most one instance of **applied_classification_assignment** with a role name of 'class system membership'.

5.2.4.91 restrict_class_system_assignment_for_security_classification_level

The **restrict_class_system_assignment_for_security_classification_level** rule specifies that each instance of **security_classification_level** shall be referenced by at most one instance of **applied_classification_assignment** that specifies the classification system for the **security_classification_level**.

EXPRESS specification:

```
*)
RULE restrict_class_system_assignment_for_security_classification_level FOR
    (applied_classification_assignment,
     security_classification_level);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* security_classification_level |
     SIZEOF ( QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_CLASSIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia.role.name = 'class system membership' ) )
     >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_classification_assignment: the set of all instances of **applied_classification_assignment**.

security_classification_level: The set of all instances of **security_classification_level**.

Formal propositions:

WR1: For each instance of **security_classification_level** there shall be only at most one instance of **applied_classification_assignment** with a role name of 'class system membership'.

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5.2.4.92 restrict_concept_feature_operator

The **restrict_concept_feature_operator** rule restricts the **name** and usage of a **concept_feature_operator**.

EXPRESS specification:

```
*)
RULE restrict_concept_feature_operator FOR
    (concept_feature_operator);
WHERE
 WR1: SIZEOF ( QUERY ( cfo <* concept_feature_operator | NOT (
     cfo. name IN ['and' , 'or' , 'oneof' , 'not' ,
     'implication'] ) ) ) =0;
 WR2: SIZEOF ( QUERY ( cfo <* concept_feature_operator | ( cfo.
     name ='implication' ) AND ( SIZEOF ( QUERY ( cfrwc <*
     USEDIN ( cfo ,
     'AUTOMOTIVE_DESIGN.'+'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION.'+
     'CONDITIONAL_OPERATOR' ) | SIZEOF ( QUERY ( ccf <* USEDIN (
     cfrwc ,
     'AUTOMOTIVE_DESIGN.'+'CONDITIONAL_CONCEPT_FEATURE.'+
     'CONDITION' ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'INCLUSION_PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( ccf ) ) ) )
     >0 ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

concept_feature_operator: the set of all instances of **concept_feature_operator**.

Formal propositions:

WR1: Each instance of **concept_feature_operator** shall have a **name** of 'and', 'or', 'oneof, 'not', or 'implication'.

WR2: If the **concept_feature_operator** has a **name** of 'implication', it shall only be referenced as **conditional_operator** by **concept_feature_relationship_with_condition** instances which are referenced as the **condition** by **conditional_concept_feature**s which are of type **inclusion_product_concept_feature**.

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5.2.4.93 restrict_configuration_design_for_product_class

The **restrict_configuration_design_for_product_class** rule enforces the restrictions that apply to the usage of a **configuration_design** when it relates to a **configuration_item** which references as its **item_concept** a **product_class**.

EXPRESS specification:

```
*)
RULE restrict_configuration_design_for_product_class FOR
    (configuration_design,
     product_class);
WHERE
 WR1: SIZEOF ( QUERY ( cd <* configuration_design | ( cd. name
     =’functionality’ ) AND ( NOT ( ’AUTOMOTIVE_DESIGN.’+
     ’PRODUCT_DEFINITION’ IN TYPEOF ( cd. design ) ) OR ( cd.
     design\product_definition. frame_of_reference.name<>
     ’functional definition’ ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( cd <* configuration_design | ( cd. name
     =’realization’ ) AND ( NOT ( ’AUTOMOTIVE_DESIGN.’+
     ’PRODUCT_DEFINITION’ IN TYPEOF ( cd. design ) ) OR ( cd.
     design\product_definition. frame_of_reference.name<>
     ’conceptual definition’ ) ) ) ) =0;
 WR3: SIZEOF ( QUERY ( cd <* configuration_design | ( cd. name
     IN [’functionality’ , ’realization’] ) AND ( NOT (
     ’AUTOMOTIVE_DESIGN.’+ ’PRODUCT_CLASS’ IN TYPEOF ( cd.
     configuration.item_concept ) ) ) ) ) =0;
 WR4: SIZEOF ( QUERY ( cd <* configuration_design | (
     ’AUTOMOTIVE_DESIGN.’+ ’PRODUCT_DEFINITION’ IN TYPEOF ( cd.
     design ) ) AND ( cd. design\product_definition.
     frame_of_reference.name<> ’design constraint definition’ )
     AND ( ( cd. configuration.name<> ’design constraint usage’
     ) OR NOT ( ’AUTOMOTIVE_DESIGN.’+ ’PRODUCT_CLASS’ IN TYPEOF
     ( cd. configuration.item_concept ) ) ) ) ) =0;
 WR5: SIZEOF ( QUERY ( cd <* configuration_design | ( cd. name =
     ’physical instance basis’ ) AND ( NOT (
     ’AUTOMOTIVE_DESIGN.’+ ’PRODUCT_DEFINITION’ IN TYPEOF ( cd.
     design ) ) OR ( cd. design\product_definition.
     frame_of_reference.name<> ’physical occurrence’ ) ) ) ) =0;
 WR6: SIZEOF ( QUERY ( cd <* configuration_design | ( cd. name =
     ’physical instance basis’ ) AND ( NOT (
     ’AUTOMOTIVE_DESIGN.’+ ’PRODUCT_IDENTIFICATION’ IN TYPEOF (
     cd. configuration ) ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

configuration_design: the set of all instances of **configuration_design**.

product_class: the set of all instances of **product_class**.

Formal propositions:

WR1: Each instance of **configuration_design** which has a **name** of 'functionality' shall reference as **design** a **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'functional definition'.

WR2: Each instance of **configuration_design** which has a **name** of 'realization' shall reference as **design** a **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'conceptual definition'.

WR3: Each instance of **configuration_design** which has a **name** of 'functionality' or 'realization' shall reference as **configuration** a **configuration_item** which references as its **item_concept** a **product_class**.

WR4: Each instance of **configuration_design** which has as **design** a **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'design constraint definition' shall reference as **configuration** a **configuration_item** which has a **name** of 'design constraint usage' and which references as its **item_concept** a **product_class**.

WR5: Each instance of **configuration_design** which has a **name** of 'physical instance basis' shall reference as **design** a **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence'.

WR6: Each instance of **configuration_design** which has a **name** of 'physical instance basis' shall reference as **configuration** a **configuration_item** of type **product_identification**.

5.2.4.94 restrict_default_settings

The **restrict_default_settings** rule ensures that the **representation** that represents a General_tolerance (see 4.2.235) is unambiguously defined.

EXPRESS specification:

```
*)
RULE restrict_default_settings FOR
    (applied_document_reference,
     representation);
WHERE
 WR1: ( SIZEOF ( QUERY ( r <* representation | ( r.name =
     'default tolerances' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( r.items )
     <>1 ) ) ) =0 ) AND ( SIZEOF ( QUERY ( r <* representation |
     ( r.name = 'default tolerances' ) AND ( r.context_of_items.
```

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```
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY ( i
     <* r.items | ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name = 'tolerance class' ) ) ) <>1 ) ) ) =0 ) ;
 WR2: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'default tolerances' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY (
     adr <* USEDIN ( r ,
     'AUTOMOTIVE_DESIGN.APPLIED_DOCUMENT_REFERENCE.ITEMS' ) |
     adr. role.name = 'general tolerance definition' ) ) +
     SIZEOF ( QUERY ( rr <* USEDIN ( r ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION_RELATIONSHIP.REP_2' ) | (
     rr. name = 'general tolerance definition' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'DEFAULT_TOLERANCE_TABLE' IN TYPEOF (
     rr. rep_1 ) ) ) ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_document_reference: the set of all instances of **applied_document_reference**.

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of **representation** that has a **name** of 'default tolerances' and a **representation_context** that has a **context_type** of 'default setting' shall contain exactly one **representation_item** in its set of **items**. This **representation_item** shall be of type **descriptive_representation_item** and shall have a **name** of 'tolerance class'.

WR2: Each instance of **representation** that has a **name** of 'default tolerances' and a **representation_context** that has a **context_type** of 'default setting' shall be refered either by an **applied_document_reference** with a role that has a **name** of 'general tolerance definition' or as **rep_2** by a **representation_relationship** with a **name** of general tolerance definition', where the **rep_1** is a **default_tolerance_table**.

5.2.4.95 restrict_default_thickness

The **restrict_default_thickness** rule ensures that the **representation** that represents a Default_thickness (see 4.2.134) is unambigously defined.

EXPRESS specification:

```
*)
RULE restrict_default_thickness FOR
    (representation);
```

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```
WHERE
 WR1: ( SIZEOF ( QUERY ( r <* representation | ( r.name =
     'default thickness' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY ( i
     <* r.items | ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >1
     ) ) ) =0 ) AND ( SIZEOF ( QUERY ( r <* representation | (
     r.name = 'default thickness' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY ( i
     <* r.items | ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name<> 'parameter name' ) ) ) >0 ) ) ) =0 ) ;
 WR2: ( SIZEOF ( QUERY ( r <* representation | ( r.name =
     'default thickness' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( r.items )
     >2 ) ) ) =0 ) AND ( SIZEOF ( QUERY ( r <* representation |
     ( r.name = 'default thickness' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY ( i
     <* r.items | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM']* TYPEOF ( i ) ) <>1 ) ) ) >0
     ) ) ) =0 ) ;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'default thickness' ) AND ( r.context_of_items.
     context_type = 'default setting' ) AND ( SIZEOF ( QUERY ( i
     <* r.items | ( 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name = 'thickness value' ) ) ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of **representation** that has a **name** of 'default thickness' and a **representation_context** that has a **context_type** of 'default setting' shall contain at most one **representation_item** in its set of **items** that is of type **descriptive_representation_item**. If present, it shall have a **name** of 'parameter name'.

WR2: Each instance of **representation** that has a **name** of 'default thickness' and a **representation_context** that has a **context_type** of 'default setting' shall contain at most two **representation_item** in its set of **items**. The **items** shall be of type **descriptive_representation_item** or **measure_representation_item**.

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WR3: Each instance of **representation** that has a **name** of 'default thickness' and a **representation_context** that has a **context_type** of 'default setting' shall contain exactly one **representation_item** in its set of **items** that is of type **measure_representation_item** and a **name** of 'thickness value'.

5.2.4.96 restrict_drawing

The **restrict_drawing** rule specifies the constraints that apply to a **drawing_revision** in the context of automotive design.

EXPRESS specification:

```
*)
RULE restrict_drawing FOR
    (draughting_title,
     drawing_revision);
WHERE
 WR1: --  drawing_requires_sheets:

     ( SIZEOF ( QUERY ( dr <* drawing_revision | ( SIZEOF ( dr.
     areas ) =0 ) OR ( SIZEOF ( QUERY ( ais <* dr. areas | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'DRAWING_SHEET_REVISION' IN TYPEOF (
     ais. area ) ) ) ) >0 ) ) ) =0 ) ;
 WR2: --  drawing_title:

     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( USEDIN (
     dr , 'AUTOMOTIVE_DESIGN.'+'DRAUGHTING_TITLE.'+ 'ITEMS' ) )
     >1 ) ) =0;
 WR3: --  sheet_title:

     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
     ais <* dr. areas | SIZEOF ( USEDIN ( ais. area ,
     'AUTOMOTIVE_DESIGN.'+'DRAUGHTING_TITLE.'+ 'ITEMS' ) ) >1 )
     ) >0 ) ) =0;
 WR4: --  allowable_items_of_sheet:

     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
     ais <* dr. areas | SIZEOF ( QUERY ( item <* ais. area.items
     | SIZEOF ( TYPEOF ( item ) *['AUTOMOTIVE_DESIGN.'+
     'STYLED_ITEM' , 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' ,
     'AUTOMOTIVE_DESIGN.'+ 'PLANAR_BOX'] ) <>1 ) ) >0 ) ) >0 ) )
     =0;
 WR5: --  sheet_contains_view_or_annotation:

     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
     ais <* dr. areas | SIZEOF ( QUERY ( item <* ais. area.items
     | SIZEOF ( TYPEOF ( item ) *['AUTOMOTIVE_DESIGN.'+
     'STYLED_ITEM' , 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM'] ) =0 )
     ) >0 ) ) >0 ) ) =0;
```

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```
WR6: --  planar_box_in_sheet:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( QUERY ( p_b <* QUERY ( item <*
    ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'PLANAR_BOX' IN
    TYPEOF ( item ) ) | SIZEOF ( USEDIN ( p_b ,
    'AUTOMOTIVE_DESIGN.'+'PRESENTATION_SIZE.'+ 'SIZE' ) ) <>1 )
    ) >0 ) ) >0 ) ) =0;
WR7: --  sheets_contain_views:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( QUERY ( mi <* QUERY ( item <*
    ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
    TYPEOF ( item ) ) | 'AUTOMOTIVE_DESIGN.'+
    'PRESENTATION_VIEW' IN TYPEOF ( mi\
    mapped_item.mapping_source. mapped_representation ) ) ) =0
    ) ) >0 ) ) =0;
WR8: --  sheets_contain_placements:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( QUERY ( a2p <* QUERY ( item <*
    ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT'
    IN TYPEOF ( item ) ) | SIZEOF ( USEDIN ( a2p ,
    'AUTOMOTIVE_DESIGN.'+'MAPPED_ITEM.'+ 'MAPPING_TARGET' ) )
    =0 ) ) >0 ) ) >0 ) ) =0;
WR9: --  sheets_have_unique_context:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( ais.
    area.context_of_items.representations_in_context ) >1 ) )
    >0 ) ) =0;
WR10: --  views_presented_once:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( QUERY ( mi <* QUERY ( item <*
    ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
    TYPEOF ( item ) ) | SIZEOF ( USEDIN ( mi\
    mapped_item.mapping_source. mapped_representation ,
    'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_MAP.'+
    'MAPPED_REPRESENTATION' ) ) <>1 ) ) >0 ) ) >0 ) ) =0;
WR11: --  allowable_items_of_view:

    SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
    ais <* dr. areas | SIZEOF ( QUERY ( mi <* QUERY ( item <*
    ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
    TYPEOF ( item ) ) | SIZEOF ( QUERY ( pv_item <* mi\
    mapped_item.mapping_source.mapped_representation. items |
    SIZEOF ( TYPEOF ( pv_item ) *['AUTOMOTIVE_DESIGN.'+
    'STYLED_ITEM' , 'AUTOMOTIVE_DESIGN.'+ 'CAMERA_IMAGE' ,
    'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT'] ) <>1 ) ) >0 ) )
    >0 ) ) >0 ) ) =0;
WR12: --  views_contain_one_placement:
```

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```
     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
     ais <* dr. areas | SIZEOF ( QUERY ( mi <* QUERY ( item <*
     ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
     TYPEOF ( item ) ) | SIZEOF ( QUERY ( a2p <* QUERY ( pv_item
     <* mi\ mapped_item.mapping_source.mapped_representation.
     items | 'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' IN TYPEOF (
     pv_item ) ) | SIZEOF ( QUERY ( rm <* USEDIN ( a2p ,
     'AUTOMOTIVE_DESIGN.'+'REPRESENTATION_MAP.'+
     'MAPPING_ORIGIN' ) | SIZEOF ( QUERY ( mi <* QUERY ( item <*
     ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
     TYPEOF ( item ) ) | mi\ mapped_item.mapping_source:=:rm ) )
     >0 ) ) =1 ) ) <>1 ) ) >0 ) ) >0 ) ) =0;
 WR13: --  views_have_unique_context:

     SIZEOF ( QUERY ( dr <* drawing_revision | SIZEOF ( QUERY (
     ais <* dr. areas | SIZEOF ( QUERY ( mi <* QUERY ( item <*
     ais. area.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
     TYPEOF ( item ) ) | SIZEOF ( mi\
     mapped_item.mapping_source.
     mapped_representation.context_of_items.
     representations_in_context ) <>1 ) ) >0 ) ) >0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

draughting_title: the set of all instances of **draughting_title**.

drawing_revision: the set of all instances of **drawing_revision**.

Formal propositions:

WR1: Each **drawing_revision** shall be related to at least one **presentation_area**, each of which is a **drawing_sheet_revision**.

WR2: Each **drawing_revision** shall be one of the **items** of no more than one **draughting_title**.

WR3: Each sheet of the **drawing_revision** shall be one of the **items** of no more than one **draughting_-title**.

WR4: The **items** of each sheet of the **drawing_revision** shall be a **styled_item**, a **mapped_item**, an **axis2_placement**, or a **planar_box**.

WR5: The **items** of each sheet of the **drawing_revision** shall include at least one **styled_item** or **mapped_item**.

WR6: Each sheet of the **drawing_revision** shall contain exactly one **planar_box** that is the size of a **presentation_size**.

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WR7: If there is a **mapped_item** in a sheet of the **drawing_revision** , the source of the **mapped_item** shall be a **presentation_view**.

WR8: Every **axis2_placement** in a sheet of the **drawing_revision** shall be the **mapping_target** for some **mapped_item**.

WR9: The **representation_context** of a sheet of the **drawing_revision** shall not be the context of any other **representation**.

WR10: Each view in a sheet of the **drawing_revision** shall be the **mapped_representation** for exactly one **mapped_item**.

WR11: The **items** of each view of each sheet of the **drawing_revision** shall be a **styled_item**, a **camera_image**, or an **axis2_placement**.

WR12: Each view of each sheet of the **drawing_revision** shall contain exactly one **axis2_placement** which is the **mapping_origin** for a **mapped_item**.

WR13: The **representation_context** of each view of each sheet of the **drawing_revision** shall not be the context of any other **representation**.

5.2.4.97 restrict_effectivity_assignment_for_class_category_usage

The **restrict_effectivity_assignment_for_class_category_usage** rule restricts the usage of **product_concept_feature_category_usage** objects in an **applied_effectivity_assignment**.

EXPRESS specification:

```
*)
RULE restrict_effectivity_assignment_for_class_category_usage FOR
    (applied_effectivity_assignment,
     product_concept_feature_category_usage);
WHERE
 WR1: SIZEOF ( QUERY ( aea <* applied_effectivity_assignment | (
     ( SIZEOF ( QUERY ( i <* aea. items | (
     'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' IN TYPEOF ( i ) )
     ) ) >0 ) OR ( SIZEOF ( QUERY ( i <* aea. items | (
     'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' IN TYPEOF ( i ) )
     ) ) <> SIZEOF ( aea. items ) ) ) AND ( ( SIZEOF ( TYPEOF (
     aea. assigned_effectivity ) ) >1 ) OR ( aea.
     assigned_effectivity.id<> 'class usage' ) OR ( SIZEOF (
     QUERY ( cueca <* USEDIN ( aea ,
     'AUTOMOTIVE_DESIGN.'+'EFFECTIVITY_CONTEXT_ASSIGNMENT.'+
     'ASSIGNED_EFFECTIVITY_ASSIGNMENT' ) | 'AUTOMOTIVE_DESIGN.'+
     'CLASS_USAGE_EFFECTIVITY_CONTEXT_ASSIGNMENT' IN TYPEOF (
     cueca ) ) ) =0 ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

applied_effectivity_assignment: the set of all instances of **applied_effectivity_assignment**.

product_concept_feature_category_usage: the set of all instances of **product_concept_feature_category_usage**.

Formal propositions:

WR1: An **applied_effectivity_assignment** which has a **product_concept_feature_category_usage** in its set of **items** may only have other **product_concept_feature_category_usage** objects in its set of **items**. It shall have an **assigned_effectivity** which is not of an **effectivity** subtype and which has an **id** of 'class usage' and it shall be the **assigned_effectivity_assignment** of a **class_usage_effectivity_context_assignment**.

5.2.4.98 restrict_effectivity_for_effectivity_relationship

The **restrict_effectivity_for_effectivity_relationship** rule restricts the types of **effectivity** that may participate in an **effectivity_relationship**.

EXPRESS specification:

```
*)
RULE restrict_effectivity_for_effectivity_relationship FOR
    (effectivity_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( er <* effectivity_relationship | ( SIZEOF
     ( ['AUTOMOTIVE_DESIGN.'+ 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'SERIAL_NUMBERED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( er. relating_effectivity ) ) >0 ) OR ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'SERIAL_NUMBERED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( er. related_effectivity ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

effectivity_relationship: the set of all instances of **effectivity_relationship**.

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Formal propositions:

WR1: The **relating_effectivity** and the **related_effectivity** of an **effectivity_relationship** may not be of type **lot_effectivity**, **serial_numbered_effectivity**, or **product_definition_effectivity** .

5.2.4.99 restrict_effectivity_usage

The **restrict_effectivity_usage** rule enforces the usage of an **effectivity** that is not a **dated_effectivity** or a **time_interval_based_effectivity** by at least one instance of **applied_effectivity_assignment** or **effectivity_relationship**.

EXPRESS specification:

```
*)
RULE restrict_effectivity_usage FOR
    (configured_effectivity_assignment,
     effectivity);
WHERE
 WR1: SIZEOF ( QUERY ( e <* effectivity | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'DATED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.'+ 'TIME_INTERVAL_BASED_EFFECTIVITY']*
     TYPEOF ( e ) ) =0 ) AND ( ( SIZEOF ( QUERY ( er <* USEDIN (
     e ,
     'AUTOMOTIVE_DESIGN.EFFECTIVITY_RELATIONSHIP.'+'RELATED_EFFECTIVITY'
     ) | er. name ='inheritance' ) ) =0 ) AND ( ( e.id =
     'configuration validity' ) AND ( SIZEOF ( QUERY ( cea <*
     USEDIN ( e ,
     'AUTOMOTIVE_DESIGN.EFFECTIVITY_ASSIGNMENT.ASSIGNED_EFFECTIVITY'
     ) | 'AUTOMOTIVE_DESIGN.'+
     'CONFIGURED_EFFECTIVITY_ASSIGNMENT' IN TYPEOF ( cea ) ) )
     =0 ) ) AND ( ( e.id = 'class usage' ) AND ( SIZEOF ( QUERY
     ( aea <* USEDIN ( e ,
     'AUTOMOTIVE_DESIGN.'+'EFFECTIVITY_ASSIGNMENT.'+
     'ASSIGNED_EFFECTIVITY' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'APPLIED_EFFECTIVITY_ASSIGNMENT' IN TYPEOF ( aea ) ) AND (
     SIZEOF ( QUERY ( i <* aea. items | 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' IN TYPEOF ( i ) )
     ) >0 ) ) ) =0 ) ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

configured_effectivity_assignment: the set of all instances of **configured_effectivity_assignment**.

effectivity: the set of all instances of **effectivity**.

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Formal propositions:

WR1: An **effectivity** that is not a **dated_effectivity** or a **time_interval_based_effectivity**, shall either be used at least once as the **related_effectivity** by an **effectivity_relationship** with a **name** of 'inheritance', or it shall have an **id** of 'configuration validity' and be the **assigned_effectivity** of a **configured_effectivity_assignment** or it shall have an **id** of 'class usage' and be the **assigned_effectivity** of an **applied_effectivity_assignment** which has a **product_concept_feature_category_usage** in its set of **items**.

5.2.4.100 restrict_externally_defined_item_relationship

The **restrict_externally_defined_item_relationship** rule ensures the correct correlation between the **name** of an **externally_defined_item_relationship** and the related **externally_defined_item**s.

EXPRESS specification:

```
*)
RULE restrict_externally_defined_item_relationship FOR
    (externally_defined_item_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( edir <*
     externally_defined_item_relationship | ( edir. name =
     'name scope' ) AND ( NOT ( 'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_GENERAL_PROPERTY' IN TYPEOF ( edir.
     relating_item ) ) OR NOT ( 'AUTOMOTIVE_DESIGN.'+
     'KNOWN_SOURCE' IN TYPEOF ( edir. relating_item.source ) )
     OR NOT ( 'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CLASS'
     IN TYPEOF ( edir. related_item ) ) OR NOT (
     'AUTOMOTIVE_DESIGN.'+ 'KNOWN_SOURCE' IN TYPEOF ( edir.
     related_item.source ) ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_item_relationship: the set of all instances of **externally_defined_item_relationship**.

Formal propositions:

WR1: If an **externally_defined_item_relationship** has a **name** of 'name scope', the **relating_item** shall be of type **externally_defined_general_property** and shall reference as the **source** a **known_source** and the **related_item** shall be of type **externally_defined_class** and shall reference as its **source** a **known_source**.

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5.2.4.101 restrict_general_property_association_for_externally_-defined_general_property

The **restrict_general_property_association_for_externally_defined_general_property** rule specifies that each instance of **general_property_association** which has a **name** of either 'definitional' or 'non-definitional' shall reference as **base_definition** a **general_property** which is of type **externally_defined_general_property**.

EXPRESS specification:

```
*)
RULE restrict_general_property_association_for_externally_defined_general_property FOR
    (general_property_association);
WHERE
 WR1: SIZEOF ( QUERY ( gpa <* general_property_association | (
     gpa. name IN ['definitional' , 'non-definitional'] ) AND
     NOT ( 'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_GENERAL_PROPERTY' IN TYPEOF ( gpa.
     base_definition ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

general_property_association: the set of all instances of **general_property_association**.

Formal propositions:

WR1: Each instance of **general_property_association** which has a **name** of either 'definitional' or 'non-definitional' shall reference as **base_definition** a **general_property** which is of type **externally_-defined_general_property**.

5.2.4.102 restrict_group_relationship_for_general_classification_-hierarchy

The **restrict_group_relationship_for_general_classification_hierarchy** rule ensures the correct correlation between the **name** of a **group_relationship** and the related **group**s of type **class**.

EXPRESS specification:

```
*)
RULE restrict_group_relationship_for_general_classification_hierarchy FOR
```

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```
    (class,
     group_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( gr <* group_relationship | ( gr. name =
     'class hierarchy' ) AND ( NOT ( 'AUTOMOTIVE_DESIGN.'+
     'CLASS' IN TYPEOF ( gr. related_group ) ) OR NOT (
     'AUTOMOTIVE_DESIGN.'+ 'CLASS' IN TYPEOF ( gr.
     relating_group ) ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

class: the set of all instances of **class**.

group_relationship: the set of all instances of **group_relationship**.

Formal propositions:

WR1: If the **group_relationship** has a name of 'class hierarchy', the **related_group** and the **relating_group** shall be of type **class**.

5.2.4.103 restrict_group_relationship_for_specification_category

The **restrict_group_relationship_for_specification_category** rule ensures the correct correlation between the **name** of a **group_relationship** and the related **group**s of type **product_concept_feature_category**.

EXPRESS specification:

```
*)
RULE restrict_group_relationship_for_specification_category FOR
    (group_relationship,
     product_concept_feature_category);
WHERE
 WR1: SIZEOF ( QUERY ( gr <* group_relationship | ( gr. name =
     'specification category hierarchy' ) AND ( NOT (
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY' IN
     TYPEOF ( gr. related_group ) ) OR NOT (
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY' IN
     TYPEOF ( gr. relating_group ) ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

group_relationship: the set of all instances of **group_relationship**.

product_concept_feature_category: the set of all instances of **product_concept_feature_category**.

Formal propositions:

WR1: If the **group_relationship** has a name of 'specification category hierarchy', the **related_group** and the **relating_group** shall be of type **product_concept_feature_category**.

5.2.4.104 restrict_multi_language_for_action

The **restrict_multi_language_for_action** rule specifies that each instance of **action** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_action FOR
    (action);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action | SIZEOF ( QUERY ( mlaa <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* action | SIZEOF ( QUERY ( ala <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* action | ( SIZEOF ( QUERY ( mlaa1
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
```

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```
END_RULE;
(*
```

Argument definitions:

action: The set of all instances of **action**.

Formal propositions:

WR1: Each instance of **action** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **action** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **action**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.105 restrict_multi_language_for_action_directive

The **restrict_multi_language_for_action_directive** rule specifies that each instance of **action_directive** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'comment'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_action_directive FOR
    (action_directive);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_directive | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'comment' ) ) ) >0 ) )
     =0;
 WR2: SIZEOF ( QUERY ( ent <* action_directive | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'comment' ) ) ) >0 ) )
     =0;
 WR3: SIZEOF ( QUERY ( ent <* action_directive | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
```

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```
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

action_directive: The set of all instances of **action_directive**.

Formal propositions:

WR1: Each instance of **action_directive** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'comment'.

WR2: Each instance of **action_directive** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'comment'.

WR3: For each instance of **action_directive**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.106 restrict_multi_language_for_action_method

The **restrict_multi_language_for_action_method** rule specifies that each instance of **action_method** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_action_method FOR
    (action_method);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_method | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* action_method | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
```

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```
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* action_method | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

action_method: The set of all instances of **action_method**.

Formal propositions:

WR1: Each instance of **action_method** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **action_method** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **action_method**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.107 restrict_multi_language_for_action_property

The **restrict_multi_language_for_action_property** rule specifies that each instance of **action_property** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_action_property FOR
```

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```
    (action_property);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_property | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* action_property | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* action_property | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

action_property: The set of all instances of **action_property**.

Formal propositions:

WR1: Each instance of **action_property** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **action_property** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **action_property**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.108 restrict_multi_language_for_action_relationship

The **restrict_multi_language_for_action_relationship** rule specifies that each instance of **action_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_action_relationship FOR
    (action_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_relationship | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* action_relationship | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* action_relationship | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

action_relationship: The set of all instances of **action_relationship**.

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Formal propositions:

WR1: Each instance of **action_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **action_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **action_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.109 restrict_multi_language_for_alternate_product_relationship

The **restrict_multi_language_for_alternate_product_relationship** rule specifies that each instance of **alternate_product_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'basis'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_alternate_product_relationship FOR
    (alternate_product_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* alternate_product_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'basis' ) ) ) >0 ) )
     =0;
 WR2: SIZEOF ( QUERY ( ent <* alternate_product_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'basis' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* alternate_product_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

alternate_product_relationship: The set of all instances of **alternate_product_relationship**.

Formal propositions:

WR1: Each instance of **alternate_product_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'basis'.

WR2: Each instance of **alternate_product_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'basis'.

WR3: For each instance of **alternate_product_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.110 restrict_multi_language_for_application_context

The **restrict_multi_language_for_application_context** rule specifies that each instance of **application_context** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_application_context FOR
    (application_context);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* application_context | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* application_context | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* application_context | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

application_context: The set of all instances of **application_context**.

Formal propositions:

WR1: Each instance of **application_context** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **application_context** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **application_context**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.111 restrict_multi_language_for_approval_relationship

The **restrict_multi_language_for_approval_relationship** rule specifies that each instance of **approval_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_approval_relationship FOR
    (approval_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* approval_relationship | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* approval_relationship | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
```

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```
 WR3: SIZEOF ( QUERY ( ent <* approval_relationship | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

approval_relationship: The set of all instances of **approval_relationship**.

Formal propositions:

WR1: Each instance of **approval_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **approval_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **approval_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.112 restrict_multi_language_for_assembly_component_usage_substitute

The **restrict_multi_language_for_assembly_component_usage_substitute** rule specifies that each instance of **assembly_component_usage_substitute** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'definition'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_assembly_component_usage_substitute FOR
```

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```
    (assembly_component_usage_substitute);
WHERE
 WR1: SIZEOF ( QUERY ( ent <*
      assembly_component_usage_substitute | SIZEOF ( QUERY ( mlaa
      <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa. attribute_name<>'definition' ) ) ) >0 )
      ) =0;
 WR2: SIZEOF ( QUERY ( ent <*
      assembly_component_usage_substitute | SIZEOF ( QUERY ( ala
      <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala. attribute_name<>'definition' ) ) ) >0 )
      ) =0;
 WR3: SIZEOF ( QUERY ( ent <*
      assembly_component_usage_substitute | ( SIZEOF ( QUERY (
      mlaa1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
      ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
      SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
      AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
      =0;
END_RULE;
(*
```

Argument definitions:

assembly_component_usage_substitute: The set of all instances of **assembly_component_usage_-substitute**.

Formal propositions:

WR1: Each instance of **assembly_component_usage_substitute** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'definition'.

WR2: Each instance of **assembly_component_usage_substitute** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'definition'.

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WR3: For each instance of **assembly_component_usage_substitute**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.113 restrict_multi_language_for_certification

The **restrict_multi_language_for_certification** rule specifies that each instance of **certification** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_certification FOR
    (certification);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* certification | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) AND ( mlaa.
     attribute_name<>'purpose' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* certification | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) AND ( ala.
     attribute_name<>'purpose' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* certification | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

certification: The set of all instances of **certification**.

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Formal propositions:

WR1: Each instance of **certification** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

WR2: Each instance of **certification** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

WR3: For each instance of **certification**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.114 restrict_multi_language_for_configuration_design

The **restrict_multi_language_for_configuration_design** rule specifies that each instance of **configuration_design** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_configuration_design FOR
    (configuration_design);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* configuration_design | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* configuration_design | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* configuration_design | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

configuration_design: The set of all instances of **configuration_design**.

Formal propositions:

WR1: Each instance of **configuration_design** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **configuration_design** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **configuration_design**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.115 restrict_multi_language_for_configuration_item

The **restrict_multi_language_for_configuration_item** rule specifies that each instance of **configuration_item** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_configuration_item FOR
    (configuration_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* configuration_item | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* configuration_item | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* configuration_item | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

configuration_item: The set of all instances of **configuration_item**.

Formal propositions:

WR1: Each instance of **configuration_item** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **configuration_item** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **configuration_item**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.116 restrict_multi_language_for_contract

The **restrict_multi_language_for_contract** rule specifies that each instance of **contract** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'purpose'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_contract FOR
    (contract);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* contract | SIZEOF ( QUERY ( mlaa
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'purpose' ) ) ) >0 ) )
     =0;
 WR2: SIZEOF ( QUERY ( ent <* contract | SIZEOF ( QUERY ( ala <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'purpose' ) ) ) >0 ) )
```

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```
     =0;
 WR3: SIZEOF ( QUERY ( ent <* contract | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

contract: The set of all instances of **contract**.

Formal propositions:

WR1: Each instance of **contract** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'purpose'.

WR2: Each instance of **contract** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'purpose'.

WR3: For each instance of **contract**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.117 restrict_multi_language_for_data_environment

The **restrict_multi_language_for_data_environment** rule specifies that each instance of **data_environment** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_data_environment FOR
    (data_environment);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* data_environment | SIZEOF ( QUERY
```

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```
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* data_environment | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* data_environment | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

data_environment: The set of all instances of **data_environment**.

Formal propositions:

WR1: Each instance of **data_environment** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **data_environment** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **data_environment**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.118 restrict_multi_language_for_date_role

The **restrict_multi_language_for_date_role** rule specifies that each instance of **date_role** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_date_role FOR
    (date_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* date_role | SIZEOF ( QUERY ( mlaa
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* date_role | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* date_role | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

date_role: The set of all instances of **date_role**.

Formal propositions:

WR1: Each instance of **date_role** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **date_role** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **date_role**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.119 restrict_multi_language_for_date_time_role

The **restrict_multi_language_for_date_time_role** rule specifies that each instance of **date_time_role** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_-assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_date_time_role FOR
    (date_time_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* date_time_role | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* date_time_role | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* date_time_role | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

date_time_role: The set of all instances of **date_time_role**.

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Formal propositions:

WR1: Each instance of **date_time_role** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **date_time_role** shall be only in the set of items of those instances of **attribute_-language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **date_time_role**, there shall not be more than one **multi_language_at-tribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_-name**.

5.2.4.120 restrict_multi_language_for_descriptive_representation_-item

The **restrict_multi_language_for_descriptive_representation_item** rule specifies that each instance of **descriptive_representation_item** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_descriptive_representation_item FOR
    (descriptive_representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* descriptive_representation_item |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* descriptive_representation_item |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* descriptive_representation_item |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
```

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```
     =0;
END_RULE;
(*
```

Argument definitions:

descriptive_representation_item: The set of all instances of **descriptive_representation_item**.

Formal propositions:

WR1: Each instance of **descriptive_representation_item** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **descriptive_representation_item** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **descriptive_representation_item**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.121 restrict_multi_language_for_document_relationship

The **restrict_multi_language_for_document_relationship** rule specifies that each instance of **document_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_document_relationship FOR
    (document_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* document_relationship | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* document_relationship | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* document_relationship | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
```

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```
      'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
      ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
      SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
      AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
      =0;
END_RULE;
(*
```

Argument definitions:

document_relationship: The set of all instances of **document_relationship**.

Formal propositions:

WR1: Each instance of **document_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **document_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **document_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.122 restrict_multi_language_for_draughting_title

The **restrict_multi_language_for_draughting_title** rule specifies that each instance of **draughting_title** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'contents'. For the **attribute_language_assignment**, a **name** of 'language' is allowed additionally.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_draughting_title FOR
    (draughting_title);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* draughting_title | SIZEOF ( QUERY
      ( mlaa <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ( mlaa. attribute_name<>'contents' ) ) ) >0 ) )
     =0;
 WR2: SIZEOF ( QUERY ( ent <* draughting_title | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'contents' ) AND ( ala.
     attribute_name<>'language' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* draughting_title | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

draughting_title: the set of all instances of **draughting_title**.

Formal propositions:

WR1: Each instance of **draughting_title** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of ”.

WR2: Each instance of **draughting_title** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either ’contents’ or ’language’.

WR3: For each instance of **draughting_title**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.123 restrict_multi_language_for_effectivity

The **restrict_multi_language_for_effectivity** rule specifies that each instance of **effectivity** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of ’description’.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_effectivity FOR
    (effectivity);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* effectivity | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* effectivity | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* effectivity | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

effectivity: The set of all instances of **effectivity**.

Formal propositions:

WR1: Each instance of **effectivity** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **effectivity** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **effectivity**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.124 restrict_multi_language_for_effectivity_relationship

The **restrict_multi_language_for_effectivity_relationship** rule specifies that each instance of **effectivity_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_effectivity_relationship FOR
    (effectivity_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* effectivity_relationship | SIZEOF
     ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* effectivity_relationship | SIZEOF
     ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* effectivity_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

effectivity_relationship: The set of all instances of **effectivity_relationship**.

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Formal propositions:

WR1: Each instance of **effectivity_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **effectivity_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **effectivity_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.125 restrict_multi_language_for_event_occurrence

The **restrict_multi_language_for_event_occurrence** rule specifies that each instance of **event_occurrence** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_event_occurrence FOR
    (event_occurrence);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* event_occurrence | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* event_occurrence | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* event_occurrence | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
```

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(*

Argument definitions:

event_occurrence: The set of all instances of **event_occurrence**.

Formal propositions:

WR1: Each instance of **event_occurrence** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **event_occurrence** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **event_occurrence**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.126 restrict_multi_language_for_external_source

The **restrict_multi_language_for_external_source** rule specifies that each instance of **external_source** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_external_source FOR
    (external_source);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* external_source | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* external_source | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* external_source | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
```

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```
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

external_source: The set of all instances of **external_source**.

Formal propositions:

WR1: Each instance of **external_source** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **external_source** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **external_source**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.127 restrict_multi_language_for_general_property

The **restrict_multi_language_for_general_property** rule specifies that each instance of **general_property** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_general_property FOR
    (general_property);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* general_property | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* general_property | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
```

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```
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* general_property | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

general_property: The set of all instances of **general_property**.

Formal propositions:

WR1: Each instance of **general_property** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **general_property** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **general_property**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.128 restrict_multi_language_for_general_property_relationship

The **restrict_multi_language_for_general_property_relationship** rule specifies that each instance of **general_property_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_general_property_relationship FOR
```

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```
    (general_property_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* general_property_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* general_property_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* general_property_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

general_property_relationship: The set of all instances of **general_property_relationship**.

Formal propositions:

WR1: Each instance of **general_property_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **general_property_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **general_property_relationship**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.129 restrict_multi_language_for_geometric_representation_item

The **restrict_multi_language_for_geometric_representation_item** rule specifies that each instance of **geometric_representation_item** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_geometric_representation_item FOR
    (geometric_representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* geometric_representation_item |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* geometric_representation_item |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* geometric_representation_item | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

geometric_representation_item: The set of all instances of **geometric_representation_item**.

Formal propositions:

WR1: Each instance of **geometric_representation_item** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

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WR2: Each instance of **geometric_representation_item** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **geometric_representation_item**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.130 restrict_multi_language_for_geometric_tolerance

The **restrict_multi_language_for_geometric_tolerance** rule specifies that each instance of **geometric_tolerance** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_geometric_tolerance FOR
    (geometric_tolerance);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* geometric_tolerance | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* geometric_tolerance | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* geometric_tolerance | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

geometric_tolerance: The set of all instances of **geometric_tolerance**.

Formal propositions:

WR1: Each instance of **geometric_tolerance** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **geometric_tolerance** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **geometric_tolerance**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.131 restrict_multi_language_for_group

The **restrict_multi_language_for_group** rule specifies that each instance of **group** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_group FOR
    (group);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* group | SIZEOF ( QUERY ( mlaa <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* group | SIZEOF ( QUERY ( ala <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* group | ( SIZEOF ( QUERY ( mlaa1
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
```

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```
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

group: The set of all instances of **group**.

Formal propositions:

WR1: Each instance of **group** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **group** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **group**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.132 restrict_multi_language_for_group_relationship

The **restrict_multi_language_for_group_relationship** rule specifies that each instance of **group_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_group_relationship FOR
    (group_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* group_relationship | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* group_relationship | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
```

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```
 WR3: SIZEOF ( QUERY ( ent <* group_relationship | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

group_relationship: The set of all instances of **group_relationship**.

Formal propositions:

WR1: Each instance of **group_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **group_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **group_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.133 restrict_multi_language_for_identification_role

The **restrict_multi_language_for_identification_role** rule specifies that each instance of **identification_role** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_identification_role FOR
    (identification_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* identification_role | SIZEOF (
```

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```
      QUERY ( mlaa <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
      ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* identification_role | SIZEOF (
      QUERY ( ala <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
      ) =0;
 WR3: SIZEOF ( QUERY ( ent <* identification_role | ( SIZEOF (
      QUERY ( mlaa1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
      ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
      SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
      AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
      =0;
END_RULE;
(*
```

Argument definitions:

identification_role: The set of all instances of **identification_role**.

Formal propositions:

WR1: Each instance of **identification_role** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **identification_role** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **identification_role**, there shall not be more than one **multi_language_-attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.134 restrict_multi_language_for_kinematic_pair

The **restrict_multi_language_for_kinematic_pair** rule specifies that each instance of **kinematic_pair** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_-assignment** that have an attribute **attribute_name** of 'name'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_kinematic_pair FOR
    (kinematic_pair);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* kinematic_pair | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* kinematic_pair | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* kinematic_pair | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

kinematic_pair: The set of all instances of **kinematic_pair**.

Formal propositions:

WR1: Each instance of **kinematic_pair** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

WR2: Each instance of **kinematic_pair** shall be only in the set of items of those instances of **attribute_-language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **kinematic_pair**, there shall not be more than one **multi_language_at-tribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_-name**.

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5.2.4.135 restrict_multi_language_for_mapped_item

The **restrict_multi_language_for_mapped_item** rule specifies that each instance of **mapped_item** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_-assignment** that have an attribute **attribute_name** of 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_mapped_item FOR
    (mapped_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* mapped_item | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* mapped_item | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* mapped_item | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

mapped_item: The set of all instances of **mapped_item**.

Formal propositions:

WR1: Each instance of **mapped_item** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

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WR2: Each instance of **mapped_item** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **mapped_item**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.136 restrict_multi_language_for_name_assignment

The **restrict_multi_language_for_name_assignment** rule specifies that each instance of **name_assignment** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'assigned_name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_name_assignment FOR
    (name_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* name_assignment | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'assigned_name' ) ) )
     >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* name_assignment | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'assigned_name' ) ) ) >0
     ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* name_assignment | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

name_assignment: The set of all instances of **name_assignment**.

Formal propositions:

WR1: Each instance of **name_assignment** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'assigned_name'.

WR2: Each instance of **name_assignment** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'assigned_name'.

WR3: For each instance of **name_assignment**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.137 restrict_multi_language_for_organization_relationship

The **restrict_multi_language_for_organization_relationship** rule specifies that each instance of **organization_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_organization_relationship FOR
    (organization_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* organization_relationship | SIZEOF
     ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* organization_relationship | SIZEOF
     ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* organization_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

organization_relationship: The set of all instances of **organization_relationship**.

Formal propositions:

WR1: Each instance of **organization_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **organization_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **organization_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.138 restrict_multi_language_for_organization_role

The **restrict_multi_language_for_organization_role** rule specifies that each instance of **organization_role** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_organization_role FOR
    (organization_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* organization_role | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* organization_role | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
```

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```
 WR3: SIZEOF ( QUERY ( ent <* organization_role | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

organization_role: The set of all instances of **organization_role**.

Formal propositions:

WR1: Each instance of **organization_role** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **organization_role** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **organization_role**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.139 restrict_multi_language_for_organizational_project

The **restrict_multi_language_for_organizational_project** rule specifies that each instance of **organizational_project** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_organizational_project FOR
    (organizational_project);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* organizational_project | SIZEOF (
```

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```
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* organizational_project | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* organizational_project | ( SIZEOF
     ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

organizational_project: The set of all instances of **organizational_project**.

Formal propositions:

WR1: Each instance of **organizational_project** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **organizational_project** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **organizational_project**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.140 restrict_multi_language_for_organizational_project_-relationship

The **restrict_multi_language_for_organizational_project_relationship** rule specifies that each instance of **organizational_project_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_organizational_project_relationship FOR
    (organizational_project_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <*
     organizational_project_relationship | SIZEOF ( QUERY ( mlaa
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <*
     organizational_project_relationship | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <*
     organizational_project_relationship | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

organizational_project_relationship: The set of all instances of **organizational_project_relationship**.

Formal propositions:

WR1: Each instance of **organizational_project_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **organizational_project_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **organizational_project_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.141 restrict_multi_language_for_pair_actuator

The **restrict_multi_language_for_pair_actuator** rule specifies that each instance of **pair_actuator** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_pair_actuator FOR
    (pair_actuator);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* pair_actuator | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* pair_actuator | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* pair_actuator | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

pair_actuator: The set of all instances of **pair_actuator**.

Formal propositions:

WR1: Each instance of **pair_actuator** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

WR2: Each instance of **pair_actuator** shall be only in the set of items of those instances of **attribute_-language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **pair_actuator**, there shall not be more than one **multi_language_attribute_-assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.142 restrict_multi_language_for_person_and_organization_role

The **restrict_multi_language_for_person_and_organization_role** rule specifies that each instance of **person_and_organization_role** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_person_and_organization_role FOR
    (person_and_organization_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* person_and_organization_role |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* person_and_organization_role |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* person_and_organization_role | (
```

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```
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

person_and_organization_role: The set of all instances of **person_and_organization_role**.

Formal propositions:

WR1: Each instance of **person_and_organization_role** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **person_and_organization_role** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **person_and_organization_role**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.143 restrict_multi_language_for_presentation_layer_assignment

The **restrict_multi_language_for_presentation_layer_assignment** rule specifies that each instance of **presentation_layer_assignment** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_presentation_layer_assignment FOR
    (presentation_layer_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* presentation_layer_assignment |
```

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```
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* presentation_layer_assignment |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* presentation_layer_assignment | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

presentation_layer_assignment: The set of all instances of **presentation_layer_assignment**.

Formal propositions:

WR1: Each instance of **presentation_layer_assignment** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **presentation_layer_assignment** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **presentation_layer_assignment**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.144 restrict_multi_language_for_process_product_association

The **restrict_multi_language_for_process_product_association** rule specifies that each instance of **process_product_association** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_process_product_association FOR
    (process_product_association);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* process_product_association |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* process_product_association |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* process_product_association | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

process_product_association: The set of all instances of **process_product_association**.

Formal propositions:

WR1: Each instance of **process_product_association** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **process_product_association** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **process_product_association**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.145 restrict_multi_language_for_product

The **restrict_multi_language_for_product** rule specifies that each instance of **product** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product FOR
    (product);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product | SIZEOF ( QUERY ( mlaa <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product | SIZEOF ( QUERY ( ala <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product | ( SIZEOF ( QUERY ( mlaa1
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product: The set of all instances of **product**.

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Formal propositions:

WR1: Each instance of **product** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **product** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **product**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.146 restrict_multi_language_for_product_concept

The **restrict_multi_language_for_product_concept** rule specifies that each instance of **product_concept** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_concept FOR
    (product_concept);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_concept | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_concept | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_concept | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

product_concept: The set of all instances of **product_concept**.

Formal propositions:

WR1: Each instance of **product_concept** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **product_concept** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **product_concept**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.147 restrict_multi_language_for_product_concept_feature

The **restrict_multi_language_for_product_concept_feature** rule specifies that each instance of **product_concept_feature** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_concept_feature FOR
    (product_concept_feature);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_concept_feature | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_concept_feature | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_concept_feature | ( SIZEOF
     ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
```

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```
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_concept_feature: The set of all instances of **product_concept_feature**.

Formal propositions:

WR1: Each instance of **product_concept_feature** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **product_concept_feature** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **product_concept_feature**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.148 restrict_multi_language_for_product_concept_feature_association

The **restrict_multi_language_for_product_concept_feature_association** rule specifies that each instance of **product_concept_feature_association** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_concept_feature_association FOR
    (product_concept_feature_association);
WHERE
 WR1: SIZEOF ( QUERY ( ent <*
     product_concept_feature_association | SIZEOF ( QUERY ( mlaa
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
```

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```
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <*
     product_concept_feature_association | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <*
     product_concept_feature_association | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_concept_feature_association: The set of all instances of **product_concept_feature_association**.

Formal propositions:

WR1: Each instance of **product_concept_feature_association** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_concept_feature_association** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **product_concept_feature_association**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.149 restrict_multi_language_for_product_concept_relationship

The **restrict_multi_language_for_product_concept_relationship** rule specifies that each instance of **product_concept_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_concept_relationship FOR
    (product_concept_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_concept_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_concept_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_concept_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_concept_relationship: The set of all instances of **product_concept_relationship**.

Formal propositions:

WR1: Each instance of **product_concept_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_concept_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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WR3: For each instance of **product_concept_relationship**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.150 restrict_multi_language_for_product_definition

The **restrict_multi_language_for_product_definition** rule specifies that each instance of **product_definition** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_-language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_definition FOR
    (product_definition);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_definition | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_definition | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_definition | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_definition: The set of all instances of **product_definition**.

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Formal propositions:

WR1: Each instance of **product_definition** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **product_definition** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **product_definition**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.151 restrict_multi_language_for_product_definition_formation

The **restrict_multi_language_for_product_definition_formation** rule specifies that each instance of **product_definition_formation** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_definition_formation FOR
    (product_definition_formation);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_definition_formation |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_definition_formation |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_definition_formation | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
```

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(*

Argument definitions:

product_definition_formation: The set of all instances of **product_definition_formation**.

Formal propositions:

WR1: Each instance of **product_definition_formation** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_definition_formation** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **product_definition_formation**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.152 restrict_multi_language_for_product_definition_formation_relationship

The **restrict_multi_language_for_product_definition_formation_relationship** rule specifies that each instance of **product_definition_formation_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_definition_formation_relationship FOR
    (product_definition_formation_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <*
     product_definition_formation_relationship | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <*
     product_definition_formation_relationship | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
```

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```
 WR3: SIZEOF ( QUERY ( ent <*
     product_definition_formation_relationship | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_definition_formation_relationship: The set of all instances of **product_definition_formation_relationship**.

Formal propositions:

WR1: Each instance of **product_definition_formation_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_definition_formation_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **product_definition_formation_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.153 restrict_multi_language_for_product_definition_-relationship

The **restrict_multi_language_for_product_definition_relationship** rule specifies that each instance of **product_definition_relationship** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_definition_relationship FOR
    (product_definition_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_definition_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_definition_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_definition_relationship |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_definition_relationship: The set of all instances of **product_definition_relationship**.

Formal propositions:

WR1: Each instance of **product_definition_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_definition_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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WR3: For each instance of **product_definition_relationship**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.154 restrict_multi_language_for_product_definition_substitute

The **restrict_multi_language_for_product_definition_substitute** rule specifies that each instance of **product_definition_substitute** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_definition_substitute FOR
    (product_definition_substitute);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_definition_substitute |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_definition_substitute |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_definition_substitute | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_definition_substitute: The set of all instances of **product_definition_substitute**.

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Formal propositions:

WR1: Each instance of **product_definition_substitute** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_definition_substitute** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **product_definition_substitute**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.155 restrict_multi_language_for_product_related_product_category

The **restrict_multi_language_for_product_related_product_category** rule specifies that each instance of **product_related_product_category** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_product_related_product_category FOR
    (product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_related_product_category |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* product_related_product_category |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* product_related_product_category |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

product_related_product_category: The set of all instances of **product_related_product_category**.

Formal propositions:

WR1: Each instance of **product_related_product_category** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **product_related_product_category** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **product_related_product_category**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.156 restrict_multi_language_for_property_definition

The **restrict_multi_language_for_property_definition** rule specifies that each instance of **property_definition** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_property_definition FOR
    (property_definition);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* property_definition | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* property_definition | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* property_definition | ( SIZEOF (
```

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```
      QUERY ( mlaa1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
      ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
      SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
      AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
      =0;
END_RULE;
(*
```

Argument definitions:

property_definition: The set of all instances of **property_definition**.

Formal propositions:

WR1: Each instance of **property_definition** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **property_definition** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **property_definition**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.157 restrict_multi_language_for_property_definition_relationship

The **restrict_multi_language_for_property_definition_relationship** rule specifies that each instance of **property_definition_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_property_definition_relationship FOR
    (property_definition_relationship);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( ent <* property_definition_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* property_definition_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* property_definition_relationship |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

property_definition_relationship: The set of all instances of **property_definition_relationship**.

Formal propositions:

WR1: Each instance of **property_definition_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **property_definition_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **property_definition_relationship**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.158 restrict_multi_language_for_representation

The **restrict_multi_language_for_representation** rule specifies that each instance of **representation** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_-assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_representation FOR
    (representation);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* representation | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) AND (
     mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* representation | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) AND (
     ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* representation | ( SIZEOF ( QUERY
     ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

representation: The set of all instances of **representation**.

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Formal propositions:

WR1: Each instance of **representation** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR2: Each instance of **representation** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'description' or 'name'.

WR3: For each instance of **representation**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.159 restrict_multi_language_for_representation_relationship

The **restrict_multi_language_for_representation_relationship** rule specifies that each instance of **representation_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_representation_relationship FOR
    (representation_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* representation_relationship |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* representation_relationship |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* representation_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
```

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Argument definitions:

representation_relationship: The set of all instances of **representation_relationship**.

Formal propositions:

WR1: Each instance of **representation_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **representation_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **representation_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.160 restrict_multi_language_for_requirement_for_action_resource

The **restrict_multi_language_for_requirement_for_action_resource** rule specifies that each instance of **requirement_for_action_resource** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_requirement_for_action_resource FOR
    (requirement_for_action_resource);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* requirement_for_action_resource |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* requirement_for_action_resource |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* requirement_for_action_resource |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

requirement_for_action_resource: The set of all instances of **requirement_for_action_resource**.

Formal propositions:

WR1: Each instance of **requirement_for_action_resource** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **requirement_for_action_resource** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **requirement_for_action_resource**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.161 restrict_multi_language_for_resource_property

The **restrict_multi_language_for_resource_property** rule specifies that each instance of **resource_property** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_resource_property FOR
    (resource_property);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* resource_property | SIZEOF ( QUERY
     ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* resource_property | SIZEOF ( QUERY
     ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* resource_property | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

resource_property: The set of all instances of **resource_property**.

Formal propositions:

WR1: Each instance of **resource_property** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **resource_property** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **resource_property**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.162 restrict_multi_language_for_resource_requirement_type

The **restrict_multi_language_for_resource_requirement_type** rule specifies that each instance of **resource_requirement_type** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

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EXPRESS specification:

```
*)
RULE restrict_multi_language_for_resource_requirement_type FOR
    (resource_requirement_type);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* resource_requirement_type | SIZEOF
      ( QUERY ( mlaa <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
      ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* resource_requirement_type | SIZEOF
      ( QUERY ( ala <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
      ) =0;
 WR3: SIZEOF ( QUERY ( ent <* resource_requirement_type | (
      SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
      'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
      ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
      SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
      'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
      'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
      AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
      =0;
END_RULE;
(*
```

Argument definitions:

resource_requirement_type: The set of all instances of **resource_requirement_type**.

Formal propositions:

WR1: Each instance of **resource_requirement_type** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **resource_requirement_type** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **resource_requirement_type**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.163 restrict_multi_language_for_security_classification

The **restrict_multi_language_for_security_classification** rule specifies that each instance of **security_classification** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_security_classification FOR
    (security_classification);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* security_classification | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) AND ( mlaa.
     attribute_name<>'purpose' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* security_classification | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) AND ( ala.
     attribute_name<>'purpose' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* security_classification | ( SIZEOF
     ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

security_classification: The set of all instances of **security_classification**.

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Formal propositions:

WR1: Each instance of **security_classification** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

WR2: Each instance of **security_classification** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of either 'name' or 'purpose'.

WR3: For each instance of **security_classification**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.164 restrict_multi_language_for_shape_aspect

The **restrict_multi_language_for_shape_aspect** rule specifies that each instance of **shape_aspect** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_shape_aspect FOR
    (shape_aspect);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* shape_aspect | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* shape_aspect | SIZEOF ( QUERY (
     ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* shape_aspect | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
```

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```
END_RULE;
(*
```

Argument definitions:

shape_aspect: The set of all instances of **shape_aspect**.

Formal propositions:

WR1: Each instance of **shape_aspect** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **shape_aspect** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **shape_aspect**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.165 restrict_multi_language_for_shape_aspect_relationship

The **restrict_multi_language_for_shape_aspect_relationship** rule specifies that each instance of **shape_aspect_relationship** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_shape_aspect_relationship FOR
    (shape_aspect_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* shape_aspect_relationship | SIZEOF
     ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* shape_aspect_relationship | SIZEOF
     ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* shape_aspect_relationship | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
```

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```
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

shape_aspect_relationship: The set of all instances of **shape_aspect_relationship**.

Formal propositions:

WR1: Each instance of **shape_aspect_relationship** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **shape_aspect_relationship** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **shape_aspect_relationship**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.166 restrict_multi_language_for_styled_item

The **restrict_multi_language_for_styled_item** rule specifies that each instance of **styled_item** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_styled_item FOR
    (styled_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* styled_item | SIZEOF ( QUERY (
     mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* styled_item | SIZEOF ( QUERY ( ala
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* styled_item | ( SIZEOF ( QUERY (
     mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

styled_item: The set of all instances of **styled_item**.

Formal propositions:

WR1: Each instance of **styled_item** shall be only in the set of items of those instances of **multi_-language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

WR2: Each instance of **styled_item** shall be only in the set of items of those instances of **attribute_-language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **styled_item**, there shall not be more than one **multi_language_attribute_-assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.167 restrict_multi_language_for_time_interval_role

The **restrict_multi_language_for_time_interval_role** rule specifies that each instance of **time_inter-val_role** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_-language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_time_interval_role FOR
    (time_interval_role);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* time_interval_role | SIZEOF (
```

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```
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* time_interval_role | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* time_interval_role | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

time_interval_role: The set of all instances of **time_interval_role**.

Formal propositions:

WR1: Each instance of **time_interval_role** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **time_interval_role** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **time_interval_role**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

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5.2.4.168 restrict_multi_language_for_topological_representation_-item

The **restrict_multi_language_for_topological_representation_item** rule specifies that each instance of **topological_representation_item** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_topological_representation_item FOR
    (topological_representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* topological_representation_item |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* topological_representation_item |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'name' ) ) ) >0 ) ) =0;
 WR3: SIZEOF ( QUERY ( ent <* topological_representation_item |
     ( SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

topological_representation_item: The set of all instances of **topological_representation_item**.

Formal propositions:

WR1: Each instance of **topological_representation_item** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'name'.

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WR2: Each instance of **topological_representation_item** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'name'.

WR3: For each instance of **topological_representation_item**, there shall not be more than one **multi_-language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.169 restrict_multi_language_for_uncertainty_measure_with_-unit

The **restrict_multi_language_for_uncertainty_measure_with_unit** rule specifies that each instance of **uncertainty_measure_with_unit** shall only be referenced by instances of **multi_language_attribute_-assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_uncertainty_measure_with_unit FOR
    (uncertainty_measure_with_unit);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* uncertainty_measure_with_unit |
     SIZEOF ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* uncertainty_measure_with_unit |
     SIZEOF ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* uncertainty_measure_with_unit | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) ) SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

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Argument definitions:

uncertainty_measure_with_unit: The set of all instances of **uncertainty_measure_with_unit**.

Formal propositions:

WR1: Each instance of **uncertainty_measure_with_unit** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **uncertainty_measure_with_unit** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **uncertainty_measure_with_unit**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.170 restrict_multi_language_for_uncertainty_qualifier

The **restrict_multi_language_for_uncertainty_qualifier** rule specifies that each instance of **uncertainty_qualifier** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_uncertainty_qualifier FOR
    (uncertainty_qualifier);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* uncertainty_qualifier | SIZEOF (
     QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* uncertainty_qualifier | SIZEOF (
     QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* uncertainty_qualifier | ( SIZEOF (
     QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
```

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```
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) )
     =0;
END_RULE;
(*
```

Argument definitions:

uncertainty_qualifier: The set of all instances of **uncertainty_qualifier**.

Formal propositions:

WR1: Each instance of **uncertainty_qualifier** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **uncertainty_qualifier** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **uncertainty_qualifier**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.171 restrict_multi_language_for_versioned_action_request

The **restrict_multi_language_for_versioned_action_request** rule specifies that each instance of **versioned_action_request** shall only be referenced by instances of **multi_language_attribute_assignment** or **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

EXPRESS specification:

```
*)
RULE restrict_multi_language_for_versioned_action_request FOR
    (versioned_action_request);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* versioned_action_request | SIZEOF
     ( QUERY ( mlaa <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa. attribute_name<>'description' ) ) ) >0
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ent <* versioned_action_request | SIZEOF
     ( QUERY ( ala <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala. attribute_name<>'description' ) ) ) >0 )
```

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```
     ) =0;
 WR3: SIZEOF ( QUERY ( ent <* versioned_action_request | (
     SIZEOF ( QUERY ( mlaa1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( mlaa2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'MULTI_LANGUAGE_ATTRIBUTE_ASSIGNMENT.'+
     'ITEMS' ) | ( mlaa1. attribute_name =mlaa2. attribute_name
     ) AND ( mlaa1. language =mlaa2. language ) ) ) >1 ) ) +
     SIZEOF ( QUERY ( ala1 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | SIZEOF ( QUERY ( ala2 <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'ATTRIBUTE_LANGUAGE_ASSIGNMENT.'+
     'ITEMS' ) | ( ala1. attribute_name =ala2. attribute_name )
     AND ( ala1. language =ala2. language ) ) ) >1 ) ) ) >0 ) ))
     =0;
END_RULE;
(*
```

Argument definitions:

versioned_action_request: The set of all instances of **versioned_action_request**.

Formal propositions:

WR1: Each instance of **versioned_action_request** shall be only in the set of items of those instances of **multi_language_attribute_assignment** that have an attribute **attribute_name** of 'description'.

WR2: Each instance of **versioned_action_request** shall be only in the set of items of those instances of **attribute_language_assignment** that have an attribute **attribute_name** of 'description'.

WR3: For each instance of **versioned_action_request**, there shall not be more than one **multi_language_attribute_assignment** or **attribute_language_assignment** with the same **language** and the same **attribute_name**.

5.2.4.172 restrict_name_assignment_for_kinematic_joint

The **restrict_name_assignment_for_kinematic_joint** rule specifies that each instance of **kinematic_joint** shall be referenced by at most one instance of **applied_name_assignment**.

EXPRESS specification:

```
*)
RULE restrict_name_assignment_for_kinematic_joint FOR
    (kinematic_joint);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* kinematic_joint | SIZEOF ( USEDIN
```

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```
     ( ent , 'AUTOMOTIVE_DESIGN.'+'APPLIED_NAME_ASSIGNMENT.'+
     'ITEMS' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

kinematic_joint: The set of all instances of **kinematic_joint**.

Formal propositions:

WR1: For each instance of **kinematic_joint** there shall be only at most one instance of **applied_name_-assignment**.

5.2.4.173 restrict_name_assignment_for_kinematic_link

The **restrict_name_assignment_for_kinematic_link** rule specifies that each instance of **kinematic_-link** shall be referenced by at most one instance of **applied_name_assignment**.

EXPRESS specification:

```
*)
RULE restrict_name_assignment_for_kinematic_link FOR
    (kinematic_link);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* kinematic_link | SIZEOF ( USEDIN (
     ent , 'AUTOMOTIVE_DESIGN.'+'APPLIED_NAME_ASSIGNMENT.'+
     'ITEMS' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

kinematic_link: The set of all instances of **kinematic_link**.

Formal propositions:

WR1: For each instance of **kinematic_link** there shall be only at most one instance of **applied_name_-assignment**.

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5.2.4.174 restrict_name_assignment_for_kinematic_structure

The **restrict_name_assignment_for_kinematic_structure** rule specifies that each instance of **kinematic_structure** shall be referenced by at most one instance of **applied_name_assignment**.

EXPRESS specification:

```
*)
RULE restrict_name_assignment_for_kinematic_structure FOR
    (kinematic_structure);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* kinematic_structure | SIZEOF (
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_NAME_ASSIGNMENT.'+ 'ITEMS' )
     ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

kinematic_structure: The set of all instances of **kinematic_structure**.

Formal propositions:

WR1: For each instance of **kinematic_structure** there shall be only at most one instance of **applied_name_assignment**.

5.2.4.175 restrict_name_for_known_source

The **restrict_name_for_known_source** rule ensures that each instance of **known_source** has a **name** of 'ISO 13584 library'.

EXPRESS specification:

```
*)
RULE restrict_name_for_known_source FOR
    (known_source);
WHERE
 WR1: SIZEOF ( QUERY ( ks <* known_source | ( ks. name<>
     'ISO 13584 library' ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

known_source: the set of all instances of **known_source**.

Formal propositions:

WR1: Each instance of **known_source** shall have a **name** of 'ISO 13584 library'.

5.2.4.176 restrict_part_occurrence

The **restrict_part_occurrence** rule specifies the restrictions that apply to **product_definition**s which reference as **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence'.

EXPRESS specification:

```
*)
RULE restrict_part_occurrence FOR
    (product_definition,
     product_definition_occurrence_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'part occurrence' ) AND ( NOT (
     pd. name IN [ 'single instance' , 'selected instance' ,
     'quantified instance' , 'specified instance' ] ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'part occurrence' ) AND ( SIZEOF
     ( QUERY ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
     'RELATED_PRODUCT_DEFINITION' ) | pdr. name =
     'definition usage' ) ) <>1 ) AND ( SIZEOF ( QUERY ( cd <*
     USEDIN ( pd , 'AUTOMOTIVE_DESIGN.'+'CONFIGURATION_DESIGN.'+
     'DESIGN' ) | ( cd. name = 'occurrence usage definition' )
     AND ( NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_IDENTIFICATION'
     IN TYPEOF ( cd. configuration ) ) ) ) ) <>1 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'part occurrence' ) AND ( SIZEOF
     ( QUERY ( cd <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
     'RELATED_PRODUCT_DEFINITION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_USAGE' IN TYPEOF ( cd ) ) ) ) =0 ) AND
     ( SIZEOF ( USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_OCCURRENCE_RELATIONSHIP.'+
     'OCCURRENCE' ) ) =0 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'part occurrence' ) AND ( pd.
     name = 'selected instance' ) AND ( SIZEOF ( QUERY ( prd <*
     USEDIN ( pd ,
```

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```
      'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION' ) | (
      prd. name = 'occurrence selection' ) AND ( SIZEOF ( QUERY (
      pdr <* USEDIN ( prd ,
      'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.DEFINITION'
      ) | ( pdr. used_representation.name = 'selection criteria'
      ) AND ( SIZEOF ( pdr. used_representation.items ) =2 ) AND
      ( SIZEOF ( QUERY ( i <* pdr. used_representation.items | (
      SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
      'VALUE_RANGE']* TYPEOF ( i ) ) =1 ) AND ( i.name =
      'selection quantity' ) ) ) =1 ) AND ( SIZEOF ( QUERY ( i <*
      pdr. used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
      'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
      i.name = 'selection control' ) ) ) =1 ) ) ) =1 ) ) ) =0 ) )
      ) =0;
 WR5: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
      frame_of_reference.name = 'part occurrence' ) AND ( pd.
      name = 'quantified instance' ) AND ( SIZEOF ( QUERY ( ppd
      <* USEDIN ( pd ,
      'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION.'+'DEFINITION' )
      | ( ppd. name = 'occurrence quantity' ) AND ( SIZEOF (
      QUERY ( pdr <* USEDIN ( ppd ,
      'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
      'DEFINITION' ) | ( pdr. used_representation.name
      ='quantity' ) AND ( SIZEOF ( pdr. used_representation.items
      ) =1 ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( 'AUTOMOTIVE_DESIGN.'+
      'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
      i.name = 'quantity measure' ) ) ) =1 ) ) ) =1 ) ) ) =0 ) )
      ) =0;
 WR6: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
      frame_of_reference.name = 'part occurrence' ) AND ( pd.
      name = 'specified instance' ) AND ( SIZEOF ( QUERY ( pdor
      <* USEDIN ( pd ,
      'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_OCCURRENCE_RELATIONSHIP.'+
      'OCCURRENCE' ) | 'AUTOMOTIVE_DESIGN.'+
      'SPECIFIED_HIGHER_USAGE_OCCURRENCE' IN TYPEOF ( pdor.
      occurrence_usage ) ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

product_definition_occurrence_relationship: the set of all instances of **product_definition_occurrence_relationship**.

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Formal propositions:

WR1: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence', shall either have a **name** of 'single instance', 'selected instance', 'quantified instance', or 'specified instance'.

WR2: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence' shall either participate as the **related_product_definition** in exactly one **product_definition_relationship** with a **name** of 'definition usage', or shall be referenced as **design** by exactly one **configuration_design** which has a **name** of 'occurrence usage definition' and which references as **configuration** a **product_identification**.

WR3: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence' shall (at least) participate in a **product_definition_usage** relationship as the **related_product_definition** or in a **product_definition_occurrence_relationship** as **occurrence**.

WR4: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence' and which has a **name** of 'selected instance', shall be referenced by a **property_definition** which has a **name** of 'occurrence selection', and which is referenced as **definition** by a **property_definition_representation** which has as **used_representation** a **representation** which has a **name** of 'selection criteria' and which contains exactly two **representation_item**s in its set of **items**. One of these **representation_item**s shall be of type **measure_representation_item** or **value_range** and shall have a **name** of 'selection quantity'. The other one of these **representation_item**s shall be of type **descriptive_representation_item** and shall have a **name** of 'selection control'.

WR5: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence' and which has a **name** of 'quantified instance', shall be referenced by a **property_definition** which has a **name** of 'occurrence quantity', and which is referenced as **definition** by a **property_definition_representation** which has as **used_representation** a **representation** which has a **name** of 'quantity' and which contains exactly one **representation_item** in its set of **items**. This **representation_item** is of type **measure_representation_item** and has a **name** of 'quantity measure'.

WR6: Each instance of **product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence' and which has a **name** of 'specified instance', shall be referenced as **occurrence** by a **product_definition_occurrence_relationship** which references as **occurrence_usage** a **specified_higher_usage_occurrence** .

5.2.4.177 restrict_process_product_association

The **restrict_process_product_association** rule specifies that the only **name**s of **process_product_association** permitted shall be 'input', 'output', or 'produced output'. Each instance of **process_product_association** with a **name** of 'input' or 'output' shall refer to an **action** that plays the role of **related_action** for an **action_relationship** that has a **name** of 'process operation occurrence'. See definition of Process_operation_input_or_output in paragraph 4.2.383 for more information. Each instance of **process_product_association** with a **name** of 'produced output' shall refer to a **product_definition** that

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refers as **formation** to a **product_definition_formation** that is the formation of a **product** that is either a part, tool, or raw material. See definition for Process_plan in paragraph 4.2.387 and for Item_version in paragraph 4.2.275 for more information.

EXPRESS specification:

```
*)
RULE restrict_process_product_association FOR
    (process_product_association);
WHERE
 WR1: SIZEOF ( QUERY ( ppa <* process_product_association | NOT
     ( ppa. name IN ['input' , 'output' , 'produced output' ] )
     ) ) =0;
 WR2: SIZEOF ( QUERY ( ppa <* process_product_association | NOT
     ( ppa. name IN ['input' , 'output'] ) OR ( SIZEOF ( QUERY (
     ar <* USEDIN ( ppa. process ,
     'AUTOMOTIVE_DESIGN.'+'ACTION_RELATIONSHIP.'+
     'RELATED_ACTION' ) | ar. name =
     'process operation occurrence' ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( ppa <* process_product_association | (
     ppa. name<> 'produced output' ) OR ( (
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION' IN TYPEOF ( ppa.
     defined_product ) ) AND ( SIZEOF ( QUERY ( prpc <* USEDIN (
     ppa. defined_product\product_definition.
     formation.of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name IN ['part' , 'tool' , 'raw material' ] ) )
     =0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

process_product_association: the set of all instances of **process_product_association**.

Formal propositions:

WR1: For each instance of **process_product_association**, the value of the **name** attribute shall be either 'input', 'output', or 'produced output'.

WR2: If an instance of **process_product_association** has a **name** of 'input' or 'output', it shall refer as **process** to a **product_definition_process** that is refered as **related_action** by an **action_relationship** that has a **name** of 'process operation occurrence'.

WR3: If an instance of **process_product_association** has a **name** of 'produced output', it shall refer to a **product_definition** that refers as **formation** to a **product_definition_formation** that refers as **of_-**

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product to a **product** that is contained in the set of **products** of a **product_related_product_category** with a **name** of either 'part', 'tool', or 'raw material'.

5.2.4.178 restrict_product_categories_for_tool_part_relationship

For each instance of **product_definition_relationship** that has a **name** of 'tool part relationship', the **product_definition** used as the **relating_product_definition** shall be associated to a **product_definition_formation** referencing a **product** that is referenced by a **product_related_product_category** with a **name** of 'tool', the **product_definition** used as the **related_product_definition** shall be associated to a **product_definition_formation** referencing a **product** that is referenced by a **product_related_product_category** with a **name** of 'part'.

This rule enforces the requirement that an Item_definition_relationship that is a Tool_part_relationship relates an item that is used to create a part to a part.

EXPRESS specification:

```
*)
RULE restrict_product_categories_for_tool_part_relationship FOR
    (product_definition_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( pdr. name = 'tool part relationship' ) AND ( ( SIZEOF (
     QUERY ( prpc <* USEDIN ( pdr.
     relating_product_definition.formation. of_product ,
      'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name ='tool' ) ) <1 ) OR   ( SIZEOF ( QUERY (
     prpc <* USEDIN ( pdr. related_product_definition.formation.
     of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name ='part' ) ) <1 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition_relationship: the set of all instances of **product_definition_relationship**.

Formal propositions:

WR1: For each instance of **product_definition_relationship** that has a **name** of 'tool part relationship', the **product_definition** used as the **relating_product_definition** shall be associated to a **product_definition_formation** referencing a **product** that is referenced by a **product_related_product_category** with a **name** of 'tool', the **product_definition** used as the **related_product_definition** shall be asso-

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ciated to a **product_definition_formation** referencing a **product** that is referenced by a **product_related_product_category** with a **name** of 'part'.

5.2.4.179 restrict_product_category_for_product

The **restrict_product_category_for_product** rule enforces the existence of a **product_related_product_category** with a **name** of either 'part', 'raw material', 'tool', 'document', 'functionality', 'conceptual product, 'alternative solution', 'requirement', or 'physically realized product' for each **product**.

EXPRESS specification:

```
*)
RULE restrict_product_category_for_product FOR
    (product);
WHERE
 WR1: SIZEOF ( QUERY ( p <* product | SIZEOF ( QUERY ( prpc <*
     USEDIN ( p ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name IN ['part' , 'raw material' ,
     'tool' , 'document' , 'functionality' ,
     'conceptual product' , 'alternative solution' ,
     'requirement' , 'physically realized product' ] ) ) =0 ) )
     =0;
 WR2: SIZEOF ( QUERY ( p <* product | SIZEOF ( QUERY ( prpc <*
     USEDIN ( p ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name IN ['part' , 'document' ,
     'functionality' , 'conceptual product' ,
     'alternative solution' , 'requirement' ,
     'physically realized product' ] ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

product: the set of all instances of **product**.

Formal propositions:

WR1: Each instance of **product** shall be referenced by a **product_related_product_category** with a **name** of either 'part', 'raw material', 'tool', 'document', 'functionality', 'conceptual product', 'alternative solution', 'requirement', or 'physically realized product'.

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WR2: Each instance of **product** shall be referenced by at most one **product_related_product_category** with a **name** of 'part', 'document', 'functionality', 'conceptual product', 'alternative solution', 'requirement', or 'physically realized product'.

5.2.4.180 restrict_product_definition_context_for_external_properties

The **restrict_product_definition_context_for_external_properties** rule specifies that a **product_definition** which is referenced as the **definition** by a **property_definition** which is referenced as the **derived_definition** by a **general_property_association** with a **name** of 'definitional' shall be referenced as the **definition** by a **product_definition_context_association** which has as the **frame_of_reference** a **product_definition_context** with a **name** of 'external' and which references as its **role** a **product_definition_context_role** with a **name** of 'external'.

EXPRESS specification:

```
*)
RULE restrict_product_definition_context_for_external_properties FOR
    (general_property_association,
     product_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( SIZEOF (
     QUERY ( propd <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION' ) | (
     SIZEOF ( QUERY ( gpa <* USEDIN ( propd ,
     'AUTOMOTIVE_DESIGN.'+'GENERAL_PROPERTY_ASSOCIATION.'+
     'DERIVED_DEFINITION' ) | ( gpa. name ='definitional' ) ) )
     >0 ) ) ) >0 ) AND ( SIZEOF ( QUERY ( pdca <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.'+
     'DEFINITION' ) | ( pdca. frame_of_reference.name
     ='external' ) AND ( pdca. role.name ='external' ) ) ) =0 )
     ) ) =0;
END_RULE;
(*
```

Argument definitions:

general_property_association: the set of all instances of **general_property_association**.

product_definition: the set of all instances of **product_definition**.

Formal propositions:

WR1: Each instance of **product_definition** which is referrenced as the **definition** by a **property_definition** which is refreferenced as the **derived_definition** by a **general_property_association** with a **name** of 'definitional' shall be referenced as the **definition** by a **product_definition_context_associa-**

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tion which has as the **frame_of_reference** a **product_definition_context** with a **name** of 'external' and which references as its **role** a **product_definition_context_role** with a **name** of 'external'.

5.2.4.181 restrict_product_definition_context_for_product

The **restrict_product_definition_context_for_product** rule ensures the correct correlation between the **name** of the **product_definition_context** which is referenced as the **frame_of_reference** by a **product_definition** and the **product_related_product_category** of the associated **product**.

EXPRESS specification:

```
*)
RULE restrict_product_definition_context_for_product FOR
    (product_definition,
     product_related_product_category);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name IN [ 'part definition' ,
     'part occurrence' ] ) AND ( SIZEOF ( QUERY ( prpc <* USEDIN
     ( pd. formation.of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name IN ['part' , 'raw material' , 'tool'] ) ) =0
     ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'functional definition' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pd. formation.of_product
     ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name ='functionality' ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'conceptual definition' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pd. formation.of_product
     ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name = 'conceptual product' ) ) =0 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'alternative definition' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( pd. formation.of_product
     ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc. name = 'alternative solution' ) ) =0 ) ) ) =0;
 WR5: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'design constraint definition' )
     AND ( SIZEOF ( QUERY ( prpc <* USEDIN ( pd.
     formation.of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name ='requirement' ) ) =0 ) ) ) =0;
 WR6: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'physical occurrence' ) AND (
```

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```
     SIZEOF ( QUERY ( prpc <* USEDIN ( pd. formation.of_product
     , 'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name = 'physically realized product' )
     ) =0 ) ) ) =0;
 WR7: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name = 'physical document definition' )
     AND ( SIZEOF ( QUERY ( prpc <* USEDIN ( pd.
     formation.of_product ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_RELATED_PRODUCT_CATEGORY.'+
     'PRODUCTS' ) | prpc. name ='document' ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

product_related_product_category: the set of all instances of **product_related_product_category**.

Formal propositions:

WR1: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part definition' or 'part occurrence', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'part', 'raw material', or 'tool'.

WR2: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'functional definition', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'functionality'.

WR3: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'conceptual definition', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'conceptual product'.

WR4: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'alternative solution'.

WR5: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'design constraint definition', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'requirement'.

WR6: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence', this **product_definition** shall reference as its **formation** a **prod-**

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uct_definition_formation which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'physically realized product'.

WR7: If the **product_definition** references as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical document definition', 'digital document definition', or 'physical model occurrence', this **product_definition** shall reference as its **formation** a **product_definition_formation** which references as **of_product** a **product** which is in the set of **products** of a **product_related_product_category** with a **name** of 'document'.

5.2.4.182 restrict_product_definition_for_mating_tree

The **restrict_product_definition_for_mating_tree** rule specifies that each instance of **product_definition** with a **product_definition_context** that has a **name** of 'mating definition' associated by a **product_definition_context_association** shall be referenced by exactly two instances of **product_definition_relationship** as the **relating_product_definition**. These two instances of **product_definition_relationship** shall have a **name** of 'mating membership'. Either both or one shall reference as **related_product_definition** each an instance of **product_definition** with a **product_definition_context** that has a **name** of 'part occurrence'. In the later case, the other instance of **product_definition** shall have a **product_definition_context** with a **name** of 'mating definition' specified through a **product_definition_context_association**. This rule ensures that the Mated_item_association is transformed in a binary mating tree. The bottommost node of such a mating tree is a Mating_definition that consists of two Item_instances. Every other node of Mating_definition is created by its subnode and an additional Item_instance that is added to the already mated instances. See definition of Mating_definition in paragraph 4.2.313 and for Mated_item_association in paragraph 4.2.307 for more information.

EXPRESS specification:

```
*)
RULE restrict_product_definition_for_mating_tree FOR
    (product_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( SIZEOF (
     QUERY ( pdca <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.'+
     'DEFINITION' ) | pdca. frame_of_reference.name =
     'mating definition' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr <*
     USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
     'RELATING_PRODUCT_DEFINITION' ) | pdr. name =
     'mating membership' ) ) <>2 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pd <* product_definition | ( SIZEOF (
     QUERY ( pdca <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.'+
     'DEFINITION' ) | pdca. frame_of_reference.name =
     'mating definition' ) ) =1 ) AND NOT ( {1<= SIZEOF ( QUERY
     ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
```

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```
     'RELATING_PRODUCT_DEFINITION' ) | ( pdr. name =
     'mating membership' ) AND ( pdr.
     related_product_definition.frame_of_reference. name =
     'part occurrence' ) ) ) <=2} ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pd <* product_definition | ( SIZEOF (
     QUERY ( pdca <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.'+
     'DEFINITION' ) | pdca. frame_of_reference.name =
     'mating definition' ) ) =1 ) AND ( SIZEOF ( QUERY ( pdr <*
     USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_RELATIONSHIP.'+
     'RELATING_PRODUCT_DEFINITION' ) | ( pdr. name =
     'mating membership' ) AND ( SIZEOF ( QUERY ( pdca <* USEDIN
     ( pdr. related_product_definition ,
     'AUTOMOTIVE_DESIGN.PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.DEFINITION'
     ) | pdca. frame_of_reference.name = 'mating definition' ) )
     =1 ) ) ) >1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

Formal propositions:

WR1: Each instance of **product_definition** that has a **product_definition_context** with **name** of 'mating definition' specified through a **product_definition_context_association** shall be referenced as the **relating_product_definition** by exactly two **product_definition_relationship**s with a **name** of 'mating membership'.

WR2: Each instance of **product_definition** with a **product_definition_context** that has a **name** of 'mating definition' specified through a **product_definition_context_association** shall be referenced as the **relating_product_definition** by either one or two instances of **product_definition_relationship** that have a **name** of 'mating membership' and that reference as **related_product_definition** an instance of **product_definition** with a **product_definition_context** that has a **name** of 'part occurrence'.

WR3: Each instance of **product_definition** with a **product_definition_context** that has a **name** of 'mating definition' specified through a **product_definition_context_association** shall be referenced as the **relating_product_definition** by at most one instance of **product_definition_relationship** that has a **name** of 'mating membership' and that references as **related_product_definition** an instance of **product_definition** with a **product_definition_context** that has a **name** of 'mating definition' specified through a **product_definition_context_association**.

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5.2.4.183 restrict_product_definition_substitute

The **restrict_product_definition_substitute** rule specifies the restrictions that apply to the usage of **product_definition_substitute** .

EXPRESS specification:

```
*)
RULE restrict_product_definition_substitute FOR
    (product_definition_substitute);
WHERE
 WR1: SIZEOF ( QUERY ( pds <* product_definition_substitute | (
     SIZEOF ( USEDIN ( pds ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_EFFECTIVITY_ASSIGNMENT.'+
     'ITEMS' ) ) =0 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pds <* product_definition_substitute |
     pds. substitute_definition.frame_of_reference.name<>
     'part occurrence' ) ) =0;
 WR3: SIZEOF ( QUERY ( pds <* product_definition_substitute | (
     ( 'AUTOMOTIVE_DESIGN.'+ 'ASSEMBLY_COMPONENT_USAGE' IN
     TYPEOF ( pds. context_relationship ) ) AND ( SIZEOF (
     USEDIN ( pds. context_relationship ,
     'AUTOMOTIVE_DESIGN.'+'PRODUCT_DEFINITION_OCCURRENCE_RELATIONSHIP.'+
     'OCCURRENCE_USAGE' ) ) =0 ) ) AND ( ( 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_RELATIONSHIP' IN TYPEOF ( pds.
     context_relationship ) ) AND ( pds.
     context_relationship.related_product_definition.
     frame_of_reference.name<>'part occurrence' ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition_substitute: the set of all instances of **product_definition_substitute**.

Formal propositions:

WR1: For each instance of **product_definition_substitute** there shall be at least one instance of **applied_effectivity_assignment** that contains the instance in its set of **items**. This rule enforces the requirement for every instance of Replaced_usage_relationship to have at least one Effectivity applied to it specifiying the start of the validity of the replacement.

WR2: Each instance of **product_definition_substitute** shall reference as **substitute_definition** a **product_definition** which references as **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence'.

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WR3: Each instance of **product_definition_substitute** shall reference as **context_relationship** an **assembly_component_usage** which is referenced as **occurrence_usage** by a **product_definition_occurrence_relationship**, or shall reference as **context_relationship** a **product_definition_relationship** with a **related_product_definition** which references as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence'.

5.2.4.184 restrict_product_definitions_for_product_definition_relationship

The **restrict_product_definitions_for_product_definition_relationship** rule ensures the correct correlation between the **name** or type of the **product_definition_relationship** and the **product_definition_context** of the related **product_definition**s.

EXPRESS specification:

```
*)
RULE restrict_product_definitions_for_product_definition_relationship FOR
    (assembly_component_usage,
     product_definition_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( pdr. name = 'definition usage' ) AND ( ( pdr.
     relating_product_definition.frame_of_reference. name<>
     'part definition' ) OR ( pdr.
     related_product_definition.frame_of_reference. name<>
     'part occurrence' ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( pdr. name IN [ 'geometrical relationship' ,
     'definition replacement' ] ) AND ( ( pdr.
     relating_product_definition.frame_of_reference. name<>
     'part definition' ) OR ( pdr.
     related_product_definition.frame_of_reference. name<>
     'part definition' ) ) ) ) =0;
 WR3: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( 'AUTOMOTIVE_DESIGN.'+ 'ASSEMBLY_COMPONENT_USAGE' IN
     TYPEOF ( pdr ) ) AND ( ( pdr.
     relating_product_definition.frame_of_reference. name<>
     'part definition' ) OR ( pdr.
     related_product_definition.frame_of_reference. name<>
     'part definition' ) ) AND ( ( pdr.
     relating_product_definition.frame_of_reference. name<>
     'physical occurrence' ) OR ( pdr.
     related_product_definition.frame_of_reference. name<>
     'physical occurrence' ) ) ) ) =0;
 WR4: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
     ( 'AUTOMOTIVE_DESIGN.'+ 'ASSEMBLY_COMPONENT_USAGE' IN
     TYPEOF ( pdr ) ) AND ( pdr. name =
     'selected instance usage' ) AND ( ( pdr.
```

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```
    relating_product_definition.frame_of_reference. name<>
    'part definition' ) OR ( pdr.
    related_product_definition.frame_of_reference. name<>
    'part definition' ) ) ) ) =0;
WR5: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'physical realization' ) AND ( ( pdr.
    relating_product_definition.frame_of_reference. name<>
    'part occurrence' ) OR ( pdr.
    related_product_definition.frame_of_reference. name<>
    'physical occurrence' ) ) ) ) =0;
WR6: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'physical occurrence usage' ) AND ( NOT (
    'AUTOMOTIVE_DESIGN.'+ 'ASSEMBLY_COMPONENT_USAGE' IN TYPEOF
    ( pdr ) ) OR ( pdr.
    relating_product_definition.frame_of_reference. name<>
    'physical occurrence' ) OR ( pdr.
    related_product_definition.frame_of_reference. name<>
    'physical occurrence' ) ) ) ) =0;
WR7: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'solution alternative definition' ) AND ( NOT
    ( pdr. relating_product_definition.frame_of_reference. name
    IN [ 'alternative definition' , 'functional definition' ,
    'conceptual definition' ] ) OR ( pdr.
    related_product_definition.frame_of_reference. name<>
    'alternative definition' ) ) ) ) =0;
WR8: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'collection membership' ) AND ( ( pdr.
    relating_product_definition.frame_of_reference. name<>
    'part definition' ) OR ( pdr.
    related_product_definition.frame_of_reference. name<>
    'part occurrence' ) OR ( SIZEOF ( QUERY ( pdca <* USEDIN (
    pdr. relating_product_definition ,
    'AUTOMOTIVE_DESIGN.PRODUCT_DEFINITION_CONTEXT_ASSOCIATION.DEFINITION'
    ) | ( pdca. role.name = 'part definition type' ) AND (
    pdca. frame_of_reference.name = 'collection definition' ) )
    ) =0 ) ) ) ) =0;
WR9: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'design constraint association' ) AND ( (
    pdr. relating_product_definition.frame_of_reference. name<>
    'design constraint definition' ) OR NOT ( pdr.
    related_product_definition.frame_of_reference. name IN [
    'alternative definition' , 'functional definition' ,
    'conceptual definition' ] ) ) ) ) =0;
WR10: SIZEOF ( QUERY ( pdr <* product_definition_relationship |
    ( pdr. name = 'final specification' ) AND ( NOT ( pdr.
    relating_product_definition.name IN ['final' ,
    'technical final' , 'supplier final' ,
    'technical supplier final' ] ) OR ( pdr.
    relating_product_definition.frame_of_reference. name<>
    'alternative definition' ) ) OR NOT ( pdr.
    related_product_definition.name IN [ 'part definition' ,
    'physical occurrence' ] ) ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

assembly_component_usage: the set of all instances of **assembly_component_usage**.

product_definition_relationship: the set of all instances of **product_definition_relationship**.

Formal propositions:

WR1: If the **product_definition_relationship** has a **name** of 'definition usage', the **relating_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'part definition', and the **related_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence'.

WR2: If the **product_definition_relationship** has a **name** of 'geometrical relationship' or 'definition replacement', the **relating_product_definition** and the **related_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'part definition'.

WR3: If the **product_definition_relationship** is of type **assembly_component_usage**, the **relating_product_definition** and the **related_product_definition** shall either both reference as their **frame_of_reference** a **product_definition_context** with a **name** of 'part definition', or shall both reference as their **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence'.

WR4: If the **product_definition_relationship** is of type **assembly_component_usage** and has a **name** of 'selected instance usage', the **relating_product_definition** and the **related_product_definition** shall both reference as their **frame_of_reference** a **product_definition_context** with a **name** of 'part definition'.

WR5: If the **product_definition_relationship** has a **name** of 'physical realization', the **relating_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'part occurrence', and the **related_product_definition** shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence'.

WR6: If the **product_definition_relationship** has a **name** of 'physical occurrence usage', it shall be of type **assembly_component_usage** and both the **relating_product_definition** and the **related_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'physical occurrence' .

WR7: If the **product_definition_relationship** has a **name** of 'solution alternative definition', the **relating_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition', 'functional definition' or 'conceptual definition', and the **related_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition'.

WR8: If the **product_definition_relationship** has a **name** of 'collection membership', the **related_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name**

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of 'part occurrence', and the **relating_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'part definition' and shall be referenced as the **definition** by a **product_definition_context_association**. This **product_definition_context_association** shall reference as its **role** a **product_definition_context_role** with a **name** of 'part definition type' and shall reference as its **frame_of_reference** a **product_definition_context** with a **name** of 'collection definition'.

WR9: If the **product_definition_relationship** has a **name** of 'design constraint association', the **relating_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'design constraint definition', and the **related_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition', 'functional definition', or 'conceptual definition'.

WR10: If the **product_definition_relationship** has a **name** of 'final specification', the **relating_product_definition** shall have a **name** of 'final', 'technical final', 'supplier final', or 'technical supplier final' and shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'alternative definition', and the **related_product_definition** shall reference as **frame_of_reference** a **product_definition_context** with a **name** of 'part definition', or 'physical occurrence'.

5.2.4.185 restrict_properties_of_document_file

The **restrict_representation_for_document_properties** rule specifies the restrictions that apply for properties of **digital_file**s.

EXPRESS specification:

```
*)
RULE restrict_properties_of_document_file FOR
    (document_file);
WHERE
 WR1: SIZEOF ( QUERY ( df <* document_file | SIZEOF ( QUERY ( pd
     <* USEDIN ( df ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION.'+ 'DEFINITION' )
     | pd. name = 'document property' ) ) >1 ) ) =0;
 WR2: SIZEOF ( QUERY ( df <* document_file | SIZEOF ( QUERY ( rt
     <* df. representation_types | ( 'AUTOMOTIVE_DESIGN.'+
     'DOCUMENT_REPRESENTATION_TYPE' IN TYPEOF ( rt ) ) AND ( rt.
     name IN ['digital' , 'physical'] ) ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

document_file: the set of all instances of **document_file**.

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Formal propositions:

WR1: Each instance of **document_file** shall be referenced as **definition** by at most one **property_definition** with a **name** of 'document property'.

WR2: Each instance of **document_file** shall reference as **representation_types** an instance of **document_representation_type** with a **name** of either 'digital', or 'physical'.

5.2.4.186 restrict_properties_of_document_representation

The **restrict_properties_of_document_representation** rule specifies the restrictions that apply for properties of **document_representation**s.

EXPRESS specification:

```
*)
RULE restrict_properties_of_document_representation FOR
    (product_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* product_definition | ( pd.
     frame_of_reference.name IN [ 'physical document definition'
     , 'digital document definition' ,
     'physical model occurrence' ] ) AND ( SIZEOF ( QUERY ( pd1
     <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION.'+ 'DEFINITION' )
     | pd1. name = 'document property' ) ) >1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_definition: the set of all instances of **product_definition**.

Formal propositions:

WR1: Each instance of **product_definition** that references as **frame_of_reference** a **application_context_element** with a **name** of either 'physical document definition', 'digital document definition', or 'physical model occurrence' shall be referenced as **definition** by at most one **property_definition** with a **name** of 'document property'.

5.2.4.187 restrict_representation_for_document_content_property

The **restrict_representation_for_document_content_property** rule specifies the restrictions that apply for **representation**s with a **name** of 'document content'.

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EXPRESS specification:

```
*)
RULE restrict_representation_for_document_content_property FOR
    (representation,
     representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document content' ) AND ( ( SIZEOF ( r.items ) <1 ) OR (
     SIZEOF ( r.items ) >3 ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( ri <* representation_item | ( SIZEOF (
     QUERY ( r <* USEDIN ( ri ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | r.name =
     'document content' ) ) >0 ) AND NOT ( ri. name IN [
     'detail level' , 'geometry type' , 'real world scale' ] ) )
     ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document content' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     ( i.name = 'detail level' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >1
     ) ) ) =0;
 WR4: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document content' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     ( i.name = 'geometry type' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >1
     ) ) ) =0;
 WR5: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document content' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     ( i.name = 'real world scale' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_REPRESENTATION_ITEM']* TYPEOF
     ( i ) ) =1 ) ) ) >1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

representation_item: the set of all instances of **representation_item**.

Formal propositions:

WR1: For each instance of **representation** which has a **name** of 'document content' there shall be at least one and at most three instances of **representation_item**s in the set of **items**.

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WR2: Each instance of **representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document content' shall have a **name** of either 'detail level', 'geometry type', or 'real world scale'.

WR3: There shall be at most one instance of **representation_item** that have a **name** of 'detail level' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document content'.

WR4: There shall be at most one instance of **representation_item** that have a **name** of 'geometry type' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document content'.

WR5: There shall be at most one instance of **representation_item** that have a **name** of 'real world scale' and which is either of type **measure_representation_item**, or **value_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document content'.

5.2.4.188 restrict_representation_for_document_creation_property

The **restrict_representation_for_document_creation_property** rule specifies the restrictions that apply for **representation**s with a **name** of 'document creation'.

EXPRESS specification:

```
*)
RULE restrict_representation_for_document_creation_property FOR
    (representation,
     representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document creation' ) AND ( ( SIZEOF ( r.items ) <2 ) OR (
     SIZEOF ( r.items ) >3 ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( ri <* representation_item | ( SIZEOF (
     QUERY ( r <* USEDIN ( ri ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | r.name =
     'document creation' ) ) >0 ) AND NOT ( ri. name IN [
     'creating interface' , 'creating system' ,
     'operating system' ] ) ) ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document creation' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     ( i.name = 'creating interface' ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) ) ) >1 ) ) ) =0;
 WR4: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document creation' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     ( i.name = 'creating system' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) <>1
     ) ) ) =0;
 WR5: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document creation' ) AND ( SIZEOF ( QUERY ( i <* r.items |
```

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```
     ( i.name = 'operating system' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) >1
     ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

representation_item: the set of all instances of **representation_item**.

Formal propositions:

WR1: For each instance of **representation** which has a **name** of 'document creation' there shall be at least two and at most three instances of **representation_item**s in the set of **items**.

WR2: Each instance of **representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document creation' shall have a **name** of either 'creating interface', 'creating system', or 'operating system'.

WR3: There shall be at most one instance of **representation_item** that have a **name** of 'creating interface' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document creation'.

WR4: There shall be exactly one instance of **representation_item** that have a **name** of 'creating system' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document creation'.

WR5: There shall be at most one instance of **representation_item** that have a **name** of 'operating system' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document creation'.

5.2.4.189 restrict_representation_for_document_format_property

The **restrict_representation_for_document_format_property** rule specifies the restrictions that apply for **representation**s with a **name** of 'document format'.

EXPRESS specification:

```
*)
RULE restrict_representation_for_document_format_property FOR
    (representation,
     representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | ( r.name =
```

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```
     'document format' ) AND ( ( SIZEOF ( r.items ) <1 ) OR (
     SIZEOF ( r.items ) >2 ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( ri <* representation_item | ( SIZEOF (
     QUERY ( r <* USEDIN ( ri ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | r.name =
     'document format' ) ) >0 ) AND NOT ( ri. name IN [
     'character code' , 'data format' ] ) ) ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document format' ) AND ( SIZEOF ( QUERY ( i <* r.items | (
     i.name = 'character code' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >1
     ) ) ) =0;
 WR4: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document format' ) AND ( SIZEOF ( QUERY ( i <* r.items | (
     i.name = 'data format' ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >1
     ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

representation_item: the set of all instances of **representation_item**.

Formal propositions:

WR1: For each instance of **representation** which has a **name** of 'document format' there shall be at least one and at most two instances of **representation_item**s in the set of **items**.

WR2: Each instance of **representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document format' shall have a **name** of either 'character code', or 'data format'.

WR3: There shall be at most one instance of **representation_item** that have a **name** of 'character code' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document format'.

WR4: There shall be at most one instance of **representation_item** that have a **name** of 'data format' and which is of type **desriptive_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document format'.

5.2.4.190 restrict_representation_for_document_properties

The **restrict_representation_for_document_properties** rule specifies that each instance of **property_definition** with a **name** of 'document property' shall be represented by **representation**s with a **name** of either 'document content', 'document creation', 'document format', or 'document size'. At the same time, this rules enforces that each instance of **representation** with a **name** of either 'document content',

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'document creation', 'document format', or 'document size', shall be referenced by one instance of **property_definition** with a **name** of 'document property'.

EXPRESS specification:

```
*)
RULE restrict_representation_for_document_properties FOR
    (property_definition,representation,
     representation_context);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* property_definition | ( pd. name =
     'document property' ) AND ( SIZEOF ( QUERY ( pdr <* USEDIN
     ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+'DEFINITION'
     ) | NOT ( pdr. used_representation.name IN [
     'document content' , 'document creation' ,
     'document format' , 'document size' ] ) ) ) >0 ) ) ) =0;
 WR2: SIZEOF ( QUERY ( r <* representation | ( r.name IN [
     'document content' , 'document creation' ,
     'document format' , 'document size' ] ) AND ( SIZEOF (
     QUERY ( pdr <* USEDIN ( r ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'USED_REPRESENTATION'
     ) | ( 'AUTOMOTIVE_DESIGN.'+ 'PROPERTY_DEFINITION' IN TYPEOF
     ( pdr. definition ) ) AND ( pdr. definition.name =
     'document property' ) ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name IN [
     'document content' , 'document creation' ,
     'document format' , 'document size' ] ) AND (
     r.context_of_items. context_type<> 'document parameters' )
     ) ) =0;
 WR4: SIZEOF ( QUERY ( rc <* representation_context | ( rc.
     context_type = 'document parameters' ) AND ( SIZEOF ( QUERY
     ( r <* USEDIN ( rc ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.CONTEXT_OF_ITEMS' ) | NOT
     ( r.name IN [ 'document content' , 'document creation' ,
     'document format' , 'document size' ] ) ) ) >0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

property_definition: the set of all instances of **property_definition**.

representation: the set of all instances of **representation**.

representation_context: the set of all instances of **representation_context**.

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Formal propositions:

WR1: Each instance of **property_definition** with a **name** of 'document property' shall be referenced as **definition** by a **property_definition_representation**, which has as **used_representation** a **representation** with a **name** of either 'document content', 'document creation', 'document format', or 'document size'.

WR2: Each instance of **representation** with a **name** of either 'document content', 'document creation', 'document format', or 'document size' shall be referenced as **used_representation** by a **property_definition_representation**, which has as **definition** a **property_definition** with a **name** of 'document property'.

WR3: Each instance of **representation** with a **name** of either 'document content', 'document creation', 'document format', or 'document size' shall reference as **context_of_items** a **representation_context**, whith a **context_type** of 'document parameters'.

WR4: Each instance of **representation_context** with a **context_type** of 'document parameters' shall be referenced as **context_of_items** by a **representation** with a **name** of either 'document content', 'document creation', 'document format', or 'document size'.

5.2.4.191 restrict_representation_for_document_size_property

The **restrict_representation_for_document_size_property** rule specifies the restrictions that apply for **representation**s with a **name** of 'document size'.

EXPRESS specification:

```
*)
RULE restrict_representation_for_document_size_property FOR
    (representation,
     representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document size' ) AND ( ( SIZEOF ( r.items ) <1 ) OR (
     SIZEOF ( r.items ) >2 ) ) ) ) =0;
 WR2: SIZEOF ( QUERY ( ri <* representation_item | ( SIZEOF (
     QUERY ( r <* USEDIN ( ri ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) | r.name =
     'document size' ) ) >0 ) AND NOT ( ri. name IN [
     'file size' , 'page count' ] ) ) ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'document size' ) AND ( SIZEOF ( QUERY ( i <* r.items | (
     i.name = 'file size' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE' , 'AUTOMOTIVE_DESIGN.'+
     'VALUE_REPRESENTATION_ITEM']* TYPEOF ( i ) ) =1 ) ) ) >1 )
     ) ) =0;
 WR4: SIZEOF ( QUERY ( r <* representation | ( r.name =
```

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```
     'document size' ) AND ( SIZEOF ( QUERY ( i <* r.items | (
     i.name = 'page count' ) AND ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE' , 'AUTOMOTIVE_DESIGN.'+
     'VALUE_REPRESENTATION_ITEM']* TYPEOF ( i ) ) =1 ) ) ) >1 )
     ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

representation_item: the set of all instances of **representation_item**.

Formal propositions:

WR1: For each instance of **representation** which has a **name** of 'document size' there shall be at least one and at most two instances of **representation_item**s in the set of **items**.

WR2: Each instance of **representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document size' shall have a **name** of either 'file size', or 'page count'.

WR3: There shall be at most one instance of **representation_item** that have a **name** of 'file size' and which is either of type **measure_representation_item**, **value_range**, or **value_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document size'.

WR4: There shall be at most one instance of **representation_item** that have a **name** of 'page count' and which is either of type **measure_representation_item**, **value_range**, or **value_representation_item** that is referenced as **items** by an instance of **representation** with a **name** of 'document size'.

5.2.4.192 restrict_representation_item_for_hybrid_geometric_model_3d

The **restrict_representation_item_for_hybrid_geometric_model_3d** specifies that each instance of **shape_representation** with a **name** of 'hybrid 3d shape representation' shall have only **geometric_representation_item**s in its set of **items**.

EXPRESS specification:

```
*)
RULE restrict_representation_item_for_hybrid_geometric_model_3d FOR
    (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( sr <* shape_representation | ( sr. name =
     'hybrid 3d shape representation' ) AND ( SIZEOF ( QUERY ( i
```

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```
     <* sr. items | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >0 )
     ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_representation: the set of all instances of **shape_representation**.

Formal propositions:

WR1: Each instance of **shape_representation** with a **name** of 'hybrid 3d shape representation' shall have only **geometric_representation_item**s in its set of **items**.

5.2.4.193 restrict_treatment_result

The **restrict_treatment_result** rule ensures the correct usage of an **representation** that fulfills the requirement of a Treatment_result (see 4.2.538.

EXPRESS specification:

```
*)
RULE restrict_treatment_result FOR
    (representation);
WHERE
 WR1: ( SIZEOF ( QUERY ( r <* representation | ( r.name =
     'treatment result' ) AND ( SIZEOF ( r.items ) >2 ) ) ) =0 )
     AND ( SIZEOF ( QUERY ( r <* representation | ( r.name =
     'treatment result' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     NOT ( 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) >0
     ) ) ) =0 ) ;
 WR2: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'treatment result' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     i.name ='result' ) ) =0 ) ) ) =0;
 WR3: SIZEOF ( QUERY ( r <* representation | ( r.name =
     'treatment result' ) AND ( SIZEOF ( QUERY ( i <* r.items |
     i.name ='purpose' ) ) >1 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of **representation** that has a **name** of 'treatment result' shall contain at most 2 **representation_item**s in its set of **items**. These **representation_item**s shall be of type **descriptive_representation_item**.

WR2: Exactly one **representation_item** shall have a **name** of 'result'.

WR3: At most one **representation_item** shall have a **name** of 'purpose'.

5.2.4.194 restrict_version_assignment_for_action

The **restrict_version_assignment_for_action** rule specifies that each instance of **action** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **action**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_action FOR
    (action);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action | SIZEOF ( QUERY ( ia <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia.role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

action: The set of all instances of **action**.

Formal propositions:

WR1: For each instance of **action** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

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5.2.4.195 restrict_version_assignment_for_action_directive

The **restrict_version_assignment_for_action_directive** rule specifies that each instance of **action_directive** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **action_directive**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_action_directive FOR
    (action_directive);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_directive | SIZEOF ( QUERY
     ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_directive: The set of all instances of **action_directive**.

Formal propositions:

WR1: For each instance of **action_directive** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.196 restrict_version_assignment_for_action_method

The **restrict_version_assignment_for_action_method** rule specifies that each instance of **action_method** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **action_method**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_action_method FOR
    (action_method);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* action_method | SIZEOF ( QUERY (
     ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_method: The set of all instances of **action_method**.

Formal propositions:

WR1: For each instance of **action_method** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.197 restrict_version_assignment_for_applied_identification_assignment

The **restrict_version_assignment_for_applied_identification_assignment** rule specifies that each instance of **applied_identification_assignment** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **applied_identification_assignment**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_applied_identification_assignment FOR
    (applied_identification_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* applied_identification_assignment
     | SIZEOF ( QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

applied_identification_assignment: The set of all instances of **applied_identification_assignment**.

Formal propositions:

WR1: For each instance of **applied_identification_assignment** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

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5.2.4.198 restrict_version_assignment_for_class

The **restrict_version_assignment_for_class** rule specifies that each instance of **class** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **class**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_class FOR
    (class);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* class | SIZEOF ( QUERY ( ia <*
     USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

class: The set of all instances of **class**.

Formal propositions:

WR1: For each instance of **class** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.199 restrict_version_assignment_for_configuration_item

The **restrict_version_assignment_for_configuration_item** rule specifies that each instance of **configuration_item** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **configuration_item**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_configuration_item FOR
    (configuration_item);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* configuration_item | SIZEOF (
     QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

configuration_item: The set of all instances of **configuration_item**.

Formal propositions:

WR1: For each instance of **configuration_item** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.200 restrict_version_assignment_for_document_file

The **restrict_version_assignment_for_document_file** rule specifies that each instance of **document_file** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **document_file**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_document_file FOR
    (document_file);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* document_file | SIZEOF ( QUERY (
     ia <* USEDIN ( ent,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia.role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

document_file: The set of all instances of **document_file**.

Formal propositions:

WR1: For each instance of **document_file** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

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5.2.4.201 restrict_version_assignment_for_draughting_model

The **restrict_version_assignment_for_draughting_model** rule specifies that each instance of **draughting_model** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **draughting_model**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_draughting_model FOR
    (draughting_model);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* draughting_model | SIZEOF ( QUERY
     ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

draughting_model: The set of all instances of **draughting_model**.

Formal propositions:

WR1: For each instance of **draughting_model** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.202 restrict_version_assignment_for_effectivity

The **restrict_version_assignment_for_effectivity** rule specifies that each instance of **effectivity** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **effectivity**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_effectivity FOR
    (effectivity);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* effectivity | SIZEOF ( QUERY ( ia
     <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
```

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```
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

effectivity: The set of all instances of **effectivity**.

Formal propositions:

WR1: For each instance of **effectivity** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.203 restrict_version_assignment_for_general_property

The **restrict_version_assignment_for_general_property** rule specifies that each instance of **general_property** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **general_property**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_general_property FOR
    (general_property);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* general_property | SIZEOF ( QUERY
     ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

general_property: The set of all instances of **general_property**.

Formal propositions:

WR1: For each instance of **general_property** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

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5.2.4.204 restrict_version_assignment_for_m_d_g_p_r

The **restrict_version_assignment_for_m_d_g_p_r** rule specifies that each instance of **mechanical_design_geometric_presentation_representation** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **mechanical_design_geometric_presentation_representation**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_m_d_g_p_r FOR
    (mechanical_design_geometric_presentation_representation);
WHERE
 WR1: SIZEOF ( QUERY ( ent <*
     mechanical_design_geometric_presentation_representation |
     SIZEOF ( QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

mechanical_design_geometric_presentation_representation: The set of all instances of **mechanical_design_geometric_presentation_representation**.

Formal propositions:

WR1: For each instance of **mechanical_design_geometric_presentation_representation** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.205 restrict_version_assignment_for_presentation_area

The **restrict_version_assignment_for_presentation_area** rule specifies that each instance of **presentation_area** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **presentation_area**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_presentation_area FOR
    (presentation_area);
WHERE
```

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```
 WR1: SIZEOF ( QUERY ( ent <* presentation_area | SIZEOF ( QUERY
     ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

presentation_area: The set of all instances of **presentation_area**.

Formal propositions:

WR1: For each instance of **presentation_area** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.206 restrict_version_assignment_for_product_concept

The **restrict_version_assignment_for_product_concept** rule specifies that each instance of **product_concept** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **product_concept**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_product_concept FOR
    (product_concept);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_concept | SIZEOF ( QUERY (
     ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_concept: The set of all instances of **product_concept**.

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Formal propositions:

WR1: For each instance of **product_concept** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.207 restrict_version_assignment_for_product_concept_feature

The **restrict_version_assignment_for_product_concept_feature** rule specifies that each instance of **product_concept_feature** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **product_concept_feature**.

EXPRESS specification:

```
*)
RULE restrict_version_assignment_for_product_concept_feature FOR
    (product_concept_feature);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* product_concept_feature | SIZEOF (
     QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

product_concept_feature: The set of all instances of **product_concept_feature**.

Formal propositions:

WR1: For each instance of **product_concept_feature** there shall be only at most one instance of **applied_identification_assignment** with a role name of 'version'.

5.2.4.208 restrict_version_assignment_for_shape_representation

The **restrict_version_assignment_for_shape_representation** rule specifies that each instance of **shape_representation** shall be referenced by at most one instance of **applied_identification_assignment** that specifies the version of the **shape_representation**.

EXPRESS specification:

```
*)
```

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```
RULE restrict_version_assignment_for_shape_representation FOR
    (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( ent <* shape_representation | SIZEOF (
     QUERY ( ia <* USEDIN ( ent ,
     'AUTOMOTIVE_DESIGN.'+'APPLIED_IDENTIFICATION_ASSIGNMENT.'+
     'ITEMS' ) | ia. role.name ='version' ) ) >1 ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_representation: The set of all instances of **shape_representation**.

Formal propositions:

WR1: For each instance of **shape_representation** there shall be only at most one instance of **applied_-identification_assignment** with a role name of 'version'.

5.2.4.209 restrict_viewing_plane_usage

The **restrict_viewing_plane_usage** rule ensures the correct usage of the viewing plane capabilities for tolerances. It constrains the usage to the types of **geometric_tolerance** that are applicable.

EXPRESS specification:

```
*)
RULE restrict_viewing_plane_usage FOR
    (geometric_tolerance);
WHERE
 WR1: SIZEOF ( QUERY ( gt <* geometric_tolerance | SIZEOF (
     QUERY ( sar <* USEDIN ( gt. toleranced_shape_aspect ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.'+'RELATING_SHAPE_ASPECT'
     ) | sar. name = 'affected plane association' ) ) >1 ) ) =0;
 WR2: SIZEOF ( QUERY ( gt <* geometric_tolerance | SIZEOF (
     QUERY ( sar <* USEDIN ( gt. toleranced_shape_aspect ,
     'AUTOMOTIVE_DESIGN.'+'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( sar. name =
     'affected plane association' ) AND NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'LINE_PROFILE_TOLERANCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PARALLELISM_TOLERANCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PERPENDICULARITY_TOLERANCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POSITION_TOLERANCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'STRAIGHTNESS_TOLERANCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'SYMMETRY_TOLERANCE']* TYPEOF ( gt )
     ) <>1 ) ) ) >0 ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

geometric_tolerance: the set of all instances of **geometric_tolerance**.

Formal propositions:

WR1: The **toleranced_shape_aspect** of each instance of **geometric_tolerance** shall be refered to as **relating_shape_aspect** by at most one **shape_aspect_relationship** that has a **name** of 'affected plane association'.

WR2: The **toleranced_shape_aspect** of an instance of **geometric_tolerance** shall only be refered to as **relating_shape_aspect** by a **shape_aspect_relationship** with a **name** of 'affected plane association' if the **geometric_tolerance** is of typeline_profile_tolerance, **parallelism_tolerance**, **perpendicularity_-tolerance**, **position_tolerance**, **straightness_tolerance**, or **symmetry_tolerance**.

5.2.4.210 restrict_zone_boundary

The **restrict_zone_boundary** rule ensures that a Tolerance_zone_definition (see 4.2.525) is unambigously defined.

EXPRESS specification:

```
*)
RULE restrict_zone_boundary FOR
    (tolerance_zone_definition);
WHERE
 WR1: SIZEOF ( QUERY ( tzd <* tolerance_zone_definition | SIZEOF
     ( tzd. boundaries ) >2 ) ) =0;
END_RULE;
(*
```

Argument definitions:

tolerance_zone_definition: the set of all instances of **tolerance_zone_definition**.

Formal propositions:

WR1: Each instance of **tolerance_zone_definition** shall refer to at most two **shape_aspect**s as **boundaries**.

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5.2.4.211 retention_requires_retention_assignment

The **retention_requires_retention_assignment** rule specifies that each instance of **retention** is referenced by at least one instance of **applied_action_assignment** as the **assigned_action**, where the role of this **applied_action_assignment** is 'retention'.

This rule enforces the requirement for every instance of Retention_period to be applied at least once.

EXPRESS specification:

```
*)
RULE retention_requires_retention_assignment FOR
    (retention);
WHERE
 WR1: SIZEOF ( QUERY ( r <* retention | SIZEOF ( QUERY ( aa <*
     USEDIN ( r , 'AUTOMOTIVE_DESIGN.'+'ACTION_ASSIGNMENT.'+
     'ASSIGNED_ACTION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( aa ) ) AND ( aa.
     role.name ='retention' ) ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

retention: the set of all instances of **retention**.

Formal propositions:

WR1: Each instance of **retention** shall be referenced at least once as the **assigned_action** by an instance of **applied_action_assignment**, where the **name** of the **object_role** of this **applied_action_assignment** is 'retention'.

5.2.4.212 security_classification_requires_security_classification_assignment

The **security_classification_requires_security_classification_assignment** rule specifies that each instance of **security_classification** is referenced by at least one instance of **security_classification_assignment** as the **assigned_security_classification**. This rule enforces the requirement for every Security_classification to be applied at least once.

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EXPRESS specification:

```
*)
RULE security_classification_requires_security_classification_assignment FOR
    (security_classification);
WHERE
 WR1: SIZEOF ( QUERY ( sc <* security_classification | SIZEOF (
     USEDIN ( sc ,
     'AUTOMOTIVE_DESIGN.'+'SECURITY_CLASSIFICATION_ASSIGNMENT.'+
     'ASSIGNED_SECURITY_CLASSIFICATION' ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

security_classification: the set of all instances of **security_classification**.

Formal propositions:

WR1: Each instance of **security_classification** shall be used at least once as the **assigned_security_classification** by an instance of **security_classification_assignment**.

5.2.4.213 selected_instance_usage_requires_representation

The **selected_instance_usage_requires_representation** rule specifies that each instance of **assembly_component_usage** which has a **name** of 'selected instance usage' shall be represented by a **representation** with a **name** of 'selection criteria' containing two **representation_item**s describing the constraints the quantity of the **related_product_definition** depends on.

EXPRESS specification:

```
*)
RULE selected_instance_usage_requires_representation FOR
    (assembly_component_usage,
     representation);
WHERE
 WR1: SIZEOF ( QUERY ( acr <* assembly_component_usage | ( acr.
     name = 'selected instance usage' ) AND ( SIZEOF ( QUERY (
     pd <* USEDIN ( acr ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION.'+ 'DEFINITION' )
     | ( pd. name = 'occurrence selection' ) AND ( SIZEOF (
     QUERY ( pdr <* USEDIN ( pd ,
     'AUTOMOTIVE_DESIGN.'+'PROPERTY_DEFINITION_REPRESENTATION.'+
     'DEFINITION' ) | ( pdr. used_representation.name =
     'selection criteria' ) AND ( SIZEOF ( pdr.
```

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```
     used_representation.items ) =2 ) AND ( SIZEOF ( QUERY ( i
     <* pdr. used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'VALUE_RANGE']* TYPEOF ( i ) ) =1 )
     AND ( i.name = 'selection quantity' ) ) ) =1 ) AND ( SIZEOF
     ( QUERY ( i <* pdr. used_representation.items | (
     'AUTOMOTIVE_DESIGN.'+ 'DESCRIPTIVE_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) AND ( i.name = 'selection control' ) ) ) =1
     ) ) ) >0 ) ) ) =0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

assembly_component_usage: the set of all instances of **assembly_component_usage**.

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of **assembly_component_relationship** which has a **name** of 'selected instance usage' shall be referenced by a **property_definition** which has a **name** of 'occurrence selection', and which is referenced as **definition** by a **property_definition_representation** which has as **used_representation** a **representation** which has a **name** of 'selection criteria' and which contains exactly two **representation_item**s in its set of **items**. One of these **representation_item**s shall be of type **measure_representation_item** or **value_range** and shall have a **name** of 'selection quantity'. The other one of these **representation_item**s shall be of type **descriptive_representation_item** and shall have a **name** of 'selection control'.

5.2.4.214 sheets_belong_to_one_drawing

The **sheets_belong_to_one_drawing** rule ensures that each **drawing_sheet_revision** belongs to exactly one **drawing_revision**.

EXPRESS specification:

```
*)
RULE sheets_belong_to_one_drawing FOR
    (drawing_sheet_revision);
WHERE
 WR1: SIZEOF ( QUERY ( dsr <* drawing_sheet_revision | SIZEOF (
     QUERY ( dsru <* USEDIN ( dsr ,
     'AUTOMOTIVE_DESIGN.AREA_IN_SET.AREA' ) | (
     'AUTOMOTIVE_DESIGN.'+ 'DRAWING_SHEET_REVISION_USAGE' IN
     TYPEOF ( dsru ) ) ) <>1 ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

drawing_sheet_revision: the set of all instances of **drawing_sheet_revision**.

Formal propositions:

WR1: For each instance of **drawing_sheet_revision** there shall be exactly one instance of **drawing_sheet_revision_usage** which contains the instance of **drawing_sheet_revision** as its **area** attribute.

5.2.4.215 styled_curve

The **styled_curve** rule ensures that a **styled_item** that gives the style for a **curve** specifies a single **curve_style**.

EXPRESS specification:

```
*)
RULE styled_curve FOR
    (styled_item);
WHERE
 WR1: SIZEOF ( QUERY ( si <* styled_item | (
     'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF ( si. item ) ) AND
     ( SIZEOF ( QUERY ( psa <* si. styles | ( SIZEOF ( QUERY (
     cs <* psa. styles | ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE'
     IN TYPEOF ( cs ( ) ) ) >0 ) ) ) <>1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

styled_item: the set of all instances of **styled_item**.

Formal propositions:

WR1: Every **styled_item** that provides the style for a **curve** shall have exactly one style that is a **curve_style**.

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5.2.4.216 subtype_exclusiveness_action

The **subtype_exclusiveness_action** rule specifies that the subtypes of **action** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_action FOR
    (action);
WHERE
 WR1: SIZEOF ( QUERY ( a <* action | NOT ( type_check_function (
     a , ['AUTOMOTIVE_DESIGN.'+ 'ELEMENT_DELIVERY' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXECUTED_ACTION' ,
     'AUTOMOTIVE_DESIGN.'+ 'PROCESS_PLAN' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_PROCESS' ,
     'AUTOMOTIVE_DESIGN.'+ 'PROPERTY_PROCESS' ,
     'AUTOMOTIVE_DESIGN.'+ 'RETENTION'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

action: the set of all instances of **action**.

Formal propositions:

WR1: Each instance of the subtypes of an **action** shall be only one of **element_delivery**, **executed_action**, **process_plan**, **product_definition_process**, **property_process**, **retention**.

5.2.4.217 subtype_exclusiveness_characterized_object

The **subtype_exclusiveness_characterized_object** rule specifies that the subtypes of **characterized_object** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_characterized_object FOR
    (characterized_object);
WHERE
 WR1: SIZEOF ( QUERY ( co <* characterized_object | NOT (
     type_check_function ( co , ['AUTOMOTIVE_DESIGN.'+
     'CHARACTERIZED_CLASS' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'DOCUMENT_FILE' , 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_DEFINITION' , 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_DEFINITION' , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_CLASS' , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_IDENTIFICATION'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

characterized_object: the set of all instances of **characterized_object**.

Formal propositions:

WR1: Each instance of the subtypes of an **characterized_object** shall be only one of **characterized_class**, **document_file**, **feature_component_definition**, **feature_definition**, **product_class**, **product_identification**.

5.2.4.218 subtype_exclusiveness_classification_assignment

The **subtype_exclusiveness_classification_assignment** rule specifies that the subtypes of **classification_assignment** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_classification_assignment FOR
    (classification_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ca <* classification_assignment | NOT (
     type_check_function ( ca , ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_CLASSIFICATION_ASSIGNMENT' , 'AUTOMOTIVE_DESIGN.'+
     'LANGUAGE_ASSIGNMENT'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

classification_assignment: the set of all instances of **classification_assignment**.

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Formal propositions:

WR1: Each instance of the subtypes of an **classification_assignment** shall be only one of **applied_classification_assignment**, **language_assignment**.

5.2.4.219 subtype_exclusiveness_colour

The **subtype_exclusiveness_colour** rule specifies that the subtypes of **colour** are mutually exclusive, except for **background_colour**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_colour FOR
    (colour);
WHERE
 WR1: SIZEOF ( QUERY ( c <* colour | NOT ( type_check_function (
     c , ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_SPECIFICATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_COLOUR'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

colour: the set of all instances of **colour**.

Formal propositions:

WR1: Each instance of the subtypes of an **colour** shall be only one of **colour_specification**, **pre_defined_colour**.

5.2.4.220 subtype_exclusiveness_compound_representation_item

The **subtype_exclusiveness_compound_representation_item** rule specifies that the subtypes of **compound_representation_item** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_compound_representation_item FOR
    (compound_representation_item);
WHERE
```

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```
 WR1: SIZEOF ( QUERY ( cri <* compound_representation_item | NOT
     ( type_check_function ( cri , ['AUTOMOTIVE_DESIGN.'+
     'DEFAULT_TOLERANCE_TABLE_CELL' , 'AUTOMOTIVE_DESIGN.'+
     'VALUE_RANGE'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

compound_representation_item: the set of all instances of **compound_representation_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **compound_representation_item** shall be only one of **default_tolerance_table_cell**, **value_range**.

5.2.4.221 subtype_exclusiveness_document_reference

The **subtype_exclusiveness_document_reference** rule specifies that the subtypes of **document_reference** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_document_reference FOR
    (document_reference);
WHERE
 WR1: SIZEOF ( QUERY ( dr <* document_reference | NOT (
     type_check_function ( dr , ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_DOCUMENT_REFERENCE' , 'AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_SPECIFICATION_REFERENCE'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

document_reference: the set of all instances of **document_reference**.

Formal propositions:

WR1: Each instance of the subtypes of an **document_reference** shall be only one of **applied_document_reference**, **draughting_specification_reference**.

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5.2.4.222 subtype_exclusiveness_effectivity

The **subtype_exclusiveness_effectivity** rule specifies that the subtypes of **effectivity** are mutually exclusive, except for **dated_effevtivity**, **lot_effectivity**, and **serial_numbered_effectivity**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_effectivity FOR
    (effectivity);
WHERE
 WR1: SIZEOF ( QUERY ( e <* effectivity | NOT (
     type_check_function ( e , ['AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_EFFECTIVITY' , 'AUTOMOTIVE_DESIGN.'+
     'TIME_INTERVAL_BASED_EFFECTIVITY'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

effectivity: the set of all instances of **effectivity**.

Formal propositions:

WR1: Each instance of the subtypes of an **effectivity** shall be only one of **product_definition_effectivity**, **time_interval_based_effectivity**.

5.2.4.223 subtype_exclusiveness_effectivity_assignment

The **subtype_exclusiveness_effectivity_assignment** rule specifies that the subtypes of **effectivity_assignment** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_effectivity_assignment FOR
    (effectivity_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ea <* effectivity_assignment | NOT (
     type_check_function ( ea , ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_EFFECTIVITY_ASSIGNMENT' , 'AUTOMOTIVE_DESIGN.'+
     'APPLIED_INEFFECTIVITY_ASSIGNMENT' , 'AUTOMOTIVE_DESIGN.'+
     'CONFIGURED_EFFECTIVITY_ASSIGNMENT'] , 3 ) ) ) ) =0;
```

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```
END_RULE;
(*
```

Argument definitions:

effectivity_assignment: the set of all instances of **effectivity_assignment**.

Formal propositions:

WR1: Each instance of the subtypes of an **effectivity_assignment** shall be only one of **applied_effectivity_assignment**, **applied_ineffectivity_assignment**, **configured_effectivity_assignment**.

5.2.4.224 subtype_exclusiveness_effectivity_context_assignment

The **subtype_exclusiveness_effectivity_context_assignment** rule specifies that the subtypes of **effectivity_context_assignment** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_effectivity_context_assignment FOR
    (effectivity_context_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( eca <* effectivity_context_assignment |
     NOT ( type_check_function ( eca , ['AUTOMOTIVE_DESIGN.'+
     'CLASS_USAGE_EFFECTIVITY_CONTEXT_ASSIGNMENT' ,
     'AUTOMOTIVE_DESIGN.'+
     'CONFIGURED_EFFECTIVITY_CONTEXT_ASSIGNMENT'] , 3 ) ) ) )
     =0;
END_RULE;
(*
```

Argument definitions:

effectivity_context_assignment: the set of all instances of **effectivity_context_assignment**.

Formal propositions:

WR1: Each instance of the subtypes of an **effectivity_context_assignment** shall be only one of **class_usage_effectivity_context_assignment**, **configured_effectivity_context_assignment**.

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5.2.4.225 subtype_exclusiveness_externally_defined_item

The **subtype_exclusiveness_externally_defined_item** rule specifies that the subtypes of **externally_-defined_item** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_externally_defined_item FOR
    (externally_defined_item);
WHERE
 WR1: SIZEOF ( QUERY ( edi <* externally_defined_item | NOT (
     type_check_function ( edi , ['AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_CHARACTER_GLYPH' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CLASS' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CURVE_FONT' ,
     'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_GENERAL_PROPERTY'
     , 'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_HATCH_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_TEXT_FONT' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_TILE_STYLE'] , 3
     ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_item: the set of all instances of **externally_defined_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **externally_defined_item** shall be only one of **externally_-defined_character_glyph**, **externally_defined_class**, **externally_defined_curve_font**, **externally_de-fined_feature_definition**, **externally_defined_general_property**, **externally_defined_hatch_style**, **ex-ternally_defined_style**, **externally_defined_symbol**, **externally_defined_text_font**, **externally_defined_-tile_style**.

5.2.4.226 subtype_exclusiveness_feature_component_relationship

The **subtype_exclusiveness_feature_component_relationship** rule specifies that the subtypes of **fea-ture_component_relationship** are mutually exclusive.

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EXPRESS specification:

```
*)
RULE subtype_exclusiveness_feature_component_relationship FOR
    (feature_component_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( fcr <* feature_component_relationship |
     NOT ( type_check_function ( fcr , ['AUTOMOTIVE_DESIGN.'+
     'PATTERN_OFFSET_MEMBERSHIP' , 'AUTOMOTIVE_DESIGN.'+
     'PATTERN_OMIT_MEMBERSHIP'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

feature_component_relationship: the set of all instances of **feature_component_relationship**.

Formal propositions:

WR1: Each instance of the subtypes of an **feature_component_relationship** shall be only one of **pattern_offset_membership**, **pattern_omit_membership**.

5.2.4.227 subtype_exclusiveness_feature_definition

The **subtype_exclusiveness_feature_definition** rule specifies that the subtypes of **feature_definition** are mutually exclusive, except for **instanced_feature**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_feature_definition FOR (feature_definition);
WHERE
 WR1: SIZEOF ( QUERY ( fd <* feature_definition | NOT (
     type_check_function ( fd , ['AUTOMOTIVE_DESIGN.'+
     'BARRING_HOLE' , 'AUTOMOTIVE_DESIGN.'+ 'BEAD' ,
     'AUTOMOTIVE_DESIGN.'+ 'BOSS' , 'AUTOMOTIVE_DESIGN.'+
     'COMPOUND_FEATURE' , 'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.'+ 'FEATURE_IN_PANEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'GENERAL_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'HOLE_IN_PANEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'JOGGLE' , 'AUTOMOTIVE_DESIGN.'+
     'LOCATOR' , 'AUTOMOTIVE_DESIGN.'+ 'POCKET' ,
     'AUTOMOTIVE_DESIGN.'+ 'REPLICATE_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'RIB' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'ROUND_HOLE' , 'AUTOMOTIVE_DESIGN.'+ 'SLOT' ,
     'AUTOMOTIVE_DESIGN.'+ 'THREAD'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

feature_definition: the set of all instances of **feature_definition**.

Formal propositions:

WR1: Each instance of the subtypes of an **feature_definition** shall be only one of **barring_hole**, **bead**, **boss**, **compound_feature**, **externally_defined_feature_definition**, **feature_in_panel**, **general_feature**, **hole_in_panel**, **joggle**, **locator**, **pocket**, **rib**, **round_hole**, **slot**, **thread**.

5.2.4.228 subtype_exclusiveness_founded_item

The **subtype_exclusiveness_founded_item** rule specifies that the subtypes of **founded_item** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_founded_item FOR
    (founded_item);
WHERE
 WR1: SIZEOF ( QUERY ( fi <* founded_item | NOT (
     type_check_function ( fi , ['AUTOMOTIVE_DESIGN.'+
     'COMPOSITE_CURVE_SEGMENT' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_PATCH' , 'AUTOMOTIVE_DESIGN.'+ 'VIEW_VOLUME'] , 3
     ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

founded_item: the set of all instances of **founded_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **founded_item** shall be only one of **composite_curve_segment**, **surface_patch**, **view_volume**.

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5.2.4.229 subtype_exclusiveness_geometric_tolerance

The **subtype_exclusiveness_geometric_tolerance** rule specifies that an instance of the subtypes of a **geometric_tolerance** shall be exactly one of **angularity_tolerance**, **circular_runout_tolerance**, **concentricity_tolerance**, **cylindricity_tolerance**, **flatness_tolerance**, **line_profile_tolerance**, **parallelism_tolerance**, **perpendicularity_tolerance**, **position_tolerance**, **roundness_tolerance**, **straightness_tolerance**, **surface_profile_tolerance**, **symmetry_tolerance**, or **total_runout_tolerance**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_geometric_tolerance FOR
    (geometric_tolerance);
WHERE
 WR1: SIZEOF ( QUERY ( gt <* geometric_tolerance | NOT (
     type_check_function ( gt , ['AUTOMOTIVE_DESIGN.'+
     'ANGULARITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CIRCULAR_RUNOUT_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'COAXIALITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CONCENTRICITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CYLINDRICITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'FLATNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'LINE_PROFILE_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'PARALLELISM_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'PERPENDICULARITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'POSITION_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'ROUNDNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'STRAIGHTNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_PROFILE_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'SYMMETRY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'TOTAL_RUNOUT_TOLERANCE'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

geometric_tolerance: the set of all instances of **geometric_tolerance**.

Formal propositions:

WR1: Each instance of the subtypes of **geometric_tolerance** shall be exactly one of **angularity_tolerance**, **circular_runout_tolerance**, **coaxiality_tolerance**, **concentricity_tolerance**, **cylindricity_tolerance**, **flatness_tolerance**, **line_profile_tolerance**, **parallelism_tolerance**, **perpendicularity_tolerance**, **position_tolerance**, **roundness_tolerance**, **straightness_tolerance**, **surface_profile_tolerance**, **symmetry_tolerance**, or **total_runout_tolerance**.

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5.2.4.230 subtype_exclusiveness_group

The **subtype_exclusiveness_group** rule specifies that the subtypes of **group** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_group FOR
    (group);
WHERE
 WR1: SIZEOF ( QUERY ( g <* group | NOT ( type_check_function (
     g , ['AUTOMOTIVE_DESIGN.'+ 'CLASS' , 'AUTOMOTIVE_DESIGN.'+
     'CLASS_SYSTEM' , 'AUTOMOTIVE_DESIGN.'+ 'LANGUAGE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_CONCEPT_FEATURE_CATEGORY' ,
     'AUTOMOTIVE_DESIGN.'+ 'REP_ITEM_GROUP'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

group: the set of all instances of **group**.

Formal propositions:

WR1: Each instance of the subtypes of an **group** shall be only one of **class**, **class_system**, **language**, **product_concept_feature_category**, **rep_item_group**.

5.2.4.231 subtype_exclusiveness_group_assignment

The **subtype_exclusiveness_group_assignment** rule specifies that the subtypes of **group_assignment** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_group_assignment FOR
    (group_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ga <* group_assignment | NOT (
     type_check_function ( ga , ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_GROUP_ASSIGNMENT' , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE'] , 3 ) ) ) ) =0;
END_RULE;
```

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```
(*
```

Argument definitions:

group_assignment: the set of all instances of **group_assignment**.

Formal propositions:

WR1: Each instance of the subtypes of an **group_assignment** shall be only one of **applied_group_assignment**, **product_concept_feature_category_usage**.

5.2.4.232 subtype_exclusiveness_identification_assignment

The **subtype_exclusiveness_identification_assignment** rule specifies that the subtypes of **identification_assignment** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_identification_assignment FOR
    (identification_assignment);
WHERE
 WR1: SIZEOF ( QUERY ( ia <* identification_assignment | NOT (
     type_check_function ( ia, ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_IDENTIFICATION_ASSIGNMENT' , 'AUTOMOTIVE_DESIGN.'+
     'EXTERNAL_IDENTIFICATION_ASSIGNMENT'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

identification_assignment: the set of all instances of **identification_assignment**.

Formal propositions:

WR1: Each instance of the subtypes of an **identification_assignment** shall be only one of **applied_identification_assignment**, **external_identification_assignment**.

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5.2.4.233 subtype_exclusiveness_mapped_item

The **subtype_exclusiveness_mapped_item** rule specifies that the subtypes of **mapped_item** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_mapped_item FOR
    (mapped_item);
WHERE
 WR1: SIZEOF ( QUERY ( mi <* mapped_item | NOT (
     type_check_function ( mi , ['AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_SYMBOL' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_TEXT' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_TEXT_CHARACTER' , 'AUTOMOTIVE_DESIGN.'+
     'CAMERA_IMAGE' , 'AUTOMOTIVE_DESIGN.'+
     'DIMENSION_TEXT_ASSOCIATIVITY'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

mapped_item: the set of all instances of **mapped_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **mapped_item** shall be only one of **annotation_symbol**, **annotation_text**, **annotation_text_character**, **camera_image**, **dimension_text_associativity**.

5.2.4.234 subtype_exclusiveness_pre_defined_item

The **subtype_exclusiveness_pre_defined_item** rule specifies that the subtypes of **pre_defined_item** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_pre_defined_item FOR
    (pre_defined_item);
WHERE
 WR1: SIZEOF ( QUERY ( pdi <* pre_defined_item | NOT (
     type_check_function ( pdi , ['AUTOMOTIVE_DESIGN.'+
```

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```
     'KNOWN_SOURCE' , 'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_COLOUR'
     , 'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_CURVE_FONT' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_MARKER' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_PRESENTATION_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_TEXT_FONT'] , 3 ) ) ) )
     =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_item: the set of all instances of **pre_defined_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **pre_defined_item** shall be only one of **known_source**, **pre_-defined_colour**, **pre_defined_curve_font**, **pre_defined_marker**, **pre_defined_presentation_style**, **pre_-defined_symbol**, **pre_defined_text_font**.

5.2.4.235 subtype_exclusiveness_pre_defined_symbol

The **subtype_exclusiveness_pre_defined_symbol** rule specifies that the subtypes of **pre_defined_sym-bol** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_pre_defined_symbol FOR
    (pre_defined_symbol);
WHERE
 WR1: SIZEOF ( QUERY ( pds <* pre_defined_symbol | NOT (
     type_check_function ( pds , ['AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_DIMENSION_SYMBOL' , 'AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_GEOMETRICAL_TOLERANCE_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_POINT_MARKER_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_SURFACE_CONDITION_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_TERMINATOR_SYMBOL'] , 3
     ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

pre_defined_symbol: the set of all instances of **pre_defined_symbol**.

Formal propositions:

WR1: Each instance of the subtypes of an **pre_defined_symbol** shall be only one of **pre_defined_dimension_symbol**, **pre_defined_geometrical_tolerance_symbol**, **pre_defined_point_marker_symbol**, **pre_defined_surface_condition_symbol**, **pre_defined_terminator_symbol**.

5.2.4.236 subtype_exclusiveness_presentation_area

The **subtype_exclusiveness_presentation_area** rule specifies that the subtypes of **presentation_area** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_presentation_area FOR
    (presentation_area);
WHERE
 WR1: SIZEOF ( QUERY ( pa <* presentation_area | NOT (
     type_check_function ( pa , ['AUTOMOTIVE_DESIGN.'+
     'DRAWING_SHEET_REVISION' , 'AUTOMOTIVE_DESIGN.'+
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_AREA'] , 3 ) ) )
     ) =0;
END_RULE;
(*
```

Argument definitions:

presentation_area: the set of all instances of **presentation_area**.

Formal propositions:

WR1: Each instance of the subtypes of an **presentation_area** shall be only one of **drawing_sheet_revision**, **mechanical_design_geometric_presentation_area**.

5.2.4.237 subtype_exclusiveness_presentation_representation

The **subtype_exclusiveness_presentation_representation** rule specifies that the subtypes of **presentation_representation** are mutually exclusive.

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EXPRESS specification:

```
*)
RULE subtype_exclusiveness_presentation_representation FOR
    (presentation_representation);
WHERE
 WR1: SIZEOF ( QUERY ( pr <* presentation_representation | NOT (
     type_check_function ( pr , ['AUTOMOTIVE_DESIGN.'+
     'PRESENTATION_AREA' , 'AUTOMOTIVE_DESIGN.'+
     'PRESENTATION_VIEW'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

presentation_representation: the set of all instances of **presentation_representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **presentation_representation** shall be only one of **presentation_area**, **presentation_view**.

5.2.4.238 subtype_exclusiveness_property_definition

The **subtype_exclusiveness_property_definition** rule specifies that the subtypes of **property_definition** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_property_definition FOR
    (property_definition);
WHERE
 WR1: SIZEOF ( QUERY ( pd <* property_definition | NOT (
     type_check_function ( pd , ['AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_PROPERTY_DEFINITION' , 'AUTOMOTIVE_DESIGN.'+
     'MATERIAL_PROPERTY' , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_SHAPE'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

property_definition: the set of all instances of **property_definition**.

Formal propositions:

WR1: Each instance of the subtypes of an **property_definition** shall be only one of **kinematic_property_definition**, **material_property**, **product_definition_shape**.

5.2.4.239 subtype_exclusiveness_property_definition_representation

The **subtype_exclusiveness_property_definition_representation** rule specifies that the subtypes of **property_definition_representation** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_property_definition_representation FOR
    (property_definition_representation);
WHERE
 WR1: SIZEOF ( QUERY ( pdr <* property_definition_representation
     | NOT ( type_check_function ( pdr , ['AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_PROPERTY_REPRESENTATION_RELATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'MATERIAL_PROPERTY_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_DEFINITION_REPRESENTATION'] ,
     3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

property_definition_representation: the set of all instances of **property_definition_representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **property_definition_representation** shall be only one of **kinematic_property_representation_relation**, **material_property_representation**, **shape_definition_representation**.

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5.2.4.240 subtype_exclusiveness_replicate_feature

The **subtype_exclusiveness_replicate_feature** rule specifies that the subtypes of **replicate_feature** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_replicate_feature FOR
    (replicate_feature);
WHERE
 WR1: SIZEOF ( QUERY ( rf <* replicate_feature | NOT (
     type_check_function ( rf , ['AUTOMOTIVE_DESIGN.'+
     'CIRCULAR_PATTERN' , 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_PATTERN' , 'AUTOMOTIVE_DESIGN.'+
     'MODIFIED_PATTERN' , 'AUTOMOTIVE_DESIGN.'+
     'RECTANGULAR_PATTERN'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

replicate_feature: the set of all instances of **replicate_feature**.

Formal propositions:

WR1: Each instance of the subtypes of an **replicate_feature** shall be only one of **circular_pattern**, **feature_pattern**, **modified_pattern**, **rectangular_pattern**.

5.2.4.241 subtype_exclusiveness_representation

The **subtype_exclusiveness_representation** rule specifies that the subtypes of **representation** are mutually exclusive, except for **uncertainty_assigned_representation**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_representation FOR
    (representation);
WHERE
 WR1: SIZEOF ( QUERY ( r <* representation | NOT (
     type_check_function ( r , ['AUTOMOTIVE_DESIGN.'+
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION' ,
```

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```
      'AUTOMOTIVE_DESIGN.'+ 'CONTACT_RATIO_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'DEFAULT_TOLERANCE_TABLE' ,
      'AUTOMOTIVE_DESIGN.'+ 'DEFINITIONAL_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_MODEL' ,
      'AUTOMOTIVE_DESIGN.'+ 'FOUNDED_KINEMATIC_PATH' ,
      'AUTOMOTIVE_DESIGN.'+ 'HARDNESS_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'KINEMATIC_FRAME_BACKGROUND_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_GROUND_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_LINK_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'MOMENTS_OF_INERTIA_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'SURFACE_TEXTURE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'SYMBOL_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'TACTILE_APPEARANCE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'TEXT_STRING_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'VISUAL_APPEARANCE_REPRESENTATION'] ,
     3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation: the set of all instances of **representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **representation** shall be only one of **constructive_geometry_representation**, **contact_ratio_representation**, **default_tolerance_table**, **definitional_representation**, **direction_shape_representation**, **draughting_model**, **founded_kinematic_path**, **hardness_representation**, **kinematic_frame_background_representation**, **kinematic_ground_representation**, **kinematic_link_representation**, **mechanical_design_geometric_presentation_representation**, **moments_of_inertia_representation**, **presentation_representation**, **shape_representation**, **surface_texture_representation**, **symbol_representation**, **tactile_appearance_representation**, **text_string_representation**, **visual_appearance_representation**.

5.2.4.242 subtype_exclusiveness_representation_item

The **subtype_exclusiveness_representation_item** rule specifies that the subtypes of **representation_item** are mutually exclusive, except for **geoemetric_representation_item**, **mapped_item**, **qualified_representation_item**, **styled_item**, and **topological_representation_item**.

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EXPRESS specification:

```
*)
RULE subtype_exclusiveness_representation_item FOR
    (representation_item);
WHERE
 WR1: SIZEOF ( QUERY ( ri <* representation_item | NOT (
     type_check_function ( ri , ['AUTOMOTIVE_DESIGN.'+
     'COMPOUND_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTIVE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_PATH' , 'AUTOMOTIVE_DESIGN.'+
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'REP_ITEM_GROUP' , 'AUTOMOTIVE_DESIGN.'+
     'VALUE_REPRESENTATION_ITEM'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

representation_item: the set of all instances of **representation_item**.

Formal propositions:

WR1: Each instance of the subtypes of an **representation_item** shall be only one of **compound_representation_item**, **descriptive_representation_item**, **kinematic_path**, **measure_representation_item**, **rep_item_group**, **value_representation_item**.

5.2.4.243 subtype_exclusiveness_representation_map

The **subtype_exclusiveness_representation_map** rule specifies that the subtypes of **representation_map** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_representation_map FOR
    (representation_map);
WHERE
 WR1: SIZEOF ( QUERY ( rm <* representation_map | NOT (
     type_check_function ( rm , ['AUTOMOTIVE_DESIGN.'+
     'CAMERA_USAGE' , 'AUTOMOTIVE_DESIGN.'+
     'SYMBOL_REPRESENTATION_MAP'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

representation_map: the set of all instances of **representation_map**.

Formal propositions:

WR1: Each instance of the subtypes of an **representation_map** shall be only one of **camera_usage**, **symbol_representation_map**.

5.2.4.244 subtype_exclusiveness_representation_relationship

The **subtype_exclusiveness_representation_relationship** rule specifies that the subtypes of **representation_relationship** are mutually exclusive, except for **representation_relationship_with_transformation** and **shape_representation_relationship**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_representation_relationship FOR
    (representation_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( rr <* representation_relationship | NOT (
     type_check_function ( rr , ['AUTOMOTIVE_DESIGN.'+
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION_RELATIONSHIP' ,
     'AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_LINK_REPRESENTATION_ASSOCIATION' ,
     'AUTOMOTIVE_DESIGN.'+'MOTION_LINK_RELATIONSHIP'] , 3 ) ) )
     ) =0;
END_RULE;
(*
```

Argument definitions:

representation_relationship: the set of all instances of **representation_relationship**.

Formal propositions:

WR1: Each instance of the subtypes of an **representation_relationship** shall be only one of **constructive_geometry_representation_relationship**, **kinematic_link_representation_association**, **motion_link_relationship**.

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5.2.4.245 subtype_exclusiveness_representation_relationship_with_-transformation

The **subtype_exclusiveness_representation_relationship_with_transformation** rule specifies that the subtypes of **representation_relationship_with_transformation** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_representation_relationship_with_transformation FOR
    (representation_relationship_with_transformation);
WHERE
 WR1: SIZEOF ( QUERY ( rrwt <*
     representation_relationship_with_transformation | NOT (
     type_check_function ( rrwt , ['AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_FRAME_BACKGROUND_REPRESENTATION_ASSOCIATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'MECHANISM_BASE_PLACEMENT' ] , 3 ) ) )
     ) =0;
END_RULE;
(*
```

Argument definitions:

representation_relationship_with_transformation: the set of all instances of **representation_relationship_with_transformation**.

Formal propositions:

WR1: Each instance of the subtypes of an **representation_relationship_with_transformation** shall be only one of **kinematic_frame_background_representation_association**, **mechanism_base_placement**.

5.2.4.246 subtype_exclusiveness_shape_aspect

The **subtype_exclusiveness_shape_aspect** rule specifies that the subtypes of **shape_aspect** are mutually exclusive, except for **composite_shape_aspect**, **datum**, **datum_feature**, **datum_target**, **derived_-shape_aspect**, and **symmetric_shape_aspect**.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_shape_aspect FOR
```

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```
    (shape_aspect);
WHERE
 WR1: SIZEOF ( QUERY ( sa <* shape_aspect | NOT (
     type_check_function ( sa , ['AUTOMOTIVE_DESIGN.'+
     'APPLIED_AREA' , 'AUTOMOTIVE_DESIGN.'+ 'BEAD_END' ,
     'AUTOMOTIVE_DESIGN.'+ 'BOSS_TOP' , 'AUTOMOTIVE_DESIGN.'+
     'CHAMFER_OFFSET' , 'AUTOMOTIVE_DESIGN.'+
     'CIRCULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'CLOSED_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.'+
     'DIRECTED_ANGLE' , 'AUTOMOTIVE_DESIGN.'+ 'HOLE_BOTTOM' ,
     'AUTOMOTIVE_DESIGN.'+ 'INSTANCED_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'JOGGLE_TERMINATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'NGON_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'OPEN_PATH_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PARTIAL_CIRCULAR_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PATH_FEATURE_COMPONENT' ,
     'AUTOMOTIVE_DESIGN.'+ 'PLACED_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POCKET_BOTTOM' ,
     'AUTOMOTIVE_DESIGN.'+ 'RECTANGULAR_CLOSED_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'ROUNDED_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'SLOT_END' ,
     'AUTOMOTIVE_DESIGN.'+ 'SQUARE_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'TAPER' ,
     'AUTOMOTIVE_DESIGN.'+ 'TEE_PROFILE' ,
     'AUTOMOTIVE_DESIGN.'+ 'TOLERANCE_ZONE' ,
     'AUTOMOTIVE_DESIGN.'+ 'TRANSITION_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'VEE_PROFILE']
     , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_aspect: the set of all instances of **shape_aspect**.

Formal propositions:

WR1: Each instance of the subtypes of an **shape_aspect** shall be only one of **applied_area**, **bead_end**, **boss_top**, **chamfer_offset**, **circular_closed_profile**, **closed_path_profile**, **directed_angle**, **hole_bottom**, **instanced_feature**, **joggle_termination**, **ngon_closed_profile**, **open_path_profile**, **partial_circular_profile**, **path_feature_component**, **placed_feature**, **pocket_bottom**, **rectangular_closed_profile**, **replicate_feature**, **rounded_u_profile**, **slot_end**, **square_u_profile**, **taper**, **tee_profile**, **thread_occurrence**, **tolerance_zone**, **transition_feature**, **vee_profile**.

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5.2.4.247 subtype_exclusiveness_shape_aspect_relationship

The **subtype_exclusiveness_shape_aspect_relationship** rule specifies that the subtypes of **shape_aspect_relationship** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_shape_aspect_relationship FOR
    (shape_aspect_relationship);
WHERE
 WR1: SIZEOF ( QUERY ( sar <* shape_aspect_relationship | NOT (
     type_check_function ( sar , ['AUTOMOTIVE_DESIGN.'+
     'DIMENSIONAL_LOCATION' , 'AUTOMOTIVE_DESIGN.'+
     'FEATURE_COMPONENT_RELATIONSHIP' , 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_ASPECT_ASSOCIATIVITY' , 'AUTOMOTIVE_DESIGN.'+
     'SHAPE_ASPECT_DERIVING_RELATIONSHIP' ,
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_ASPECT_TRANSITION' ,
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_DEFINING_RELATIONSHIP'] , 3 )
     ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_aspect_relationship: the set of all instances of **shape_aspect_relationship**.

Formal propositions:

WR1: Each instance of the subtypes of an **shape_aspect_relationship** shall be only one of **dimensional_location**, **feature_component_relationship**, **shape_aspect_associativity**, **shape_aspect_deriving_relationship**, **shape_aspect_transition**, **shape_defining_relationship**.

5.2.4.248 subtype_exclusiveness_shape_representation_feature_geometry

The **subtype_exclusiveness_shape_representation_feature_geometry** rule specifies that the subtypes of **shape_representation** are mutually exclusive, except for **shape_dimension_representation**, **shape_representation_with_parameters**, and the subtypes covered by the **subtype_exclusiveness_shape_representation_geometry** rule.

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EXPRESS specification:

```
*)
RULE subtype_exclusiveness_shape_representation_feature_geometry FOR
    (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( sr <* shape_representation | NOT (
     type_check_function ( sr , ['AUTOMOTIVE_DESIGN.'+
     'DIRECTION_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'FACE_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'LOCATION_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'PATH_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'PLANAR_SHAPE_REPRESENTATION'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_representation: the set of all instances of **shape_representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **shape_representation** shall be only one of **direction_shape_representation**, **face_shape_representation**, **location_shape_representation**, **path_shape_representation**, **planar_shape_representation**.

5.2.4.249 subtype_exclusiveness_shape_representation_geometry

The **subtype_exclusiveness_shape_representation_geometry** rule specifies that the subtypes of **shape_representation** are mutually exclusive, except for **shape_dimension_representation**, **shape_representation_with_parameters**, and the subtypes covered by the **subtype_exclusiveness_shape_representation_feature_geometry** rule.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_shape_representation_geometry FOR
    (shape_representation);
WHERE
 WR1: SIZEOF ( QUERY ( sr <* shape_representation | NOT (
     type_check_function ( sr , ['AUTOMOTIVE_DESIGN.'+
     'ADVANCED_BREP_SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'COMPOUND_SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'CSG_SHAPE_REPRESENTATION' ,
```

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```
      'AUTOMOTIVE_DESIGN.'+
      'EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'GEOMETRICALLY_BOUNDED_2D_WIREFRAME_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'GEOMETRICALLY_BOUNDED_SURFACE_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'GEOMETRICALLY_BOUNDED_WIREFRAME_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'MANIFOLD_SURFACE_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION' ,
      'AUTOMOTIVE_DESIGN.'+
      'POINT_PLACEMENT_SHAPE_REPRESENTATION'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

shape_representation: the set of all instances of **shape_representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **shape_representation** shall be only one of **advanced_brep_shape_representation**, **compound_shape_representation**, **csg_shape_representation**, **edge_based_wireframe_shape_representation**, **faceted_brep_shape_representation**, **geometrically_bounded_2d_wireframe_representation**, **geometrically_bounded_surface_shape_representation**, **geometrically_bounded_wireframe_shape_representation**, **manifold_surface_shape_representation**, **non_manifold_surface_shape_representation**, **point_placement_shape_representation**.

5.2.4.250 subtype_exclusiveness_symbol_representation

The **subtype_exclusiveness_symbol_representation** rule specifies that the subtypes of **symbol_representation** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_symbol_representation FOR
    (symbol_representation);
WHERE
 WR1: SIZEOF ( QUERY ( sr <* symbol_representation | NOT (
     type_check_function ( sr , ['AUTOMOTIVE_DESIGN.'+
     'CHARACTER_GLYPH_SYMBOL' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'DRAUGHTING_SUBFIGURE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_SYMBOL_REPRESENTATION'] ,
     3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

symbol_representation: the set of all instances of **symbol_representation**.

Formal propositions:

WR1: Each instance of the subtypes of an **symbol_representation** shall be only one of **character_-glyph_symbol**, **draughting_subfigure_representation**, **draughting_symbol_representation**.

5.2.4.251 subtype_exclusiveness_transition_feature

The **subtype_exclusiveness_transition_feature** rule specifies that the subtypes of **transition_feature** are mutually exclusive.

EXPRESS specification:

```
*)
RULE subtype_exclusiveness_transition_feature FOR
    (transition_feature);
WHERE
 WR1: SIZEOF ( QUERY ( tf <* transition_feature | NOT (
     type_check_function ( tf , ['AUTOMOTIVE_DESIGN.'+ 'CHAMFER'
     , 'AUTOMOTIVE_DESIGN.'+ 'EDGE_ROUND' ,
     'AUTOMOTIVE_DESIGN.'+ 'FILLET'] , 3 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

transition_feature: the set of all instances of **transition_feature**.

Formal propositions:

WR1: Each instance of the subtypes of an **transition_feature** shall be only one of **chamfer**, **edge_-round**, **fillet**.

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5.2.4.252 subtype_mandatory_address

The **subtype_mandatory_address** rule ensures that all **address** entities are of type **organizational_address** and/or **personal_address**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_address FOR
    (address);
WHERE
 WR1: SIZEOF ( QUERY ( a <* address | NOT ( type_check_function
     ( a , ['AUTOMOTIVE_DESIGN.'+ 'ORGANIZATIONAL_ADDRESS',
     'AUTOMOTIVE_DESIGN.'+ 'PERSONAL_ADDRESS'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

address: the set of all instances of **address**.

Formal propositions:

WR1: Each instance of **address** shall be of type **organizational_address** and/or **personal_address**.

5.2.4.253 subtype_mandatory_annotation_occurrence

The **subtype_mandatory_annotation_occurrence** rule ensures that all **annotation_occurrence** entities are of type **annotation_curve_occurrence**, **annotation_fill_area_occurrence**,**annotation_symbol_occurrence**, **annotation_text_occurrence**, and/or **draughting_annotation_occurrence**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_annotation_occurrence FOR
    (annotation_occurrence);
WHERE
 WR1: SIZEOF ( QUERY ( ao <* annotation_occurrence | NOT (
     type_check_function ( ao , ['AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_CURVE_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_FILL_AREA_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_SYMBOL_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_TEXT_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
```

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```
     'DRAUGHTING_ANNOTATION_OCCURRENCE'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

annotation_occurrence: the set of all instances of **annotation_occurrence**.

Formal propositions:

WR1: Each instance of **annotation_occurrence** shall be of type **annotation_curve_occurrence**, **annotation_fill_area_occurrence**,**annotation_symbol_occurrence**, **annotation_text_occurrence**, and/or **draughting_annotation_occurrence**.

5.2.4.254 subtype_mandatory_camera_image

The **subtype_mandatory_camera_image_2d_or_3d** rule ensures that all **camera_image** entities are of type **camera_image_2d_with_scale** or **camera_image_3d_with_scale**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_camera_image FOR
    (camera_image);
WHERE
 WR1: SIZEOF ( QUERY ( ci <* camera_image | NOT (
     type_check_function ( ci , ['AUTOMOTIVE_DESIGN.'+
     'CAMERA_IMAGE_2D_WITH_SCALE' , 'AUTOMOTIVE_DESIGN.'+
     'CAMERA_IMAGE_3D_WITH_SCALE'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

camera_image: the set of all instances of **camera_image**.

Formal propositions:

WR1: Each **camera_image** shall be either a **camera_image_2d_with_scale** or a **camera_image_3d_with_scale**.

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5.2.4.255 subtype_mandatory_camera_model

The **subtype_mandatory_camera_model** rule ensures that all **camera_model** entities are of type **camera_model_d2** or **camera_model_d3**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_camera_model FOR
    (camera_model);
WHERE
 WR1: SIZEOF ( QUERY ( cm <* camera_model | NOT (
     type_check_function ( cm , ['AUTOMOTIVE_DESIGN.'+
     'CAMERA_MODEL_D2' , 'AUTOMOTIVE_DESIGN.'+
     'CAMERA_MODEL_D3'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

camera_model: the set of all instances of **camera_model**.

Formal propositions:

WR1: Each **camera_model** shall be either a **camera_model_d2** or a **camera_model_d3**.

5.2.4.256 subtype_mandatory_colour_specification

The **subtype_mandatory_colour_specification** rule ensures that all **colour_specification** entities are of type **colour_rgb**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_colour_specification FOR
    (colour_specification);
WHERE
 WR1: SIZEOF ( QUERY ( cs <* colour_specification | NOT (
     type_check_function ( cs , ['AUTOMOTIVE_DESIGN.'+
     'COLOUR_RGB'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

colour_specification: the set of all instances of **colour_specification**.

Formal propositions:

WR1: Each **colour_specification** shall be of type **colour_rgb**.

5.2.4.257 subtype_mandatory_configurable_item

The **subtype_mandatory_configurable_item** rule ensures that all **configurable_item** entities are of type **product_specification**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_configurable_item FOR
    (configurable_item);
WHERE
 WR1: SIZEOF ( QUERY ( ci <* configurable_item | NOT (
     type_check_function ( ci , ['AUTOMOTIVE_DESIGN.'+
     'PRODUCT_SPECIFICATION'] , 0 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

configurable_item: the set of all instances of **configurable_item**.

Formal propositions:

WR1: Each **configurable_item** shall be of type **product_specification**.

5.2.4.258 subtype_mandatory_document_product_association

The **subtype_mandatory_document_product_association** rule ensures that all **document_product_association** entities are of type **document_product_equivalence**.

EXPRESS specification:

```
*)
```

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```
RULE subtype_mandatory_document_product_association FOR
    (document_product_association);
WHERE
 WR1: SIZEOF ( QUERY ( dpa <* document_product_association | NOT
     ( type_check_function ( dpa , ['AUTOMOTIVE_DESIGN.'+
     'DOCUMENT_PRODUCT_EQUIVALENCE'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

document_product_association: the set of all instances of **document_product_association**.

Formal propositions:

WR1: Each **document_product_association** shall be of type **document_product_equivalence**.

5.2.4.259 subtype_mandatory_draughting_callout

The **subtype_mandatory_draughting_callout** rule ensures that all **draughting_callout** entities are of type **datum_feature_callout**, **datum_target_callout**, **dimension_curve_directed_callout**, **draughting_elements**, **geometrical_tolerance_callout**, **leader_directed_callout**, **projection_directed_callout**, **structured_dimension_callout**, and/or **surface_condition_callout**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_draughting_callout FOR
    (draughting_callout);
WHERE
 WR1: SIZEOF ( QUERY ( dc <* draughting_callout | NOT (
     type_check_function ( dc , ['AUTOMOTIVE_DESIGN.'+
     'DATUM_FEATURE_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'DATUM_TARGET_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'DIMENSION_CURVE_DIRECTED_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_ELEMENTS' , 'AUTOMOTIVE_DESIGN.'+
     'GEOMETRICAL_TOLERANCE_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'LEADER_DIRECTED_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'PROJECTION_DIRECTED_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'STRUCTURED_DIMENSION_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_CONDITION_CALLOUT'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

draughting_callout: the set of all instances of **draughting_callout**.

Formal propositions:

WR1: Each **draughting_callout** shall be of type **datum_feature_callout**, **datum_target_callout**, **dimension_curve_directed_callout**, **draughting_elements**, **geometrical_tolerance_callout**, **leader_directed_callout**, **projection_directed_callout**, **structured_dimension_callout**, and/or **surface_condition_callout**.

5.2.4.260 subtype_mandatory_externally_defined_item

The **subtype_mandatory_externally_defined_item** rule ensures that all **externally_defined_item** entities are of type **externally_defined_character_glyph**, **externally_defined_class**, **externally_defined_curve_font**, **externally_defined_feature_definition**, **externally_defined_general_property**, **externally_defined_hatch_style**, **externally_defined_style**, **externally_defined_symbol**, **externally_defined_text_font**, or **externally_defined_tile_style**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_externally_defined_item FOR
    (externally_defined_item);
WHERE
 WR1: SIZEOF ( QUERY ( edi <* externally_defined_item | NOT (
     type_check_function ( edi , ['AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_CHARACTER_GLYPH' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CLASS' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_CURVE_FONT' ,
     'AUTOMOTIVE_DESIGN.'+
     'EXTERNALLY_DEFINED_FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_GENERAL_PROPERTY'
     , 'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_HATCH_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_TEXT_FONT' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTERNALLY_DEFINED_TILE_STYLE'] , 0
     ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_item: the set of all instances of **externally_defined_item**.

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Formal propositions:

WR1: Each **externally_defined_item** shall be either a **externally_defined_character_glyph**, **externally_defined_class**, **externally_defined_curve_font**, **externally_defined_feature_definition**, **externally_defined_general_property**, **externally_defined_hatch_style**, **externally_defined_style**, **externally_defined_symbol**, **externally_defined_text_font**, or **externally_defined_tile_style**.

5.2.4.261 subtype_mandatory_founded_item

The **subtype_mandatory_founded_item** rule ensures that all **founded_item** entities are of type **composite_curve_segment**, **surface_patch**, or **view_volume**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_founded_item FOR
    (founded_item);
WHERE
 WR1: SIZEOF ( QUERY ( fi <* founded_item | NOT (
     type_check_function ( fi , ['AUTOMOTIVE_DESIGN.'+
     'COMPOSITE_CURVE_SEGMENT' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_PATCH' , 'AUTOMOTIVE_DESIGN.'+ 'VIEW_VOLUME'] , 0
     ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

founded_item: the set of all instances of **founded_item**.

Formal propositions:

WR1: Each **founded_item** shall be of type **composite_curve_segment**, **surface_patch**, or **view_volume**.

5.2.4.262 subtype_mandatory_geometric_tolerance

The **subtype_mandatory_geometric_tolerance** rule ensures that each **geometric_tolerance** is a **angularity_tolerance**, **circular_runout_tolerance**, **concentricity_tolerance**, **cylindricity_tolerance**, **flatness_tolerance**, **line_profile_tolerance**, **parallelism_tolerance**, **perpendicularity_tolerance**, **position_tolerance**, **roundness_tolerance**, **straightness_tolerance**, **surface_profile_tolerance**, **symmetry_tolerance**, or **total_runout_tolerance**.

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EXPRESS specification:

```
*)
RULE subtype_mandatory_geometric_tolerance FOR
    (geometric_tolerance);
WHERE
 WR1: SIZEOF ( QUERY ( gt <* geometric_tolerance | NOT (
     type_check_function ( gt , ['AUTOMOTIVE_DESIGN.'+
     'ANGULARITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CIRCULAR_RUNOUT_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'COAXIALITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CONCENTRICITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'CYLINDRICITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'FLATNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'LINE_PROFILE_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'PARALLELISM_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'PERPENDICULARITY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'POSITION_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'ROUNDNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'STRAIGHTNESS_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_PROFILE_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'SYMMETRY_TOLERANCE' , 'AUTOMOTIVE_DESIGN.'+
     'TOTAL_RUNOUT_TOLERANCE'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

geometric_tolerance: the set of all instances of **geometric_tolerance**.

Formal propositions:

WR1: Each instance of **geometric_tolerance** shall be of type **angularity_tolerance**, **circular_runout_tolerance**, **coaxiality_tolerance**, **concentricity_tolerance**, **cylindricity_tolerance**, **flatness_tolerance**, **line_profile_tolerance**, **parallelism_tolerance**, **perpendicularity_tolerance**, **position_tolerance**, **roundness_tolerance**, **straightness_tolerance**, **surface_profile_tolerance**, **symmetry_tolerance**, or **total_runout_tolerance**.

5.2.4.263 subtype_mandatory_pre_defined_colour

The **subtype_mandatory_pre_defined_colour** rule ensures that all **pre_defined_colour** entities are of type **draughting_pre_defined_colour**.

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EXPRESS specification:

```
*)
RULE subtype_mandatory_pre_defined_colour FOR
    (pre_defined_colour);
WHERE
 WR1: SIZEOF ( QUERY ( pdc <* pre_defined_colour | NOT (
     type_check_function ( pdc , ['AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_PRE_DEFINED_COLOUR'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_colour: the set of all instances of **pre_defined_colour**.

Formal propositions:

WR1: Each **pre_defined_colour** shall be a **draughting_pre_defined_colour**.

5.2.4.264 subtype_mandatory_pre_defined_curve_font

The **subtype_mandatory_pre_defined_curve_font** rule ensures that all **pre_defined_curve_font** entities are of type **draughting_pre_defined_curve_font**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_pre_defined_curve_font FOR
    (pre_defined_curve_font);
WHERE
 WR1: SIZEOF ( QUERY ( pdcf <* pre_defined_curve_font | NOT (
     type_check_function ( pdcf , ['AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_PRE_DEFINED_CURVE_FONT'] , 0 ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_curve_font: the set of all instances of **pre_defined_curve_font**.

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Formal propositions:

WR1: Each **pre_defined_curve_font** shall be a **draughting_pre_defined_curve_font**.

5.2.4.265 subtype_mandatory_pre_defined_item

The **subtype_mandatory_pre_defined_item** rule ensures that all **pre_defined_item** entities are of type **known_source**, **pre_defined_colour**, **pre_defined_curve_font**, **pre_defined_marker**, **pre_defined_-presentation_style**, **pre_defined_symbol**, or **pre_defined_text_font**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_pre_defined_item FOR
    (pre_defined_item);
WHERE
 WR1: SIZEOF ( QUERY ( pdi <* pre_defined_item | NOT (
     type_check_function ( pdi , ['AUTOMOTIVE_DESIGN.'+
     'KNOWN_SOURCE' , 'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_COLOUR'
     , 'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_CURVE_FONT' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_MARKER' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_PRESENTATION_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_TEXT_FONT'] , 0 ) ) ) )
     =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_item: the set of all instances of **pre_defined_item**.

Formal propositions:

WR1: Each **pre_defined_item** shall be of type **known_source**, **pre_defined_colour**, **pre_defined_-curve_font**, **pre_defined_marker**, **pre_defined_presentation_style**, **pre_defined_symbol**, or **pre_de-fined_text_font**.

5.2.4.266 subtype_mandatory_pre_defined_symbol

The **subtype_mandatory_pre_defined_symbol** rule ensures that all **pre_defined_symbol** entities are of type **pre_defined_geometrical_tolerance_symbol**, **pre_defined_dimension_symbol**, **pre_defined_point_-marker_symbol**, **pre_defined_surface_condition_symbol**, or **pre_defined_terminator_symbol**.

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EXPRESS specification:

```
*)
RULE subtype_mandatory_pre_defined_symbol FOR
    (pre_defined_symbol);
WHERE
 WR1: SIZEOF ( QUERY ( pds <* pre_defined_symbol | NOT (
     type_check_function ( pds , ['AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_GEOMETRICAL_TOLERANCE_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_SURFACE_CONDITION_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_DIMENSION_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_POINT_MARKER_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'PRE_DEFINED_TERMINATOR_SYMBOL'] , 0
     ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

pre_defined_symbol: the set of all instances of **pre_defined_symbol**.

Formal propositions:

WR1: Each **pre_defined_symbol** shall be of type **pre_defined_geometrical_tolerance_symbol**, **pre_defined_surface_condition_symbol**, **pre_defined_dimension_symbol**, **pre_defined_point_marker_symbol**, or **pre_defined_terminator_symbol**.

5.2.4.267 subtype_mandatory_pre_defined_text_font

The **subtype_mandatory_pre_defined_text_font** rule ensures that all **pre_defined_text_font** entities are of type **draughting_pre_defined_text_font**.

EXPRESS specification:

```
*)
RULE subtype_mandatory_pre_defined_text_font FOR
    (pre_defined_text_font);
WHERE
 WR1: SIZEOF ( QUERY ( pdtf <* pre_defined_text_font | NOT (
     type_check_function ( pdtf , ['AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_PRE_DEFINED_TEXT_FONT'] , 0 ) ) ) =0;
END_RULE;
(*
```

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Argument definitions:

pre_defined_text_font: the set of all instances of **pre_defined_text_font**.

Formal propositions:

WR1: Each **pre_defined_text_font** shall be a **draughting_pre_defined_text_font**.

5.2.4.268 terminator_symbol_constraint

The **terminator_symbol_constraint** rule ensures that a **defined_symbol** that is used as the **definition** of a **terminator_symbol** is described by a **pre_defined_terminator_symbol**.

EXPRESS specification:

```
*)
RULE terminator_symbol_constraint FOR
    (terminator_symbol);
WHERE
 WR1: SIZEOF ( QUERY ( ts <* terminator_symbol | ( (
     'AUTOMOTIVE_DESIGN.'+ 'DEFINED_SYMBOL' IN TYPEOF ( ts. item
     ) ) AND NOT ( 'AUTOMOTIVE_DESIGN.'+
     'PRE_DEFINED_TERMINATOR_SYMBOL' IN TYPEOF ( ts.
     item\defined_symbol. definition ) ) ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

terminator_symbol: the set of all instances of **terminator_symbol**.

Formal propositions:

WR1: Each **terminator_symbol** that has an implicit definition shall be defined by a **pre_defined_-terminator_symbol**.

5.2.4.269 text_font_usage

The **text_font_usage** rule ensures that every **pre_defined_text_font** and **externally_defined_text_font** is used in the presentation of a **text_literal**.

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EXPRESS specification:

```
*)
RULE text_font_usage FOR
    (externally_defined_text_font,
     pre_defined_text_font);
WHERE
 WR1: SIZEOF ( QUERY ( pdtf <* pre_defined_text_font | SIZEOF (
     USEDIN ( pdtf , 'AUTOMOTIVE_DESIGN.TEXT_LITERAL.FONT' ) )
     =0 ) ) =0;
 WR2: SIZEOF ( QUERY ( edtf <* externally_defined_text_font |
     SIZEOF ( USEDIN ( edtf ,
     'AUTOMOTIVE_DESIGN.TEXT_LITERAL.FONT' ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

externally_defined_text_font: the set of all instances of **externally_defined_text_font**.

pre_defined_text_font: the set of all instances of **pre_defined_text_font**.

Formal propositions:

WR1: Each **pre_defined_text_font** shall be the font for at least one **text_literal**.

WR2: Each **externally_defined_text_font** shall be the font for at least one **text_literal**.

5.2.4.270 versioned_action_request_requires_date_and_person_or_-organization

The **versioned_action_request_requires_date_and_person_or_organization** rule specifies that each instance of **versioned_action_request** shall be referenced by at least two instances of either **applied_-person_and_organization_assignment** or **applied_organization_assignment** that has a **role** with a **name** of 'requestor' and 'notified person or organization', respectively.

This rule enforces the requirement for every Work_request to have at least one notified person or organization associated to it.

EXPRESS specification:

```
*)
RULE versioned_action_request_requires_date_and_person_or_organization FOR
    (versioned_action_request);
```

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```
WHERE
 WR1: SIZEOF ( QUERY ( va <* versioned_action_request | ( SIZEOF
      ( QUERY ( adapaoa <* USEDIN ( va ,
      'AUTOMOTIVE_DESIGN.'+'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.'+
      'ITEMS' ) | adapaoa. role.name ='requestor' ) ) + SIZEOF (
      QUERY ( adaoa <* USEDIN ( va ,
      'AUTOMOTIVE_DESIGN.'+'APPLIED_ORGANIZATION_ASSIGNMENT.'+
      'ITEMS' ) | adaoa. role.name ='requestor' ) ) ) =0 ) ) =0;
 WR2: SIZEOF ( QUERY ( va <* versioned_action_request | ( SIZEOF
      ( QUERY ( adapaoa <* USEDIN ( va ,
      'AUTOMOTIVE_DESIGN.'+'APPLIED_PERSON_AND_ORGANIZATION_ASSIGNMENT.'+
      'ITEMS' ) | adapaoa. role.name =
      'notified person or organization' ) ) + SIZEOF ( QUERY (
      adaoa <* USEDIN ( va ,
      'AUTOMOTIVE_DESIGN.'+'APPLIED_ORGANIZATION_ASSIGNMENT.'+
      'ITEMS' ) | adaoa. role.name =
      'notified person or organization' ) ) ) =0 ) ) =0;
END_RULE;
(*
```

Argument definitions:

versioned_action_request: the set of all instances of **versioned_action_request**.

Formal propositions:

WR1: For each instance of **versioned_action_request** there shall be at least one instance of either **applied_person_and_organization_assignment**, or **applied_organization_assignment** that contains the instance of **versioned_action_request** in its set of **items** and has a **role** with a **name** of 'requestor'.

WR2: For each instance of **versioned_action_request** there shall be at least one instance of either **applied_person_and_organization_assignment**, or **applied_organization_assignment** that contains the instance of **versioned_action_request** in its set of **items** and has a **role** with a **name** of 'notified person or organization'.

5.2.4.271 versioned_action_request_requires_status

The **versioned_action_request_requires_status** rule specifies that each instance of **versioned_action_request** shall have exactly one status. The status of a **versioned_action_request** is defined by the **action_request_status** entity.

EXPRESS specification:

```
*)
RULE versioned_action_request_requires_status FOR
```

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```
    (action_request_status,
     versioned_action_request);
WHERE
 WR1: SIZEOF ( QUERY ( ar <* versioned_action_request | NOT (
     SIZEOF ( QUERY ( ars <* action_request_status | ar:=:ars.
     assigned_request ) ) =1 ) ) ) =0;
END_RULE;
(*
```

Argument definitions:

action_request_status: the set of all instances of **action_request_status**.

versioned_action_request: the set of all instances of **versioned_action_request**.

Formal propositions:

WR1: For each instance of **versioned_action_request** there shall be exactly one instance of **action_request_status** that contains an **assigned_request** attribute value to this instance of **versioned_action_request**.

5.2.5 automotive_design function definitions

5.2.5.1 assembly_shape_is_defined

The **assembly_shape_is_defined** function accepts a **next_assembly_usage_occurrence** as input and returns a boolean result. The function will return TRUE if the shape is defined for the **product_definition** which is the **related_product_definition** and the shape is defined for the **product_definition** which is the **relating_product_definition** in the **next_assembly_usage_occurrence**, and the two shapes are related through a **shape_representation_relationship**, and the two relationships are related through **context_dependent_shape_representation**. The function will also return TRUE if the shape of the **related_product_definition** or the **relating_product_definition** is not defined.

The only time this function will return false is when the shapes are defined for the **related_product_definition** and the **relating_product_definition** and related through **shape_representation_relationship**, but the **next_assembly_usage_occurrence** and the **shape_representation_relationship** are not explicitly related through **context_dependent_shape_representation**.

NOTE - The definition of this function is identical to the definition in ISO 10303-203.

EXPRESS specification:

```
*)
FUNCTION assembly_shape_is_defined
```

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```
  (assy: next_assembly_usage_occurrence) : BOOLEAN;
  LOCAL
        sdr_set : SET OF shape_definition_representation := [];
        srr_set : SET OF shape_representation_relationship := [];
        sdr1_set : SET OF shape_definition_representation := [];
        pd_set : SET OF property_definition := [];
        pdr_set : SET OF product_definition_relationship := [];
        pds_set : SET OF product_definition_shape := [];
prop_set : SET OF property_definition := [];
  END_LOCAL;

  -- Gather all instances of shape_definition_representation where the
  -- component part has a representation defined for it.

  pd_set := bag_to_set( USEDIN(assy.related_product_definition,
            'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION'));
  pdr_set := QUERY( pdr <* bag_to_set(USEDIN
            (assy.related_product_definition,
            'AUTOMOTIVE_DESIGN.PRODUCT_DEFINITION_RELATIONSHIP.' +
            'RELATED_PRODUCT_DEFINITION')) |
             SIZEOF( USEDIN( pdr,
            'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION'))
             > 0);
  IF SIZEOF(pd_set) > 0 THEN
      REPEAT i:=1 TO HIINDEX(pd_set);
       sdr_set := sdr_set + QUERY( pdr <* USEDIN(pd_set[i],
      'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.'+
      'DEFINITION') |
      'AUTOMOTIVE_DESIGN.SHAPE_DEFINITION_REPRESENTATION' IN
       TYPEOF(pdr));
      END_REPEAT;
  END_IF;
  IF SIZEOF(pdr_set) > 0 THEN
       -- mp: first, get all the property_definitions
       -- that reference the elements of pdr_set
      REPEAT i:=1 TO HIINDEX(pdr_set);
        prop_set := prop_set + bag_to_set(USEDIN(pdr_set[i],
       'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION'));
      END_REPEAT;
       -- mp: now, get all the shape_definition_representations
      -- that are reps of the properties found
      IF SIZEOF (prop_set) > 0 THEN
        REPEAT i:=1 TO HIINDEX(prop_set);
         sdr_set := sdr_set + QUERY( pdr <* USEDIN(prop_set[i],
         'AUTOMOTIVE_DESIGN.' +
         'PROPERTY_DEFINITION_REPRESENTATION.DEFINITION') |
         'AUTOMOTIVE_DESIGN.SHAPE_DEFINITION_REPRESENTATION' IN
         TYPEOF(pdr));
        END_REPEAT;
      END_IF;
  END_IF;
```

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```
-- If there is a representation defined for the component part

IF SIZEOF (sdr_set) > 0 THEN

  -- For each representation of the shape of the component part gather
  -- all instances of shape_representation_relationship where the
  -- representation of component part is related to another
  -- representation.

  REPEAT i := 1 TO HIINDEX (sdr_set);
    srr_set := QUERY (rr <* bag_to_set (
             USEDIN (sdr_set[i]\
             property_definition_representation.used_representation,
             'AUTOMOTIVE_DESIGN.REPRESENTATION_RELATIONSHIP.REP_2')) |
             'AUTOMOTIVE_DESIGN.SHAPE_REPRESENTATION_RELATIONSHIP' IN
             TYPEOF (rr));

    -- If there is a shape_representation_relationship where the component
    -- component part's shape_representation is related to another shape_-
    -- representation.

    pd_set := bag_to_set(USEDIN(assy.relating_product_definition,
           'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION'));

    IF SIZEOF(pd_set) > 0 THEN
        REPEAT i:=1 TO HIINDEX(pd_set);
           sdr1_set := sdr1_set + QUERY( pdr <* USEDIN(pd_set[i],
           'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.'+
           'DEFINITION') |
           'AUTOMOTIVE_DESIGN.SHAPE_DEFINITION_REPRESENTATION' IN
           TYPEOF(pdr));
        END_REPEAT;
    END_IF;

    IF ( (SIZEOF(sdr_set) > 0) AND (SIZEOF(sdr1_set) > 0) ) THEN

      IF SIZEOF (srr_set) > 0 THEN

        -- For each shape_representation_relationship in that set

        REPEAT j := 1 TO HIINDEX (srr_set);

          -- If the other shape_representation in the shape_representa-
          -- tion_relationship is the  shape_representation of the assembly
          -- product_definition in at least one instance.

          IF SIZEOF (QUERY (pdr <* bag_to_set (USEDIN
            (srr_set[j]\representation_relationship.rep_1,
            'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.' +
            'USED_REPRESENTATION')) |
            'AUTOMOTIVE_DESIGN.SHAPE_DEFINITION_REPRESENTATION' IN
```

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```
                TYPEOF (pdr)) * sdr1_set) >= 1 THEN

                -- If the shape_representation_relationship and the
                -- product_definition_relationship of each occurrence
                -- of the component
                -- and assembly relationship is not given via the
                -- context_dependent_shape_representation then return FALSE

                pds_set := QUERY(x <*  bag_to_set( USEDIN(assy,
                   'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION')) |
                   'AUTOMOTIVE_DESIGN.PRODUCT_DEFINITION_SHAPE'  IN
                    TYPEOF(x));

                IF SIZEOF(pds_set) = 0 THEN
                  RETURN (FALSE);
                END_IF;

                REPEAT k:=1 TO HIINDEX(pds_set);
                  IF SIZEOF (QUERY (cdsr <*
                    USEDIN (pds_set[k], 'AUTOMOTIVE_DESIGN.' +
                    'CONTEXT_DEPENDENT_SHAPE_REPRESENTATION.' +
                    'REPRESENTED_PRODUCT_RELATION') |
                    (cdsr.representation_relation :=: srr_set[j]) )) > 0
                    THEN RETURN (FALSE);
                  END_IF;
                END_REPEAT;
              END_IF;
            END_REPEAT;
          END_IF;
        END_IF;
      END_REPEAT;
    END_IF;

    -- If the shape of the component is not specified or there are no
    -- violations then return TRUE

    RETURN (TRUE);
END_FUNCTION; -- assembly_shape_is_defined
(*
```

Argument definitions:

assy: The **assy** identifies the **next_assembly_usage_occurrence** for which the relationships are to be checked.

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5.2.5.2 default_tolerance_table_cell_wr2

The **default_tolerance_table_cell_wr2** function accepts an AGGREGATE of **representation_item**s as input and returns a boolean result. The function will return TRUE if the size of the aggregate is less or equal to five. Else it will return FALSE.

NOTE - This function realizes the second local rule of **default_tolerance_table_cell**.

EXPRESS specification:

```
*)
FUNCTION default_tolerance_table_cell_wr2(
    agg: AGGREGATE OF representation_item): BOOLEAN;
   BEGIN
     IF SIZEOF(agg) <= 5 THEN
       RETURN(TRUE);
     ELSE
       RETURN(FALSE);
     END_IF;
   END;
END_FUNCTION; -- default_tolerance_table_cell_wr2
(*
```

Argument definitions:

agg: The **agg** identifies the aggregate of instances which are tested.

5.2.5.3 default_tolerance_table_cell_wr3

The **default_tolerance_table_cell_wr3** function accepts an AGGREGATE of **representation_item**s as input and returns a boolean result. The function will return TRUE if the aggregate contains either exactly one **measure_representation_item** with **name** 'significant number of digits', or exactly two **measure_representation_item**s, one with a **name** of 'upper limit', and the other with a **name** of 'lower limit'. Else it will return FALSE.

NOTE - This function realizes the third local rule of **default_tolerance_table_cell**.

EXPRESS specification:

```
*)
FUNCTION default_tolerance_table_cell_wr3(
       agg: AGGREGATE OF representation_item): BOOLEAN;
```

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```
 BEGIN
   IF (SIZEOF(QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name =
         'significant number of digits'))
         )) = 1) OR
     ((SIZEOF(QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name = 'lower limit'))
        )) = 1) AND
      (SIZEOF( QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name = 'upper limit'))
        )) = 1))
   THEN
     RETURN(TRUE);
   ELSE
     RETURN(FALSE);
   END_IF;
 END;
END_FUNCTION; -- default_tolerance_table_cell_wr3
(*
```

Argument definitions:

agg: The **agg** identifies the aggregate of instances which are tested.

5.2.5.4 default_tolerance_table_cell_wr4

The **default_tolerance_table_cell_wr4** function accepts an AGGREGATE of **representation_item**s as input and returns a boolean result. The function will return TRUE if the aggregate contains either exactly one **measure_representation_item** a with **name**s of 'plus minus tolerance value', or exactly two **measure_representation_item**s, one with a **name** of 'lower tolerance value', and the other with a **name** of 'upper tolerance value'. Else it will return FALSE.

NOTE - This function realizes the forth local rule of **default_tolerance_table_cell**.

EXPRESS specification:

```
*)
FUNCTION default_tolerance_table_cell_wr4(
    agg: AGGREGATE OF representation_item): BOOLEAN;
  BEGIN
```

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```
   IF (SIZEOF(QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name =
         'plus minus tolerance value'))
        )) = 1) OR
     ((SIZEOF(QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name = 'lower tolerance value'))
        )) = 1) AND
       (SIZEOF( QUERY ( i <* agg |
         (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
         IN TYPEOF(i)) AND
          (i\representation_item.name = 'upper tolerance value'))
        )) = 1))
   THEN
     RETURN(TRUE);
   ELSE
     RETURN(FALSE);
   END_IF;
  END;

END_FUNCTION; -- default_tolerance_table_cell_wr4
(*
```

Argument definitions:

agg: The **agg** identifies the aggregate of instances which are tested.

5.2.5.5 default_tolerance_table_cell_wr5

The **default_tolerance_table_cell_wr5** function accepts an AGGREGATE of **representation_item**s as input and returns a boolean result. The function will return TRUE if the aggregate contains at most one **descriptive_representation_item**. If it is present, its **name** shall be 'cell description'. Else it will return FALSE.

NOTE - This function realizes the fifth local rule of **default_tolerance_table_cell**.

EXPRESS specification:

```
*)
FUNCTION default_tolerance_table_cell_wr5(
     agg: AGGREGATE OF representation_item): BOOLEAN;
  BEGIN
    IF (SIZEOF(QUERY ( i <* agg |
```

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```
          ('AUTOMOTIVE_DESIGN.DESCRIPTIVE_REPRESENTATION_ITEM'
          IN TYPEOF(i))
         )) <= 1) AND
       (SIZEOF(QUERY ( i <* agg |
          ('AUTOMOTIVE_DESIGN.DESCRIPTIVE_REPRESENTATION_ITEM'
          IN TYPEOF(i))
         )) =
        SIZEOF(QUERY ( i <* agg |
          (('AUTOMOTIVE_DESIGN.DESCRIPTIVE_REPRESENTATION_ITEM'
          IN TYPEOF(i)) AND
           (i\representation_item.name = 'cell description'))) ))
    THEN
      RETURN(TRUE);
    ELSE
      RETURN(FALSE);
    END_IF;
  END;
END_FUNCTION; -- default_tolerance_table_cell_wr5
(*
```

Argument definitions:

agg: The **agg** identifies the aggregate of instances which are tested.

5.2.5.6 get_diameter_for_round_hole

The **get_diameter_for_round_hole** function accepts an instance of **round_hole** as input and returns a REAL value representing the diameter of the **round_hole**.

NOTE - This is used in the fourth local rule of **composite_hole**.

EXPRESS specification:

```
*)
FUNCTION get_diameter_for_round_hole
      ( rh : round_hole ) : REAL;

      LOCAL
      sa_set : SET OF shape_aspect;
      sar_set : SET OF shape_aspect_relationship;
      pdr_set : SET OF property_definition_representation;
      ri_set : SET OF representation_item;
      END_LOCAL;

 sa_set := get_shape_aspects(rh);
 REPEAT i:=1 to HIINDEX(sa_set);
  IF (sa_set[i].description = 'diameter occurrence')
```

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```
   THEN
     sar_set := bag_to_set(USEDIN(sa_set[i],'AUTOMOTIVE_DESIGN.'+
                'SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'));
     REPEAT j:=1 to HIINDEX(sar_set);
      IF ((sar_set[j].name = 'diameter') AND
          (sar_set[j].description = 'profile usage') AND
          ('AUTOMOTIVE_DESIGN.SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF
          (sar_set[j])) AND
          ('AUTOMOTIVE_DESIGN.CIRCULAR_CLOSED_PROFILE' IN TYPEOF
          (sar_set[j].relating_shape_aspect)))
       THEN
         pdr_set := get_shape_aspect_property_definition_representations
                    (sar_set[j].relating_shape_aspect);
         REPEAT k:=1 to HIINDEX(pdr_set);
          IF ('AUTOMOTIVE_DESIGN.SHAPE_REPRESENTATION_WITH_PARAMETERS'
             IN TYPEOF(pdr_set[k].used_representation))
           THEN
            ri_set := pdr_set[k].used_representation.items;
            REPEAT l:=1 to HIINDEX(ri_set);
             IF (('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
                IN TYPEOF(ri_set[l])) AND
                 ('AUTOMOTIVE_DESIGN.LENGTH_MEASURE_WITH_UNIT'
                 IN TYPEOF(ri_set[l])))
              THEN
               RETURN (ri_set[l]\measure_with_unit.value_component);
             END_IF;
            END_REPEAT;
          END_IF;
         END_REPEAT;
      END_IF;
     END_REPEAT;
  END_IF;
 END_REPEAT;
 RETURN(?);
END_FUNCTION;
```

(*

Argument definitions:

rh: The **rh** identifies the instance of **round_hole** whose diameter is to be determined.

5.2.5.7 get_multi_language

The **get_multi_language** function accepts an instance of **multi_language_attribute_assignment** as input and returns a label representing the language.

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NOTE - This function is used to determine the value of the derived attribute **language** of **multi_language_attribute_assignment**.

EXPRESS specification:

```
*)
FUNCTION get_multi_language
(x : attribute_value_assignment) : label;
LOCAL
alas : BAG OF attribute_language_assignment :=
         USEDIN(x, 'AUTOMOTIVE_DESIGN.'+
               'ATTRIBUTE_LANGUAGE_ASSIGNMENT.ITEMS');
 --  note: sizeof(alas) has to be 1 due to
 --  multi_language_attribute_assignment.wr2
END_LOCAL;
IF SIZEOF(alas) > 0 THEN RETURN(alas[1].language);
END_IF;
RETURN (?);
END_FUNCTION;
(*
```

Argument definitions:

x: The **x** identifies the instance of **attribute_value_assignment** for which a language is returned.

5.2.5.8 get_round_holes_for_composite_hole

The **get_round_holes_for_composite_hole** function accepts a set of **shape_aspect_relationship** as input and returns a set of **round_hole**s as output.

NOTE - This function is used within the local rules of **composite_hole**.

EXPRESS specification:

```
*)
FUNCTION get_round_holes_for_composite_hole
     ( sar_instance_set : SET OF shape_aspect_relationship )
      : SET OF round_hole;

     LOCAL
     rh_set : SET OF round_hole := [];
     pdr_set : SET OF property_definition_representation;
     pdr_set1 : SET OF property_definition_representation;
     ri_set : SET OF representation_item;
     END_LOCAL;
```

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```
 REPEAT i:=1 to HIINDEX (sar_instance_set);
   IF (SIZEOF (['AUTOMOTIVE_DESIGN.INSTANCED_FEATURE' ,
              'AUTOMOTIVE_DESIGN.ROUND_HOLE'] * TYPEOF
   (sar_instance_set[i].related_shape_aspect)) >= 2)
   THEN
    rh_set := rh_set + sar_instance_set[i].related_shape_aspect;
  END_IF;
  IF ('AUTOMOTIVE_DESIGN.PLACED_FEATURE' IN TYPEOF
     (sar_instance_set[i]))
   THEN
     pdr_set := get_shape_aspect_property_definition_representations
                (sar_instance_set[i].related_shape_aspect);
     REPEAT j:=1 to HIINDEX(pdr_set);
      IF ((pdr_set[j].used_representation.name =
         'feature definition placement') AND
          ('AUTOMOTIVE_DESIGN.SHAPE_REPRESENTATION' IN TYPEOF
          (pdr_set[j].used_representation)))
       THEN
         ri_set := pdr_set[j].used_representation.items;
         REPEAT k:=1 to HIINDEX(ri_set);
          IF (('AUTOMOTIVE_DESIGN.MAPPED_ITEM' IN TYPEOF
             (ri_set[k])) AND
              ('AUTOMOTIVE_DESIGN.'+
              'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN
               TYPEOF(ri_set[k]\mapped_item.mapping_source.
                     mapped_representation)))
           THEN
             pdr_set1 := bag_to_set (USEDIN(ri_set[k]\mapped_item.
             mapping_source.mapped_representation ,
              'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.'+
              'USED_REPRESENTATION'));
             REPEAT l:=1 to HIINDEX(pdr_set1);
              IF ('AUTOMOTIVE_DESIGN.ROUND_HOLE' IN TYPEOF
                 (pdr_set1[l].definition.definition))
               THEN
                rh_set := rh_set + pdr_set1[l].definition.definition;
              END_IF;
             END_REPEAT;
           END_IF;
         END_REPEAT;
      END_IF;
     END_REPEAT;
  END_IF;
 END_REPEAT;

 RETURN (rh_set);
END_FUNCTION;

(*
```

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Argument definitions:

sar_instance_set: The **sar_instance_set** identifies the set of **shape_aspect_relationship** instances which are tested.

5.2.5.9 get_shape_aspect_property_definition_representation

The **get_shape_aspect_property_definition_representation** function accepts an instance of **shape_aspect** as input and returns a set of **property_definition_representation**s, which are of type **shape_definition_representation** and refering by the attribute **definition** to instances of **property_definition** which are refering to the **shape_aspect** by the attribute **definition** themselves. If the **shape_aspect** is not refered by such an object, the return value is an empty set.

NOTE - This function is used in local rules uf different types of **shape_aspect**.

EXPRESS specification:

```
*)
FUNCTION get_shape_aspect_property_definition_representations
      ( s_a_instance : shape_aspect )
       : SET OF property_definition_representation;

      LOCAL
      pd_set : SET OF property_definition := [];
      pdr_set : SET OF property_definition_representation := [];
      END_LOCAL;

 pd_set := bag_to_set (USEDIN (s_a_instance,
      'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION.DEFINITION'));
 IF (SIZEOF (pd_set) < 1 ) THEN RETURN (pdr_set);
 END_IF;

 REPEAT i:= 1 to HIINDEX (pd_set);
    pdr_set := pdr_set + (QUERY( pdr <* USEDIN (pd_set[i],
    'AUTOMOTIVE_DESIGN.PROPERTY_DEFINITION_REPRESENTATION.'+
    'DEFINITION') |
    'AUTOMOTIVE_DESIGN.SHAPE_DEFINITION_REPRESENTATION'
    IN TYPEOF(pdr)));
 END_REPEAT;
 RETURN (pdr_set);
END_FUNCTION;
(*
```

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Argument definitions:

s_a_instance: The **s_a_instance** identifies the **shape_aspect** wich is tested.

5.2.5.10 item_correlation

The **item_correlation** function accepts a set of GENERIC and a set of STRING as input and returns a boolean result. The function will return TRUE if all elements of the first set are in the set of types that is generated from the second set. Else it will return FALSE.

EXPRESS specification:

```
*)
FUNCTION item_correlation
         (items :   SET OF GENERIC;
          c_items:  SET OF STRING):LOGICAL;
 LOCAL
  c_types   : SET OF STRING := [];
  c_hit     : INTEGER := 0;
 END_LOCAL;

 REPEAT i:=1 TO HIINDEX(c_items);
  c_types := c_types + ['AUTOMOTIVE_DESIGN.' + c_items[i]];
 END_REPEAT;

 REPEAT i:=1 TO HIINDEX(items);
  IF (SIZEOF(c_types * TYPEOF(items[i])) = 1)
   THEN
    c_hit := c_hit + 1;
  END_IF;
 END_REPEAT;

 IF (SIZEOF(items) = c_hit)
  THEN
   RETURN(TRUE);
  ELSE
   RETURN(FALSE);
 END_IF;
 END_FUNCTION;
(*
```

Argument definitions:

items: The **items** identifies the set of instances which are tested, if they are in the set of types constructed from the second argument **c_items**.

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c_items: The **c_items** identifies a set of STRING, from which a set of types is generated.

5.2.5.11 value_range_aggregate_rep_item

The **value_range_aggregate_rep_item** function accepts an AGGREGATE of type **representation_item** as input and returns a boolean result. The function will return TRUE if the elements of the AGGREGATE repesent a 3x3 matrix of **measure_representation_item**s. Else it will return FALSE.

NOTE - This function is used in the second local rule of **moments_of_inertia**.

EXPRESS specification:

```
*)
 FUNCTION value_range_aggregate_rep_item
          (agg : AGGREGATE OF representation_item) : BOOLEAN;

  FUNCTION cri (agg : AGGREGATE OF representation_item) : BOOLEAN;
   BEGIN
    IF (SIZEOF(agg) = 3) AND
       (SIZEOF(QUERY(i1 <* agg |
                       ('AUTOMOTIVE_DESIGN.'+
                       'MEASURE_REPRESENTATION_ITEM' IN
                         TYPEOF(i1))
                    )) = 3)
    THEN
     RETURN (TRUE);
    ELSE
     RETURN (FALSE);
    END_IF;
   END;
  END_FUNCTION;

  BEGIN
   IF ((SIZEOF(agg) = 3) AND
       (SIZEOF(QUERY(i <* agg |
                ('AUTOMOTIVE_DESIGN.COMPOUND_REPRESENTATION_ITEM' IN
                  TYPEOF(i)) AND
                cri(i\compound_representation_item.item_element)
             )) = 1))
    THEN
     RETURN (TRUE);
    ELSE
     RETURN (FALSE);
   END_IF;
  END;
 END_FUNCTION;
(*
```

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Argument definitions:

agg: The **agg** identifies the AGGREGATE of **representation_item**s.

5.2.5.12 value_range_wr1

The **value_range_wr1** function accepts an AGGREGATE of **representation_item** and returns a boolean result. The function will return TRUE if the AGGREGATE contains either exactly two **measure_representation_item**s or two **value_representation_item**s. Else it will return FALSE.

NOTE - This function realizes the first local rule of **value_range**.

EXPRESS specification:

```
*)
FUNCTION value_range_wr1(
     agg: AGGREGATE OF representation_item): BOOLEAN;
  BEGIN
    IF (SIZEOF(agg) = 2) AND ((SIZEOF(QUERY ( i1 <* agg | (
    'AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM' IN TYPEOF
    (i1)) ))
    = 2) OR (SIZEOF(QUERY ( i2 <* agg | (
    'AUTOMOTIVE_DESIGN.VALUE_REPRESENTATION_ITEM' IN TYPEOF
    (i2)) ))
    = 2)) THEN
      RETURN(TRUE);
    ELSE
      RETURN(FALSE);
    END_IF;
  END;

END_FUNCTION; -- value_range_wr1
(*
```

Argument definitions:

agg: The **agg** identifies the AGGREGATE of **representation_item**s which are tested.

5.2.5.13 value_range_wr2

The **value_range_wr2** function accepts an AGGREGATE of **representation_item** and returns a boolean result. The function will return TRUE if the AGGREGATE contains two **representation_item**s that have a **name** of 'upper limit' and 'lower limit'. Else it will return FALSE.

NOTE - This function realizes the second local rule of **value_range**.

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EXPRESS specification:

```
*)
FUNCTION value_range_wr2(
      agg: AGGREGATE OF representation_item): BOOLEAN;
  BEGIN
    IF (SIZEOF(QUERY ( i <* agg | (i.name = 'upper limit')
        )) = 1)
    AND (SIZEOF(QUERY ( i <* agg | (i.name = 'lower limit')
         )) = 1)
     THEN
      RETURN(TRUE);
    ELSE
      RETURN(FALSE);
    END_IF;
  END;

END_FUNCTION; -- value_range_wr2
(*
```

Argument definitions:

agg: The **agg** identifies the AGGREGATE of **representation_item**s which are tested.

5.2.5.14 value_range_wr3

The **value_range_wr3** function accepts an AGGREGATE of **representation_item** and returns a boolean result. The function will return TRUE if the AGGREGATE contains two **measure_representation_item**s that reference the same **unit_component**. Else it will return FALSE.

NOTE - This function realizes the third local rule of **value_range**.

EXPRESS specification:

```
*)
FUNCTION value_range_wr3(
    agg: AGGREGATE OF representation_item): BOOLEAN;
  BEGIN
    IF (SIZEOF(QUERY ( i <* agg | (
    'AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM' IN
    TYPEOF(i)) ))
    <> 2) OR (SIZEOF(QUERY ( i1 <* agg |
     ('AUTOMOTIVE_DESIGN.MEASURE_REPRESENTATION_ITEM'
     IN TYPEOF (i1))
```

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```
     AND
     (SIZEOF(QUERY ( i2 <* agg
     | ((i1\measure_with_unit.unit_component
    :=: i2\measure_with_unit.unit_component) OR
     (i1\measure_with_unit.unit_component :=:
     i2\measure_with_unit.unit_component)) ))
    = 2) )) = 2) THEN
      RETURN(TRUE);
    ELSE
      RETURN(FALSE);
    END_IF;
  END;

END_FUNCTION; -- value_range_wr3
(*
```

Argument definitions:

agg: The **agg** identifies the AGGREGATE of **representation_items** which are tested.

EXPRESS specification:

```
*)
END_SCHEMA;  -- automotive_design
(*
```

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6 Conformance requirements

Conformance to this part of ISO 10303 includes satisfying the requirements stated in this part, the requirements of the implementation method(s) supported, and the relevant requirements of the normative references.

An implementation shall support at least one of the following implementation methods: ISO 10303-21, ISO 10303-22.

Requirements with respect to implementation methods-specific requirements are specified in annex C.

The Protocol Information Conformance Statement (PICS) proforma lists the options or the combination of options that may be included in the implementation. The PICS proforma is provided in annex D.

NOTE 1 - An implementation using the method of ISO 10303 – 22 will make use of a specific language binding.

NOTE 2 - ISO 10303 – 314 defines the abstract test suite to be used in the assessment of conformance. ISO 10303 – 32 describes the conformance assessment process.

The conformance classes are specified using combinations of UoFs as given in tables 33, 34, 35, and 36.

NOTE 3 - Since the UoFs have interdependencies specified by the structure defined in clause 4, not every combination of UoFs is appropriate as a conformance class. There are also user requirements that restrict the allowed combinations of UoFs. Figure 85 shows the interdependencies of the UoFs.

Table 37 specifies for each conformance class the set of AIM elements that an implementation of the conformance class shall support.

NOTE 4 - Each of the following conformance classes, with the exception of CC20, makes use of a subset of the constructs specified in the AIM EXPRESS expanded listing given in annex A. The EXPRESS specifications of the conformance classes CC1 to CC19 are included in annex L in digital form.

NOTE 5 - There are totally 20 conformance classes defined for data exchange and sharing in the following application areas:

— conformance classes 1 to 5 for CAD/CAM;

— conformance classes 6 to 10 for product structure and configuration management;

— conformance classes 11 to 13 for process planning;

— conformance classes 14 and 15 for feature based design;

— conformance classes 16 and 17 for simulation and quality control;

— conformance classes 18 and 19 for configuration control of process planning with 3D digital mockup data exchange and sharing;

— conformance class 20 for complete data storage and retrieval.

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The conformance classes are characterized as follows:

6.1 Conformance Class for component design with 3D shape representation (CC1)

The scope of the CC1 is:

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_-model, csg_model, and geometrically_bounded_surface_model;

— presentation data: geometric_presentation;

— product_structure data: product_management_data and element_structure.

NOTE 1 - This conformance class supports the following areas:

— component design of car body, power train, chassis, or interior parts;

— component design of tools.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance classes 2, 4, 5, and 6 of ISO 10303 – 203, with the additional requirement for geometric_presentation (P1), csg_model (G7), and element_structure (S2). In the area of configuration_control information this conformance class requires product_management_data (S1), which is a subset of conformance class 1 of ISO 10303 – 203.

6.2 Conformance Class for assembly design with 3D shape representation (CC2)

The scope of the CC2 is:

— external_reference data;

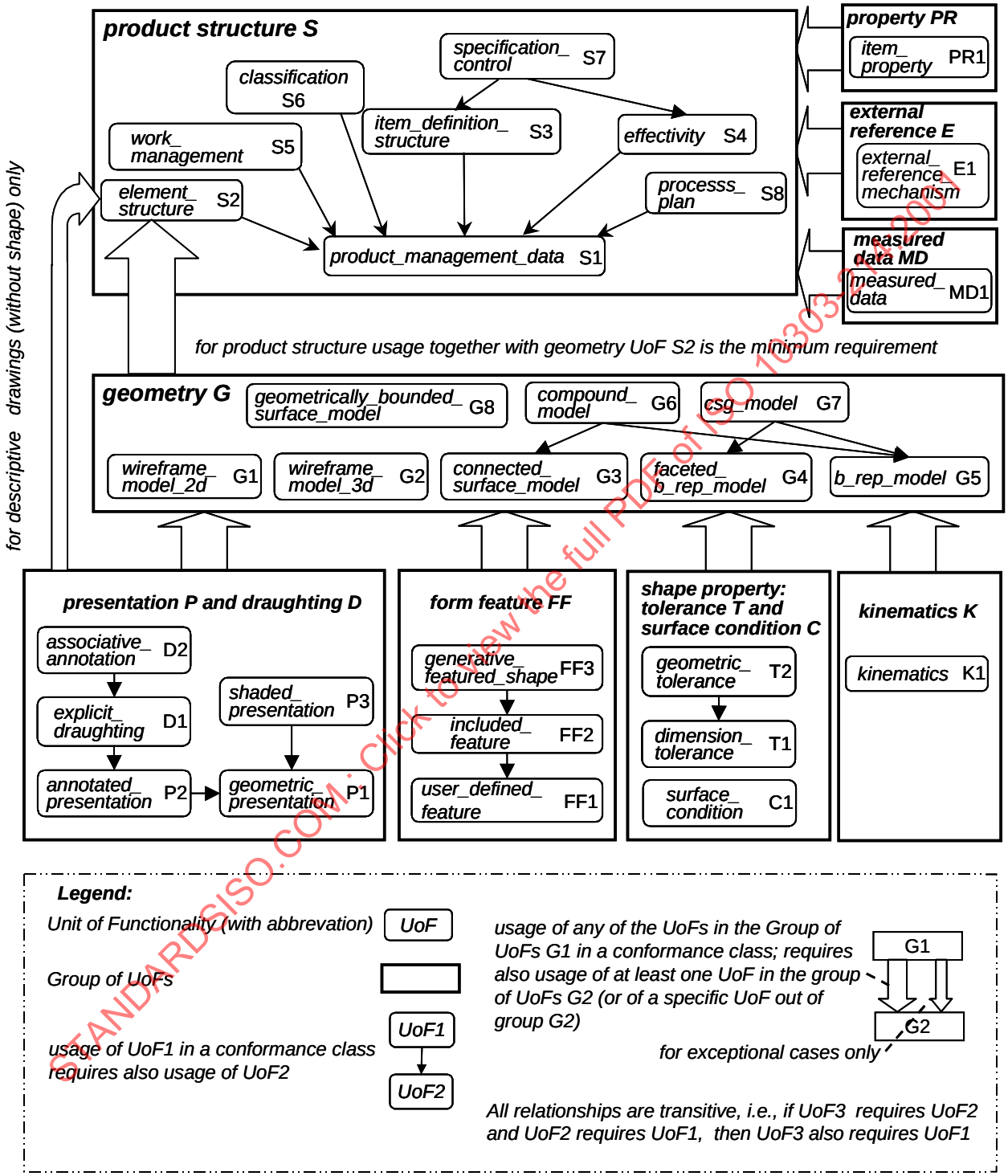
— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_-model, csg_model, and geometrically_bounded_surface_model;

— presentation data: geometric_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure.

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Figure 85 – Interdependencies among UoFs

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NOTE 1 - This conformance class supports the following areas:

— conceptual design including assembly definitions;

— mountability examination;

— packaging layout.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance classes 2, 4, 5, and 6 of ISO 10303 – 203, with the additional requirement for geometric_presentation (P1), csg_model (G7), element_structure (S2), and external_reference_mechanism (E1). In the area of configuration_control information this conformance class requires product_management_data (S1) and item_definition_structure (S3), which is a subset of conformance class 1 of ISO 10303 – 203.

NOTE 3 - This conformance class includes the requirements as defined for the conformance class 1 of this part of ISO 10303, with the additional requirement for item_definition_structure (S3) and external_reference_mechanism (E1).

6.3 Conformance Class for component drawings with wireframe or surface shape representation (CC3)

The scope of the CC3 is:

— draughting data: explicit_draughting;

— geometry data: wireframe_model_2d, wireframe_model_3d, and connected_surface_model;

— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data and element_structure.

NOTE 1 - This conformance class supports the following areas:

— component drawings or sketches for car body or some interior parts;

— component drawings or sketches for tools.

NOTE 2 - This conformance class includes requirements that match those defined in ISO 10303 – 201, with additional requirements for wireframe_model_3d (G2) and connected_surface_model (G3).

6.4 Conformance Class for assembly drawings with wireframe, surface or solid shape representation (CC4)

The scope of the CC4 is:

— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

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— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, csg_model, and geometrically_bounded_surface_model;

— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure;

— tolerance data: dimension_tolerance.

NOTE 1 - This conformance class is suitable for use in the following areas:

— component or assembly drawings for power train, chassis, or interior parts;

— component or assembly drawings for tools.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance classes 3, 5, 7, 9, and 10 of ISO 10303 – 202, with the additional requirement for item_definition_structure (S3), external_reference_mechanism (E1), and csg_model (G7).

NOTE 3 - This conformance class includes the requirements as defined for the conformance classes 2 and 3 of this part of ISO 10303.

6.5 Conformance Class for styling data (CC5)

The scope of the CC5 is:

— external_reference data;

— geometry data: connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

— presentation data: geometric_presentation, annotated_presentation, and shaded_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure.

NOTE - This conformance class is suitable for use in the following areas:

— digital mockup;

— styling.

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6.6 Conformance Class for product data management without shape representation (CC6)

The scope of the CC6 is:

— external_reference data;

— property data;

— product_structure data: product_management_data, item_definition_structure, effectivity, work_management, and classification.

NOTE 1 - This conformance class is suitable for use in the following areas:

— product data management systems that manage CAD models as files;

— administrative data of parts, assemblies, documents, and models.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance class 1 of ISO 10303 – 203.

6.7 Conformance Class for product data management with 3D shape representation (CC7)

The scope of the CC7 is:

— external_reference data;

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, csg_model, and geometrically_bounded_surface_model;

— property data;

— presentation data: geometric_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, and classification.

NOTE 1 - This conformance class supports the following areas:

— administrative data of parts, assemblies, documents, and models;

— conceptual design including assembly definitions;

— mountability examination;

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— packaging layout;

— data exchange between product data management systems linked to CAD/CAM systems.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance classes 1, 2, 4, 5, and 6 of ISO 10303 – 203, with the additional requirement for geometric_presentation (P1), csg_model (G7), element_structure (S2), and external_reference_mechanism (E1).

NOTE 3 - This conformance class includes the requirements as defined for the conformance classes 2 and 6 of this part of ISO 10303.

6.8 Conformance Class for configuration controlled design without shape representation (CC8)

The scope of the CC8 is:

— external_reference data;

— property data;

— product_structure data: product_management_data, item_definition_structure, effectivity, work_management, classification, and specification_control.

NOTE 1 - This conformance class is suitable for use in the following areas:

— configuration control for power train, chassis, car body, or interior parts;

— configuration control for tools.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 6 of this part of ISO 10303, with the additional requirement for specification_control (S7).

6.9 Conformance Class for configuration controlled design with 3D shape representation (CC9)

The scope of the CC9 is:

— external_reference data;

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, csg_model, and geometrically_bounded_surface_model;

— property data;

— presentation data: geometric_presentation;

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— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, classification, and specification_control.

NOTE 1 - This conformance class supports the following areas:

— configuration control for power train, chassis, car body, or interior parts;

— configuration control for tools;

— administrative and configuration control data of parts, assemblies, documents, and models;

— product data management systems for control of a large number of product variants.

NOTE 2 - This conformance class includes requirements that match those defined in the conformance classes 1, 2, 4, 5, and 6 of ISO 10303 – 203, with the additional requirement for geometric_presentation (P1), csg_model (G7), element_structure (S2), external_reference_mechanism (E1), and specification_control (S7).

NOTE 3 - This conformance class includes the requirements as defined for the conformance classes 7 and 8 of this part of ISO 10303.

6.10 Conformance Class for configuration controlled design with shape representation and draughting data (CC10)

The scope of the CC10 is:

— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, csg_model, and geometrically_bounded_surface_model;

— property data;

— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, classification, and specification_control;

— tolerance data: dimension_tolerance.

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NOTE 1 - This conformance class supports the following areas:

— configuration control and assembly drawings for power train, chassis, car body, or interior parts;

— configuration control and assembly drawings for tools;

— administrative and configuration control data of parts, assemblies, documents, and models;

— product data management systems for control of a large number of product variants with links to CAD/CAM systems.

NOTE 2 - This conformance class includes the requirements as defined for the conformance classes 4 and 9 of this part of ISO 10303.

6.11 Conformance Class for process planning of components (CC11)

The scope of the CC11 is:

— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

— measured_data;

— property data;

— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data, element_structure, classification, and process_plan.

NOTE 1 - This conformance class supports process planning for components (piece parts) with shape and draughting data.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 1 of this part of ISO 10303, without the requirement for geometrically_bounded_surface_model (G8), and the conformance class 3 of this part of ISO 10303.

6.12 Conformance Class for process planning of components with form feature and tolerance data (CC12)

The scope of the CC12 is:

— surface_condition data;

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— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

— form_features data: user_defined_feature, included_feature, and generative_featured_shape;

— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

— measured_data;

— property data;

— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data, element_structure, classification, and process_plan;

— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports process planning data for components (piece parts) with shape, draughting, form_feature, tolerance, and surface_condition data.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 11 of this part of ISO 10303, with the additional requirement for user_defined_feature (FF1), included_feature (FF2), generative_featured_shape (FF3), surface_condition (C1), dimension_tolerance (T1), and geometric_tolerance (T2).

6.13 Conformance Class for effectivity controlled process planning of assemblies (CC13)

The scope of the CC13 is:

— surface_condition data;

— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

— form_features data: user_defined_feature, included_feature, and generative_featured_shape;

— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

— measured_data;

— property data;

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— presentation data: geometric_presentation and annotated_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, classification, and process_plan;

— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports process planning with effectivity control for assemblies with shape, draughting, form_feature, tolerance, and surface_condition data.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 12 of this part of ISO 10303, with the additional requirement for item_definition_structure (S3) and effectivity (S4).

6.14 Conformance Class for feature based design (CC14)

The scope of the CC14 is:

— surface_condition data;

— external_reference data;

— form_features data: user_defined_feature and included_feature;

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, and csg_model;

— property data;

— presentation data: geometric_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure;

— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports the following areas:

— feature based conceptual design for components and assemblies, including manufacturing information such as tolerance and surface_condition data;

— feature based mountability examination.

NOTE 2 - This conformance class allows for identification of form features on the final shape of a component or of an assembly.

NOTE 3 - This conformance class includes requirements that match those defined in ISO 10303 – 224, with the additional requirement for geometric_presentation (P1), wireframe_model_3d (G2), connected_-

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surface_model (G3), faceted_b_rep_model (G4), csg_model (G7), external_reference_mechanism (E1), and surface_condition (C1).

NOTE 4 - This conformance class includes the requirements as defined for the conformance class 2 of this part of ISO 10303, without the requirement for geometrically_bounded_surface_model (G8) and with the additional requirement for user_defined_feature (FF1), included_feature (FF2), item_property (PR1), surface_condition (C1), dimension_tolerance (T1), and geometric_tolerance (T2).

6.15 Conformance Class for feature based design with flexible feature placement (CC15)

The scope of the CC15 is:

— surface_condition data;

— external_reference data;

— form_features data: user_defined_feature, included_feature, and generative_featured_shape;

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, and csg_model;

— property data;

— presentation data: geometric_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure;

— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports the following areas:

— feature based conceptual design for components and assemblies, supporting efficient design changes through flexible feature placement;

— feature based mountability examination.

NOTE 2 - This conformance class allows for an independent feature definition, e.g. in a feature library, and its usage through placement on the shape of a component or of an assembly.

NOTE 3 - This conformance class includes the requirements as defined for the conformance class 14 of this part of ISO 10303, with the additional requirement for generative_featured_shape (FF3).

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6.16 Conformance Class for kinematic simulations for components and assemblies with 3D shape representation (CC16)

The scope of the CC16 is:

— external_reference data;

— geometry data: wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_-model, and csg_model;

— kinematics data;

— property data;

— presentation data: geometric_presentation;

— product_structure data: product_management_data, element_structure, and item_definition_structure.

NOTE 1 - This conformance class supports the following areas:

— collision detection;

— support of kinematics modules of CAD systems.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 2 of this part of ISO 10303, without the requirement for geometrically_bounded_surface_model (G8) and with the additional requirement for kinematics (K1) and item_property (PR1).

6.17 Conformance Class for measured data (CC17)

The scope of the CC17 is:

— external_reference data;

— geometry data: wireframe_model_3d;

— measured_data;

— property data;

— presentation data: geometric_presentation;

— product_structure data: product_management_data and element_structure.

NOTE - This conformance class supports the following areas:

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— exchange of scanned (measured) data from a measuring system to a CAD/CAM system;

— quality control.

6.18 Conformance Class for configuration controlled process planning of components and assemblies with 3D shape representation and kinematic data (CC18)

The scope of the CC18 is:

— external_reference data;

— geometry data: connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

— kinematics data;

— property data;

— presentation data: geometric_presentation and shaded_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, classification, specification_control, and process_plan;

— tolerance data: dimension_tolerance.

NOTE - This conformance class supports process planning for components and assemblies with 3D digital mockup data. The 3D digital mockup may include kinematic data that needs to be considered in the process planning. The tools used for the process planning may also have kinematic data that needs to be considered.

6.19 Conformance Class for configuration controlled process planning of components and assemblies with 3D shape representation including form features and kinematic data (CC19)

The scope of the CC19 is:

— surface_condition data;

— external_reference data;

— form_features data: user_defined_feature, included_feature, and generative_featured_shape;

— geometry data: connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, and csg_model;

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— kinematics data;

— property data;

— presentation data: geometric_presentation and shaded_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, classification, specification_control, and process_plan;

— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports process planning for components and assemblies with 3D digital mockup data including form features. The 3D digital mockup may include kinematic data that needs to be considered in the process planning. The tools used for the process planning may also have kinematic data that needs to be considered.

NOTE 2 - This conformance class includes the requirements as defined for the conformance class 18 of this part of ISO 10303, with the additional requirement for user_defined_feature (FF1), included_feature (FF2), generative_featured_shape (FF3), surface_condition (C1), and geometric_toleranc (T2).

6.20 Conformance Class for data storage and retrieval systems (CC20)

The scope of the CC20 is:

— surface_condition data;

— draughting data: explicit_draughting and associative_annotation;

— external_reference data;

— form_features data: user_defined_feature, included_feature, and generative_featured_shape;

— geometry data: wireframe_model_2d, wireframe_model_3d, connected_surface_model, faceted_b_rep_model, b_rep_model, compound_model, csg_model, and geometrically_bounded_surface_model;

— kinematics data;

— measured_data;

— property data;

— presentation data: geometric_presentation, annotated_presentation, and shaded_presentation;

— product_structure data: product_management_data, element_structure, item_definition_structure, effectivity, work_management, classification, specification_control, and process_plan;

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— tolerance data: dimension_tolerance and geometric_tolerance.

NOTE 1 - This conformance class supports database implementations to store, retrieve, or archive all of the data specified in this part of ISO 10303. Data manipulation functionality as performed in application systems is not expected to be implemented within the scope of this conformance class.

NOTE 2 - This conformance class includes all requirements as defined for the conformance classes 1 to 19 of this part of ISO 10303.

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Table 33 – Usage of UoFs in Conformance Classes CC1-CC5 for CAD/CAM data exchange and sharing

	CC1	CC2	CC3	CC4	CC5
surface_condition (C1)					
explicit_draughting (D1)			•	•	
associative_annotation (D2)				•	
external_reference_mechanism (E1)		•		•	•
user_defined_feature (FF1)					
included_feature (FF2)					
generative_featured_shape (FF3)					
wireframe_model_2d (G1)			•	•	
wireframe_model_3d (G2)	•	•	•	•	
connected_surface_model (G3)	•	•	•	•	•
faceted_b_rep_model (G4)	•	•		•	•
b_rep_model (G5)	•	•		•	•
compound_model (G6)					•
csg_model (G7)	•	•		•	•
geometrically_bounded_surface_model (G8)	•	•		•	
kinematics (K1)					
measured_data (MD1)					
item_property (PR1)					
geometric_presentation (P1)	•	•	•	•	•
annotated_presentation (P2)			•	•	•
shaded_presentation (P3)					•
product_management_data (S1)	•	•	•	•	•
element_structure (S2)	•	•	•	•	•
item_definition_structure (S3)		•		•	•
effectivity (S4)					
work_management (S5)					
classification (S6)					
specification_control (S7)					
process_plan (S8)					
dimension_tolerance (T1)				•	
geometric_tolerance (T2)					

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Table 34 – Usage of UoFs in Conformance Classes CC6-CC10 for product structure and configuration management data exchange and sharing

	CC6	CC7	CC8	CC9	CC10
surface_condition (C1)					
explicit_draughting (D1)					•
associative_annotation (D2)					•
external_reference_mechanism (E1)	•	•	•	•	•
user_defined_feature (FF1)					
included_feature (FF2)					
generative_featured_shape (FF3)					
wireframe_model_2d (G1)					•
wireframe_model_3d (G2)		•		•	•
connected_surface_model (G3)		•		•	•
faceted_b_rep_model (G4)		•		•	•
b_rep_model (G5)		•		•	•
compound_model (G6)					
csg_model (G7)		•		•	•
geometrically_bounded_surface_model (G8)		•		•	•
kinematics (K1)					
measured_data (MD1)					
item_property (PR1)	•	•	•	•	•
geometric_presentation (P1)		•		•	•
annotated_presentation (P2)					•
shaded_presentation (P3)					
product_management_data (S1)	•	•	•	•	•
element_structure (S2)		•		•	•
item_definition_structure (S3)	•	•	•	•	•
effectivity (S4)	•	•	•	•	•
work_management (S5)	•	•	•	•	•
classification (S6)	•	•	•	•	•
specification_control (S7)			•	•	•
process_plan (S8)					
dimension_tolerance (T1)					•
geometric_tolerance (T2)					

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Table 35 – Usage of UoFs in Conformance Classes CC11-CC15 for process planning and feature based design data exchange and sharing

	CC11	CC12	CC13	CC14	CC15
surface_condition (C1)		•	•	•	•
explicit_draughting (D1)	•	•	•		
associative_annotation (D2)	•	•	•		
external_reference_mechanism (E1)	•	•	•	•	•
user_defined_feature (FF1)		•	•	•	•
included_feature (FF2)		•	•	•	•
generative_featured_shape (FF3)		•	•		•
wireframe_model_2d (G1)	•	•	•		
wireframe_model_3d (G2)	•	•	•	•	•
connected_surface_model (G3)	•	•	•	•	•
faceted_b_rep_model (G4)	•	•	•	•	•
b_rep_model (G5)	•	•	•	•	•
compound_model (G6)	•	•	•		
csg_model (G7)	•	•	•	•	•
geometrically_bounded_surface_model (G8)					
kinematics (K1)					
measured_data (MD1)	•	•	•		
item_property (PR1)	•	•	•	•	•
geometric_presentation (P1)	•	•	•	•	•
annotated_presentation (P2)	•	•	•		
shaded_presentation (P3)					
product_management_data (S1)	•	•	•	•	•
element_structure (S2)	•	•	•	•	•
item_definition_structure (S3)			•	•	•
effectivity (S4)			•		
work_management (S5)					
classification (S6)	•	•	•		
specification_control (S7)					
process_plan (S8)	•	•	•		
dimension_tolerance (T1)		•	•	•	•
geometric_tolerance (T2)		•	•	•	•

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Table 36 – Usage of UoFs in Conformance Classes CC16-CC20 for simulation, quality control, and complete data storage and retrieval

	CC16	CC17	CC18	CC19	CC20
surface_condition (C1)				•	•
explicit_draughting (D1)					•
associative_annotation (D2)					•
external_reference_mechanism (E1)	•	•	•	•	•
user_defined_feature (FF1)				•	•
included_feature (FF2)				•	•
generative_featured_shape (FF3)				•	•
wireframe_model_2d (G1)					•
wireframe_model_3d (G2)	•	•			•
connected_surface_model (G3)	•		•	•	•
faceted_b_rep_model (G4)	•		•	•	•
b_rep_model (G5)	•		•	•	•
compound_model (G6)			•	•	•
csg_model (G7)	•		•	•	•
geometrically_bounded_surface_model (G8)					•
kinematics (K1)	•		•	•	•
measured_data (MD1)		•			•
item_property (PR1)	•	•	•	•	•
geometric_presentation (P1)	•	•	•	•	•
annotated_presentation (P2)					•
shaded_presentation (P3)			•	•	•
product_management_data (S1)	•	•	•	•	•
element_structure (S2)	•	•	•	•	•
item_definition_structure (S3)	•		•	•	•
effectivity (S4)			•	•	•
work_management (S5)			•	•	•
classification (S6)			•	•	•
specification_control (S7)			•	•	•
process_plan (S8)			•	•	•
dimension_tolerance (T1)			•	•	•
geometric_tolerance (T2)				•	•

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Table 37 – Usage of AIM elements in Conformance Classes

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
abs_function																				●
acos_function																				●
action	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_assignment						●	●	●	●	●			●					●	●	●
action_directive						●	●	●	●	●								●	●	●
action_method	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_method_relationship											●	●	●					●	●	●
action_property	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_property_representation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_relationship	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_request_assignment						●	●	●	●	●								●	●	●
action_request_solution						●	●	●	●	●								●	●	●
action_request_status						●	●	●	●	●								●	●	●
action_resource						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_resource_requirement						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_resource_type						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
action_status						●	●	●	●	●								●	●	●
address	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
advanced_brep_shape_representation	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
advanced_face	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
alternate_product_relationship		●		●	●	●	●	●	●	●			●	●	●	●		●	●	●
amount_of_substance_measure_with_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
amount_of_substance_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
and_expression																				●
angular_dimension	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
angular_location				●						●		●	●	●	●			●	●	●
angular_size				●						●		●	●	●	●			●	●	●
angularity_tolerance												●	●	●	●				●	●
annotation_curve_occurrence	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
annotation_fill_area			●	●	●					●	●	●	●							●
annotation_fill_area_occurrence			●	●	●					●	●	●	●							●
annotation_occurrence	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
annotation_occurrence_associativity				●						●	●	●	●							●
annotation_occurrence_relationship				●						●	●	●	●							●
annotation_subfigure_occurrence			●	●	●					●	●	●	●							●
annotation_symbol			●	●	●					●	●	●	●							●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
annotation_symbol_occurrence	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
annotation_text			•	•	•					•	•	•	•							•
annotation_text_character			•	•	•					•	•	•	•							•
annotation_text_occurrence	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
apex				•						•		•	•	•	•			•	•	•
application_context	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
application_context_element	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
application_context_relationship																				•
application_protocol_definition	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_action_assignment						•	•	•	•	•			•					•	•	•
applied_action_request_assignment						•	•	•	•	•								•	•	•
applied_approval_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_area												•	•	•	•				•	•
applied_certification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_classification_assignment				•		•	•	•	•	•	•	•	•	•	•			•	•	•
applied_contract_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_date_and_time_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_date_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_document_reference		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_document_usage_constraint_assignment		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_effectivity_assignment						•	•	•	•	•			•					•	•	•
applied_event_occurrence_assignment						•	•	•	•	•			•					•	•	•
applied_external_identification_assignment		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_group_assignment	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_identification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_ineffectivity_assignment						•	•	•	•	•			•					•	•	•
applied_name_assignment																•		•	•	•
applied_organization_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_organizational_project_assignment						•	•	•	•	•								•	•	•
applied_person_and_organization_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_presented_item	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
applied_security_classification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
applied_time_interval_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
approval_date_time	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval_person_organization	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval_relationship	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approval_status	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
approximation_tolerance	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
approximation_tolerance_deviation	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
approximation_tolerance_parameter	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
area_in_set	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
area_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
area_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
asin_function																				•
assembly_component_usage		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
assembly_component_usage_substitute		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
atan_function																				•
attribute_classification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
attribute_language_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
attribute_value_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
attribute_value_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
axis1_placement	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
axis2_placement_2d	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
axis2_placement_3d	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
b_spline_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
b_spline_curve_with_knots	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
b_spline_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
b_spline_surface_with_knots	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
background_colour	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
barring_hole												•	•	•	•				•	•
bead												•	•	•	•				•	•
bead_end												•	•	•	•				•	•
bezier_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
bezier_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
binary_boolean_expression																				•
binary_function_call																				•
binary_generic_expression	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
binary_numeric_expression																				•
block	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
boolean_expression																				•
boolean_literal																				•
boolean_result	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
boolean_variable																				•
boss												•	•	•	•				•	•
boss_top												•	•	•	•				•	•
boundary_curve	•	•		•			•		•	•										•
bounded_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
bounded_pcurve	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
bounded_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
bounded_surface_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
box_domain	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
boxed_half_space	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
brep_with_voids	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
calendar_date	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
camera_image	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_image_2d_with_scale	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_image_3d_with_scale	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_model	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_model_d2	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_model_d3	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_model_d3_with_hlhsr	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
camera_usage	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
cartesian_point	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
cartesian_transformation_operator	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
cartesian_transformation_operator_2d	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
cartesian_transformation_operator_3d	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
celsius_temperature_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
centre_of_symmetry				•						•		•	•	•	•			•	•	•
certification	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
certification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
certification_type	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
chamfer												•	•	•	•				•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
chamfer_offset												•	•	•	•				•	•
character_glyph_symbol			•	•	•					•	•	•	•							•
characterized_class						•	•	•	•	•	•	•	•					•	•	•
characterized_object		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
circle	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
circular_closed_profile												•	•	•	•				•	•
circular_pattern												•	•	•	•				•	•
circular_runout_tolerance												•	•	•	•				•	•
class						•	•	•	•	•	•	•	•					•	•	•
class_system						•	•	•	•	•	•	•	•					•	•	•
class_usage_effectivity_context_assignment								•	•	•								•	•	•
classification_assignment		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
classification_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
closed_path_profile												•	•	•	•				•	•
closed_shell	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
coaxiality_tolerance												•	•	•	•				•	•
colour	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
colour_rgb	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
colour_specification	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
common_datum												•	•	•	•				•	•
comparison_equal																				•
comparison_expression																				•
comparison_greater																				•
comparison_greater_equal																				•
comparison_less																				•
comparison_less_equal																				•
comparison_not_equal																				•
composite_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
composite_curve_on_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
composite_curve_segment	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
composite_hole												•	•	•	•				•	•
composite_shape_aspect												•	•	•	•				•	•
composite_text			•	•	•					•	•	•	•							•
composite_text_with_associated_curves			•	•	•					•	•	•	•							•
composite_text_with_blanking_box			•	•	•					•	•	•	•							•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
composite_text_with_extent			●	●	●					●	●	●	●							●
compound_feature												●	●	●	●				●	●
compound_representation_item	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
compound_shape_representation					●						●	●	●					●	●	●
concat_expression																				●
concentricity_tolerance												●	●	●	●				●	●
concept_feature_operator								●	●	●								●	●	●
concept_feature_relationship								●	●	●								●	●	●
concept_feature_relationship_with_condition								●	●	●								●	●	●
conditional_concept_feature								●	●	●								●	●	●
configurable_item								●	●	●								●	●	●
configuration_definition																●		●	●	●
configuration_design						●	●	●	●	●			●					●	●	●
configuration_effectivity						●	●	●	●	●			●					●	●	●
configuration_interpolation																●		●	●	●
configuration_item						●	●	●	●	●			●					●	●	●
configured_effectivity_assignment								●	●	●								●	●	●
configured_effectivity_context_assignment								●	●	●								●	●	●
conic	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
conical_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
connected_edge_set					●						●	●	●					●	●	●
connected_face_set	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
connected_face_sub_set	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
constructive_geometry_representation	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
constructive_geometry_representation_relationship	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
contact_ratio_representation												●	●	●	●				●	●
context_dependent_invisibility			●	●	●					●	●	●	●							●
context_dependent_over_riding_styled_item	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
context_dependent_shape_representation		●		●	●	●	●	●	●	●			●	●	●	●		●	●	●
context_dependent_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
contract	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
contract_assignment	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
contract_type	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
conversion_based_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
coordinated_universal_time_offset	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
cos_function																				•
csg_shape_representation	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
csg_solid	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_bounded_surface	•	•		•			•		•	•										•
curve_dimension	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_replica	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_style_font	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_style_font_pattern	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
curve_style_rendering	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
cylindrical_pair																•		•	•	•
cylindrical_pair_range																•		•	•	•
cylindrical_pair_value																•		•	•	•
cylindrical_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
cylindricity_tolerance												•	•	•	•				•	•
data_environment						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date_and_time	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date_and_time_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
date_time_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
dated_effectivity						•	•	•	•	•			•					•	•	•
datum												•	•	•	•				•	•
datum_feature												•	•	•	•				•	•
datum_feature_callout	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
datum_reference												•	•	•	•				•	•
datum_target												•	•	•	•				•	•
datum_target_callout	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
default_tolerance_table				•						•			•	•	•			•	•	•
default_tolerance_table_cell				•						•			•	•	•			•	•	•
defined_character_glyph			•	•	•					•	•	•	•							•
defined_symbol			•	•	•					•	•	•	•							•
definitional_representation	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
degenerate_pcurve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
degenerate_toroidal_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
derived_shape_aspect				●						●		●	●	●	●			●	●	●
derived_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
derived_unit_element	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
derived_unit_variable	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
description_attribute	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
descriptive_representation_item	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
diameter_dimension	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_callout_component_relationship	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_callout_relationship	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_curve_directed_callout	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_curve_terminator	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_pair	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
dimension_related_tolerance_zone_element												●	●	●	●				●	●
dimension_text_associativity				●						●	●	●	●							●
dimensional_characteristic_representation				●						●	●	●	●	●	●			●	●	●
dimensional_exponents	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
dimensional_location				●						●	●	●	●	●	●			●	●	●
dimensional_location_with_path				●						●		●	●	●	●			●	●	●
dimensional_size				●						●	●	●	●	●	●			●	●	●
dimensional_size_with_path				●						●		●	●	●	●			●	●	●
directed_action						●	●	●	●	●								●	●	●
directed_angle												●	●	●	●				●	●
directed_dimensional_location				●						●		●	●	●	●			●	●	●
direction	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
direction_shape_representation												●	●	●	●				●	●
div_expression																				●
document		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_file		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_product_association		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_product_equivalence		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_reference		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_relationship		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
document_representation_type		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_type		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_usage_constraint		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_usage_constraint_assignment		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
document_usage_role		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
draughting_annotation_occurrence			●	●	●					●	●	●	●							●
draughting_callout	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_callout_relationship	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_elements	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_model			●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_pre_defined_colour	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_pre_defined_curve_font	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
draughting_pre_defined_text_font			●	●	●					●	●	●	●							●
draughting_specification_reference			●	●						●	●	●	●							●
draughting_subfigure_representation			●	●	●					●	●	●	●							●
draughting_symbol_representation			●	●	●					●	●	●	●							●
draughting_text_literal_with_delineation			●	●	●					●	●	●	●							●
draughting_title			●	●						●	●	●	●							●
drawing_definition			●	●						●	●	●	●				●			●
drawing_revision			●	●						●	●	●	●				●			●
drawing_revision_sequence			●	●						●	●	●	●							●
drawing_sheet_layout			●	●	●					●	●	●	●							●
drawing_sheet_revision	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
drawing_sheet_revision_usage			●	●						●	●	●	●							●
edge	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
edge_based_wireframe_model					●						●	●	●					●	●	●
edge_based_wireframe_shape_representation					●						●	●	●					●	●	●
edge_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
edge_loop	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
edge_round											●	●	●	●	●				●	●
effectivity						●	●	●	●	●			●					●	●	●
effectivity_assignment						●	●	●	●	●			●					●	●	●
effectivity_context_assignment								●	●	●								●	●	●
effectivity_context_role								●	●	●								●	●	●
effectivity_relationship						●	●	●	●	●			●					●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
electric_current_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
electric_current_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
element_delivery						•	•	•	•	•								•	•	•
elementary_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
ellipse	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
environment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
equals_expression																				•
evaluated_degenerate_pcurve	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
event_occurrence						•	•	•	•	•	•	•	•					•	•	•
event_occurrence_assignment						•	•	•	•	•			•					•	•	•
event_occurrence_context_assignment																				•
event_occurrence_context_role																				•
event_occurrence_role						•	•	•	•	•			•					•	•	•
exclusive_product_concept_feature_category								•	•	•								•	•	•
executed_action						•	•	•	•	•								•	•	•
exp_function																				•
expression																				•
expression_conversion_based_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
extension				•						•		•	•	•	•			•	•	•
external_identification_assignment		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
external_source	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
externally_defined_character_glyph			•	•	•					•	•	•	•							•
externally_defined_class						•	•	•	•	•	•	•	•					•	•	•
externally_defined_curve_font	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
externally_defined_feature_definition												•	•	•	•				•	•
externally_defined_general_property						•	•	•	•	•	•	•	•					•	•	•
externally_defined_hatch_style			•	•	•					•	•	•	•							•
externally_defined_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
externally_defined_item_relationship						•	•	•	•	•		•	•					•	•	•
externally_defined_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
externally_defined_symbol			•	•	•					•	•	•	•							•
externally_defined_text_font			•	•	•					•	•	•	•							•
externally_defined_tile_style			•	•	•					•	•	•	•							•
extruded_face_solid	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
face	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
face_based_surface_model	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
face_bound	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
face_outer_bound	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
face_shape_representation												•	•	•	•				•	•
face_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
faceted_brep	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
faceted_brep_shape_representation	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
feature_component_definition												•	•	•	•				•	•
feature_component_relationship												•	•	•	•				•	•
feature_definition												•	•	•	•				•	•
feature_in_panel												•	•	•	•				•	•
feature_pattern												•	•	•	•				•	•
featured_shape												•	•		•				•	•
fill_area_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
fill_area_style_colour	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
fill_area_style_hatching			•	•	•					•	•	•	•							•
fill_area_style_tile_symbol_with_style			•	•	•					•	•	•	•							•
fill_area_style_tiles			•	•	•					•	•	•	•							•
fillet												•	•	•	•				•	•
flatness_tolerance												•	•	•	•				•	•
format_function																				•
founded_item	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
founded_kinematic_path																•		•	•	•
fully_constrained_pair																•		•	•	•
functionally_defined_transformation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
gear_pair																•		•	•	•
gear_pair_range																				•
gear_pair_value																•		•	•	•
general_feature												•	•	•	•				•	•
general_material_property						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
general_property						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
general_property_association						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
general_property_relationship						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
generic_expression	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
generic_literal																				•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
generic_variable	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
geometric_alignment				•						•		•	•	•	•			•	•	•
geometric_curve_set	•	•	•	•			•		•	•	•	•	•	•	•	•	•			•
geometric_intersection				•						•		•	•	•	•			•	•	•
geometric_representation_context	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
geometric_representation_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
geometric_set	•	•	•	•			•		•	•	•	•	•	•	•	•	•			•
geometric_tolerance												•	•	•	•				•	•
geometric_tolerance_relationship												•	•	•	•				•	•
geometric_tolerance_with_datum_reference												•	•	•	•				•	•
geometric_tolerance_with_defined_unit												•	•	•	•				•	•
geometrical_tolerance_callout	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
geometrically_bounded_2d_wireframe_representation			•	•						•	•	•	•							•
geometrically_bounded_surface_shape_representation	•	•		•			•		•	•										•
geometrically_bounded_wireframe_shape_representation	•	•	•	•			•		•	•	•	•	•	•	•	•	•			•
global_uncertainty_assigned_context	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
global_unit_assigned_context	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
group	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
group_assignment	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
group_relationship	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
half_space_solid	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
hardness_representation												•	•	•	•				•	•
hidden_element_over_riding_styled_item	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
hole_bottom												•	•	•	•				•	•
hole_in_panel												•	•	•	•				•	•
homokinetic_pair																•		•	•	•
hyperbola	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
id_attribute	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
identification_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
identification_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
inclusion_product_concept_feature								•	•	•								•	•	•
index_expression																				•
initial_state																•		•	•	•
instanced_feature												•	•	•	•				•	•
int_literal																				•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
int_numeric_variable																				●
int_value_function																				●
interpolated_configuration_sequence																●		●	●	●
intersection_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
interval_expression																				●
invisibility	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
item_defined_transformation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
joggle												●	●	●	●				●	●
joggle_termination												●	●	●	●				●	●
kinematic_analysis_consistency																●		●	●	●
kinematic_analysis_result																●		●	●	●
kinematic_control																●		●	●	●
kinematic_frame_background_representation																●		●	●	●
kinematic_frame_background_representation_association																●		●	●	●
kinematic_frame_based_transformation																●		●	●	●
kinematic_ground_representation																●		●	●	●
kinematic_joint																●		●	●	●
kinematic_link																●		●	●	●
kinematic_link_representation																●		●	●	●
kinematic_link_representation_association																●		●	●	●
kinematic_link_representation_relation																●		●	●	●
kinematic_pair																●		●	●	●
kinematic_path																●		●	●	●
kinematic_property_definition																●		●	●	●
kinematic_property_representation_relation																●		●	●	●
kinematic_structure																●		●	●	●
known_source						●	●	●	●	●	●	●	●					●	●	●
language	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
language_assignment		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
leader_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
leader_directed_callout	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
leader_directed_dimension	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
leader_terminator	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
length_function																				●
length_measure_with_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
length_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
light_source					•													•	•	•
light_source_ambient					•													•	•	•
light_source_directional					•													•	•	•
light_source_positional					•													•	•	•
light_source_spot					•													•	•	•
like_expression																				•
limits_and_fits				•						•		•	•	•	•			•	•	•
line	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
line_profile_tolerance												•	•	•	•				•	•
linear_dimension	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
literal_number																				•
local_time	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
location_shape_representation												•	•	•	•				•	•
locator												•	•	•	•				•	•
log10_function																				•
log2_function																				•
log_function																				•
loop	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
lot_effectivity						•	•	•	•	•			•					•	•	•
luminous_intensity_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
luminous_intensity_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
make_from_usage_option		•		•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
manifold_solid_brep	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
manifold_surface_shape_representation	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
mapped_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
mass_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
mass_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
material_designation						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
material_designation_characterization						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
material_property						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
material_property_representation						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
maximum_function																				•
measure_qualification				•						•		•	•	•	•			•	•	•
measure_representation_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
measure_with_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
mechanical_design_geometric_presentation_area	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
mechanical_design_geometric_presentation_representation	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
mechanism																●		●	●	●
mechanism_base_placement																●		●	●	●
minimum_function																				●
minus_expression																				●
minus_function																				●
mod_expression																				●
modified_geometric_tolerance												●	●	●	●				●	●
modified_pattern												●	●	●	●				●	●
moments_of_inertia_representation						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
motion_link_relationship																●		●	●	●
mult_expression																				●
multi_language_attribute_assignment	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
multiple_arity_boolean_expression																				●
multiple_arity_function_call																				●
multiple_arity_generic_expression	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
multiple_arity_numeric_expression																				●
name_assignment																●		●	●	●
name_attribute	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
named_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
named_unit_variable	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
next_assembly_usage_occurrence		●		●	●	●	●	●	●	●			●	●	●	●		●	●	●
ngon_closed_profile												●	●	●	●				●	●
non_manifold_surface_shape_representation	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
not_expression																				●
numeric_expression																				●
numeric_variable																				●
object_role	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
odd_function																				●
offset_curve_2d			●	●						●	●	●	●							●
offset_curve_3d	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
offset_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
one_direction_repeat_factor			●	●	●					●	●	●	●							●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
open_path_profile												•	•	•	•				•	•
open_shell	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
or_expression																				•
ordinate_dimension	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
organization	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
organization_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
organization_relationship						•	•	•	•	•								•	•	•
organization_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
organizational_address	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
organizational_project						•	•	•	•	•								•	•	•
organizational_project_assignment						•	•	•	•	•								•	•	•
organizational_project_relationship						•	•	•	•	•								•	•	•
organizational_project_role						•	•	•	•	•								•	•	•
oriented_closed_shell	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
oriented_edge	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
oriented_face	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
oriented_open_shell	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
oriented_path	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
oriented_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
outer_boundary_curve	•	•		•			•		•	•										•
over_riding_styled_item	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
package_product_concept_feature								•	•	•								•	•	•
pair_actuator																•		•	•	•
pair_value																•		•	•	•
parabola	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
parallel_offset				•						•		•	•	•	•			•	•	•
parallelism_tolerance												•	•	•	•				•	•
parametric_representation_context	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
partial_circular_profile												•	•	•	•				•	•
path	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
path_feature_component												•	•	•	•				•	•
path_shape_representation												•	•	•	•				•	•
pattern_offset_membership												•	•	•	•				•	•
pattern_omit_membership												•	•	•	•				•	•
pcurve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
perpendicular_to				•						•		•	•	•	•			•	•	•
perpendicularity_tolerance												•	•	•	•				•	•
person	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
person_and_organization	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
person_and_organization_address	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
person_and_organization_assignment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
person_and_organization_role	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
personal_address	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
physically_modelled_product_definition		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
placed_datum_target_feature												•	•	•	•				•	•
placed_feature												•	•	•	•				•	•
placement	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
planar_box	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
planar_curve_pair																•		•	•	•
planar_curve_pair_range																				•
planar_extent	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
planar_pair																•		•	•	•
planar_pair_range																				•
planar_pair_value																•		•	•	•
planar_shape_representation												•	•	•	•				•	•
plane	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
plane_angle_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
plane_angle_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
plus_expression																				•
plus_minus_tolerance				•						•		•	•	•	•			•	•	•
pocket												•	•	•	•				•	•
pocket_bottom												•	•	•	•				•	•
point	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
point_on_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
point_on_planar_curve_pair																•		•	•	•
point_on_planar_curve_pair_range																				•
point_on_planar_curve_pair_value																•		•	•	•
point_on_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
point_on_surface_pair																•		•	•	•
point_on_surface_pair_range																				•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
point_on_surface_pair_value																•		•	•	•
point_placement_shape_representation											•	•	•				•			•
point_replica	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
point_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
poly_loop	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
polyline	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
position_tolerance												•	•	•	•				•	•
power_expression																				•
pre_defined_colour	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_curve_font	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_dimension_symbol			•	•	•					•	•	•	•							•
pre_defined_geometrical_tolerance_symbol			•	•	•					•	•	•	•							•
pre_defined_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_marker	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_point_marker_symbol	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_presentation_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_surface_condition_symbol			•	•	•					•	•	•	•							•
pre_defined_symbol	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_terminator_symbol	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
pre_defined_text_font			•	•	•					•	•	•	•							•
precision_qualifier	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
presentation_area	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_layer_assignment	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_representation	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_set	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_size	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_style_assignment	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_style_by_context	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presentation_view	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presented_item	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
presented_item_representation	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
prismatic_pair																•		•	•	•
prismatic_pair_range																				•
prismatic_pair_value																•		•	•	•
process_operation											•	•	•					•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
process_plan											●	●	●					●	●	●
process_product_association											●	●	●					●	●	●
process_property_association											●	●	●					●	●	●
product	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_category	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_category_relationship	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_class						●	●	●	●	●			●					●	●	●
product_concept						●	●	●	●	●			●					●	●	●
product_concept_context						●	●	●	●	●			●					●	●	●
product_concept_feature								●	●	●								●	●	●
product_concept_feature_association								●	●	●								●	●	●
product_concept_feature_category								●	●	●								●	●	●
product_concept_feature_category_usage								●	●	●								●	●	●
product_concept_relationship								●	●	●								●	●	●
product_context	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_context	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_context_association	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_context_role	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_effectivity						●	●	●	●	●			●					●	●	●
product_definition_formation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_formation_relationship	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_formation_with_specified_source	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_occurrence_relationship								●	●	●								●	●	●
product_definition_process											●	●	●					●	●	●
product_definition_relationship	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_resource											●	●	●					●	●	●
product_definition_shape	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_definition_substitute								●	●	●								●	●	●
product_definition_usage		●		●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
product_definition_with_associated_documents		●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_identification								●	●	●								●	●	●
product_process_plan											●	●	●					●	●	●
product_related_product_category	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
product_specification								●	●	●								●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
projected_zone_definition												•	•	•	•				•	•
projection_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
projection_directed_callout	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
promissory_usage_occurrence		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
property_definition	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
property_definition_relationship	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
property_definition_representation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
property_process											•	•	•					•	•	•
qualified_representation_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
quantified_assembly_component_usage		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
quasi_uniform_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
quasi_uniform_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
rack_and_pinion_pair																•		•	•	•
rack_and_pinion_pair_range																				•
rack_and_pinion_pair_value																•		•	•	•
radius_dimension	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
ratio_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ratio_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
rational_b_spline_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
rational_b_spline_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
real_literal																				•
real_numeric_variable																				•
rectangular_closed_profile												•	•	•	•				•	•
rectangular_composite_surface	•	•		•			•		•	•										•
rectangular_pattern												•	•	•	•				•	•
rectangular_trimmed_surface	•	•		•			•		•	•										•
referenced_modified_datum												•	•	•	•				•	•
relative_event_occurrence						•	•	•	•	•			•					•	•	•
rep_item_group	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
reparametrised_composite_curve_segment	•	•	•	•			•		•	•	•	•	•	•	•	•	•			•
replicate_feature													•	•	•				•	•
representation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
representation_context	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
representation_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
representation_map	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
representation_relationship	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
representation_relationship_with_transformation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
requirement_for_action_resource											●	●	●					●	●	●
resource_property						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
resource_property_representation						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
resource_requirement_type						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
resulting_path																●		●	●	●
retention						●	●	●	●	●			●					●	●	●
revolute_pair																●		●	●	●
revolute_pair_range																				●
revolute_pair_value																●		●	●	●
revolved_face_solid	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
rib												●	●	●	●				●	●
right_angular_wedge	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
right_circular_cone	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
right_circular_cylinder	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
role_association	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
rolling_curve_pair																●		●	●	●
rolling_curve_pair_value																●		●	●	●
rolling_surface_pair																●		●	●	●
rolling_surface_pair_value																●		●	●	●
rotation_about_direction																●		●	●	●
round_hole												●	●	●	●				●	●
rounded_u_profile												●	●	●	●				●	●
roundness_tolerance												●	●	●	●				●	●
runout_zone_definition												●	●	●	●				●	●
runout_zone_orientation												●	●	●	●				●	●
runout_zone_orientation_reference_direction												●	●	●	●				●	●
screw_pair																●		●	●	●
screw_pair_range																				●
screw_pair_value																●		●	●	●
seam_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
seam_edge	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
security_classification	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
security_classification_assignment	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
security_classification_level	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
serial_numbered_effectivity						•	•	•	•	•			•					•	•	•
shape_aspect	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
shape_aspect_associativity				•						•	•	•	•							•
shape_aspect_deriving_relationship				•						•		•	•	•	•			•	•	•
shape_aspect_relationship	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
shape_aspect_transition	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
shape_defining_relationship												•	•	•	•				•	•
shape_definition_representation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
shape_dimension_representation				•						•	•	•	•	•	•			•	•	•
shape_representation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
shape_representation_relationship		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
shape_representation_with_parameters												•	•	•	•				•	•
shell_based_surface_model	•	•	•	•	•		•		•	•	•	•	•	•	•	•		•	•	•
si_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
simple_boolean_expression																				•
simple_generic_expression	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
simple_numeric_expression																				•
simple_pair_range																•		•	•	•
simple_string_expression																				•
sin_function																				•
slash_expression																				•
sliding_curve_pair																•		•	•	•
sliding_curve_pair_value																•		•	•	•
sliding_surface_pair																•		•	•	•
sliding_surface_pair_value																•		•	•	•
slot												•	•	•	•				•	•
slot_end												•	•	•	•				•	•
solid_angle_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
solid_angle_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
solid_model	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
solid_replica	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
specified_higher_usage_occurrence		•		•	•	•	•	•	•	•			•	•	•	•		•	•	•
sphere	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
spherical_pair																•		•	•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
spherical_pair_range																				●
spherical_pair_value																●		●	●	●
spherical_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
square_root_function																				●
square_u_profile												●	●	●	●				●	●
standard_uncertainty	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
straightness_tolerance												●	●	●	●				●	●
string_expression																				●
string_literal																				●
string_variable																				●
structured_dimension_callout	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
styled_item	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
subedge	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
subface	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
substring_expression																				●
surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_condition_callout			●	●						●	●	●	●							●
surface_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_of_linear_extrusion	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_of_revolution	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_pair																●		●	●	●
surface_pair_range																				●
surface_patch	●	●		●			●		●	●										●
surface_profile_tolerance												●	●	●	●				●	●
surface_rendering_properties	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_replica	●	●	●	●	●		●		●	●	●	●	●	●	●	●		●	●	●
surface_side_style	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_style_boundary	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_style_control_grid	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_style_fill_area	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_style_parameter_line	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
surface_style_reflectance_ambient					●													●	●	●
surface_style_reflectance_ambient_diffuse					●													●	●	●
surface_style_reflectance_ambient_diffuse_specular					●													●	●	●
surface_style_rendering					●													●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
surface_style_rendering_with_properties					•													•	•	•
surface_style_segmentation_curve	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
surface_style_silhouette	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
surface_style_transparent																				•
surface_style_usage	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
surface_texture_representation												•	•	•	•				•	•
swept_face_solid	•	•		•	•		•		•	•	•	•	•	•	•	•		•	•	•
swept_surface	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
symbol_colour	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
symbol_representation			•	•	•					•	•	•	•							•
symbol_representation_map			•	•	•					•	•	•	•							•
symbol_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
symbol_target			•	•	•					•	•	•	•							•
symmetric_shape_aspect												•	•	•	•				•	•
symmetry_tolerance												•	•	•	•				•	•
tactile_appearance_representation												•	•	•	•				•	•
tan_function																				•
tangent				•						•		•	•	•	•			•	•	•
taper												•	•	•	•				•	•
tee_profile												•	•	•	•				•	•
terminator_symbol	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
text_literal			•	•	•					•	•	•	•							•
text_literal_with_associated_curves			•	•	•					•	•	•	•							•
text_literal_with_blanking_box			•	•	•					•	•	•	•							•
text_literal_with_delineation			•	•	•					•	•	•	•							•
text_literal_with_extent			•	•	•					•	•	•	•							•
text_string_representation			•	•	•					•	•	•	•							•
text_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
text_style_for_defined_font	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
text_style_with_box_characteristics			•	•	•					•	•	•	•							•
text_style_with_mirror			•	•	•					•	•	•	•							•
text_style_with_spacing			•	•	•					•	•	•	•							•
thermodynamic_temperature_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
thermodynamic_temperature_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
thread												•	•	•	•				•	•

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Table 37 – Usage of AIM elements in Conformance Classes (continued)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
time_interval	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
time_interval_assignment	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
time_interval_based_effectivity						●	●	●	●	●			●					●	●	●
time_interval_role	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
time_interval_with_bounds	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
time_measure_with_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
time_unit						●	●	●	●	●			●					●	●	●
tolerance_value				●						●		●	●	●	●			●	●	●
tolerance_zone												●	●	●	●				●	●
tolerance_zone_definition												●	●	●	●				●	●
tolerance_zone_form												●	●	●	●				●	●
topological_representation_item	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
toroidal_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
torus	●	●		●	●		●		●	●	●	●	●	●	●	●		●	●	●
total_runout_tolerance												●	●	●	●				●	●
transition_feature												●	●	●	●				●	●
trimmed_curve	●	●	●	●			●		●	●	●	●	●	●	●	●	●			●
two_direction_repeat_factor			●	●	●					●	●	●	●							●
type_qualifier	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
unary_boolean_expression																				●
unary_function_call																				●
unary_generic_expression	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
unary_numeric_expression																				●
uncertainty_assigned_representation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
uncertainty_measure_with_unit	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
uncertainty_qualifier	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
unconstrained_pair																●		●	●	●
unconstrained_pair_value																●		●	●	●
uniform_curve	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
uniform_surface	●	●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●	●
universal_pair																●		●	●	●
universal_pair_range																				●
universal_pair_value																●		●	●	●
value_function																				●
value_range	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

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Table 37 – Usage of AIM elements in Conformance Classes (concluded)

AIM element	Conformance class																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
value_representation_item	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
variable																				•
variable_semantics	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
vector	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
vector_style	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
vee_profile												•	•	•	•				•	•
versioned_action_request						•	•	•	•	•								•	•	•
vertex	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
vertex_loop	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
vertex_point	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
view_volume	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
visual_appearance_representation												•	•	•	•				•	•
volume_measure_with_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
volume_unit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
xor_expression																				•

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Annex A
(normative)

AIM EXPRESS expanded listing

This annex provides a listing of the table of short names and a listing of the EXPRESS specified in the AIM of this part of ISO 10303. No text or annotation is included. This annex is provided only in computer-interpretable form.

NOTE - The information provided on this diskette is informative; the normative text is that contained in the body of this part of ISO 10303.

EXPRESS specification:

```
*)

SCHEMA automotive_design;

 CONSTANT
  dummy_gri : geometric_representation_item := representation_item('') ||
              geometric_representation_item();
   -- 10303-42: geometry_schema
  dummy_tri : topological_representation_item := representation_item('') ||
              topological_representation_item();
   -- 10303-42: topology_schema
 END_CONSTANT;


 TYPE action_item = SELECT
     ( action, action_directive, action_method, action_property,
     action_relationship, action_request_solution,
     alternate_product_relationship, applied_action_assignment,
     applied_classification_assignment,
     applied_person_and_organization_assignment,
     approval_status, assembly_component_usage_substitute,
     certification, class, class_system, configuration_design,
     configuration_effectivity, configuration_item,
     configured_effectivity_assignment, contract, document_file,
     draughting_model, drawing_revision, executed_action,
     general_property, material_designation,
     mechanical_design_geometric_presentation_representation,
     organization_relationship, organizational_project,
     person_and_organization, presentation_area, product,
     product_concept, product_concept_feature,
     product_concept_feature_association,
     product_concept_feature_category,
     product_concept_feature_category_usage, product_definition,
```

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```
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_aspect, shape_representation,
    versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE action_request_item = SELECT
    ( action, action_method, action_property, action_relationship,
    alternate_product_relationship,
    assembly_component_usage_substitute, configuration_design,
    configuration_effectivity, configuration_item,
    configured_effectivity_assignment, document_file,
    draughting_model, drawing_revision, general_property,
    material_designation,
    mechanical_design_geometric_presentation_representation,
    presentation_area, product, product_concept,
    product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    resource_property, shape_aspect, shape_representation);
END_TYPE;  -- 10303-214: automotive_design


TYPE ahead_or_behind = ENUMERATION OF
     (ahead,exact,behind);
END_TYPE;  -- 10303-41: date_time_schema


TYPE amount_of_substance_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE angle_relator = ENUMERATION OF
     (equal,large,small);
END_TYPE;  -- 10303-47: shape_dimension_schema


TYPE approval_item = SELECT
    ( action, action_directive, action_property,
    action_request_solution, alternate_product_relationship,
    applied_action_assignment,
```

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```
    applied_classification_assignment,
    assembly_component_usage_substitute, certification, class,
    class_system, configuration_design,
    configuration_effectivity,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, executed_action,
    general_property, material_designation,
    mechanical_design_geometric_presentation_representation,
    organizational_project, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    resource_property, shape_representation,
    versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE approximation_method = ENUMERATION OF
     (chordal_deviation,chordal_length);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE area_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE area_or_view = SELECT
    ( presentation_area, presentation_view);
END_TYPE;  -- 10303-46: presentation_organization_schema


TYPE attribute_language_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, alternate_product_relationship,
    application_context, approval_relationship,
    assembly_component_usage_substitute,
    attribute_value_assignment, certification,
    configuration_design, configuration_item, contract,
    data_environment, date_role, date_time_role,
    descriptive_representation_item, document_relationship,
    draughting_title, effectivity, effectivity_relationship,
    event_occurrence, external_source, general_property,
    general_property_relationship,
    geometric_representation_item, geometric_tolerance, group,
    group_relationship, identification_role, kinematic_pair,
    mapped_item, name_assignment, organization_relationship,
    organization_role, organizational_project,
```

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```
    organizational_project_relationship, pair_actuator,
    person_and_organization_role,
    presentation_layer_assignment, process_product_association,
    product, product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_relationship, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute,
    product_related_product_category, property_definition,
    property_definition_relationship, representation,
    representation_relationship,
    requirement_for_action_resource, resource_property,
    resource_requirement_type, security_classification,
    shape_aspect, shape_aspect_relationship, styled_item,
    time_interval_role, topological_representation_item,
    uncertainty_measure_with_unit, uncertainty_qualifier,
    versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE attribute_type = SELECT
    ( label, text);
END_TYPE;  -- 10303-41: management_resources_schema


TYPE axis2_placement = SELECT
    ( axis2_placement_2d, axis2_placement_3d);
END_TYPE;  -- 10303-42: geometry_schema


TYPE b_spline_curve_form = ENUMERATION OF
     (polyline_form,circular_arc,elliptic_arc,parabolic_arc,
      hyperbolic_arc,unspecified);
END_TYPE;  -- 10303-42: geometry_schema


TYPE b_spline_surface_form = ENUMERATION OF
     (plane_surf,cylindrical_surf,conical_surf,spherical_surf,
      toroidal_surf,surf_of_revolution,ruled_surf,
      generalised_cone,quadric_surf,
      surf_of_linear_extrusion,unspecified);
END_TYPE;  -- 10303-42: geometry_schema


TYPE boolean_operand = SELECT
    ( solid_model, half_space_solid, csg_primitive, boolean_result);
END_TYPE;  -- 10303-42: geometric_model_schema
```

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```
TYPE boolean_operator = ENUMERATION OF
     (union,intersection,difference);
END_TYPE;  -- 10303-42: geometric_model_schema


TYPE box_characteristic_select = SELECT
    ( box_height, box_width, box_slant_angle, box_rotate_angle);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE box_height = positive_ratio_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE box_rotate_angle = plane_angle_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE box_slant_angle = plane_angle_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE box_width = positive_ratio_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE category_usage_item = SELECT
    ( product_class);
END_TYPE;  -- 10303-214: automotive_design


TYPE celsius_temperature_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE central_or_parallel = ENUMERATION OF
     (central,parallel);
END_TYPE;  -- 10303-46: presentation_organization_schema


TYPE certification_item = SELECT
    ( product_definition, product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship);
END_TYPE;  -- 10303-214: automotive_design
```

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```
TYPE character_spacing_select = SELECT
    ( length_measure, ratio_measure, measure_with_unit,
    descriptive_measure);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE character_style_select = SELECT
    ( text_style_for_defined_font);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE characterized_action_definition = SELECT
    ( action, action_method, action_method_relationship,
    action_relationship);
END_TYPE;  -- 10303-49: process_property_schema


TYPE characterized_definition = SELECT
    ( characterized_object, characterized_product_definition,
    shape_definition);
END_TYPE;  -- 10303-41: product_property_definition_schema


TYPE characterized_material_property = SELECT
    ( material_property_representation);
END_TYPE;  -- 10303-45: material_property_definition_schema


TYPE characterized_product_definition = SELECT
    ( product_definition, product_definition_relationship);
END_TYPE;  -- 10303-41: product_property_definition_schema


TYPE characterized_resource_definition = SELECT
    ( action_resource, action_resource_requirement);
END_TYPE;  -- 10303-49: process_property_schema


TYPE class_usage_effectivity_context_item = SELECT
    ( product_definition);
END_TYPE;  -- 10303-214: automotive_design


TYPE classification_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, approval_status, class,
    configuration_item, contract, document_file, document_type,
    executed_action, feature_definition, general_feature,
    general_property, material_designation,
```

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```
    organizational_project, planar_extent,
    plus_minus_tolerance, process_operation, product,
    product_concept, product_concept_feature_category,
    product_definition, product_definition_formation,
    product_definition_relationship, property_definition,
    resource_property, security_classification_level,
    shape_aspect, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE compound_item_definition = SELECT
    ( list_representation_item, set_representation_item);
END_TYPE;  -- 10303-43: representation_schema


TYPE configuration_design_item = SELECT
    ( product_definition, product_definition_formation);
END_TYPE;  -- 10303-44: configuration_management_schema


TYPE configured_effectivity_context_item = SELECT
    ( product_concept_feature_association);
END_TYPE;  -- 10303-214: automotive_design


TYPE configured_effectivity_item = SELECT
    ( action_relationship, process_plan, product_definition,
    product_process_plan);
END_TYPE;  -- 10303-214: automotive_design


TYPE context_dependent_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE contract_item = SELECT
    ( drawing_revision, executed_action, product_definition_formation);
END_TYPE;  -- 10303-214: automotive_design


TYPE count_measure = NUMBER;
END_TYPE;  -- 10303-41: measure_schema


TYPE csg_primitive = SELECT
    ( sphere, block, right_angular_wedge, torus, right_circular_cone,
    right_circular_cylinder);
END_TYPE;  -- 10303-42: geometric_model_schema
```

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```
TYPE csg_select = SELECT
    ( boolean_result, csg_primitive);
END_TYPE;  -- 10303-42: geometric_model_schema


TYPE curve_font_or_scaled_curve_font_select = SELECT
    ( curve_style_font_select);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE curve_on_surface = SELECT
    ( pcurve, surface_curve, composite_curve_on_surface);
END_TYPE;  -- 10303-42: geometry_schema


TYPE curve_or_annotation_curve_occurrence = SELECT
    ( curve, annotation_curve_occurrence);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE curve_or_render = SELECT
    ( curve_style, curve_style_rendering);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE curve_style_font_select = SELECT
    ( curve_style_font, pre_defined_curve_font,
    externally_defined_curve_font);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE curve_tolerance_deviation = positive_length_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE curve_tolerance_parameter = REAL;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE date_and_time_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_organization_assignment,
    applied_person_and_organization_assignment,
    approval_person_organization, approval_status,
    assembly_component_usage_substitute, certification, class,
    class_system, configuration_design, configuration_item,
```

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```
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, effectivity,
    event_occurrence, executed_action, general_property,
    material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE date_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_organization_assignment,
    applied_person_and_organization_assignment,
    approval_person_organization, approval_status,
    assembly_component_usage_substitute, certification, class,
    class_system, configuration_design, configuration_item,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, effectivity,
    event_occurrence, executed_action, general_property,
    material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design
```

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```
TYPE date_time_or_event_occurrence = SELECT
    ( date_time_select, event_occurrence);
END_TYPE;  -- 10303-41: date_time_schema


TYPE date_time_select = SELECT
    ( date, local_time, date_and_time);
END_TYPE;  -- 10303-41: date_time_schema


TYPE day_in_month_number = INTEGER;
 WHERE
  wr1 : {1<=SELF<=31};
END_TYPE;  -- 10303-41: date_time_schema


TYPE defined_glyph_select = SELECT
    ( externally_defined_character_glyph);
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE defined_symbol_select = SELECT
    ( pre_defined_symbol, externally_defined_symbol);
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE derived_property_select = SELECT
    ( property_definition, action_property, resource_property);
END_TYPE;  -- 10303-41: product_property_definition_schema


TYPE description_attribute_select = SELECT
    ( action_request_solution, application_context, approval_role,
    configuration_design, date_role, date_time_role,
    context_dependent_shape_representation, effectivity,
    external_source, organization_role,
    person_and_organization_role, person_and_organization,
    property_definition_representation, representation);
END_TYPE;  -- 10303-41: basic_attribute_schema


TYPE descriptive_measure = STRING;
END_TYPE;  -- 10303-41: measure_schema


TYPE dimension_count = INTEGER;
 WHERE
  wr1 : SELF > 0;
END_TYPE;  -- 10303-42: geometry_schema
```

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```
TYPE dimension_extent_usage = ENUMERATION OF
     (origin,target);
END_TYPE;  -- 10303-101: draughting_element_schema


TYPE dimensional_characteristic = SELECT
    ( dimensional_location, dimensional_size);
END_TYPE;  -- 10303-47: shape_dimension_schema


TYPE direction_count_select = SELECT
    ( u_direction_count, v_direction_count);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE document_reference_item = SELECT
    ( action_directive, action_method, action_relationship,
    applied_action_assignment, approval, certification, class,
    class_system, configuration_design, configuration_item,
    contract, descriptive_representation_item, executed_action,
    feature_definition, general_property, material_designation,
    organization, organizational_project, person,
    presentation_area, process_plan, product, product_concept,
    product_concept_feature, product_concept_feature_category,
    product_definition, product_definition_formation,
    product_definition_formation_relationship,
    product_definition_process,
    product_definition_relationship,
    product_definition_substitute,
    product_related_product_category, property_definition,
    representation, resource_requirement_type, retention,
    security_classification, shape_aspect,
    shape_aspect_relationship, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE draughting_callout_element = SELECT
    ( annotation_text_occurrence, annotation_symbol_occurrence,
    annotation_curve_occurrence);
END_TYPE;  -- 10303-101: draughting_element_schema


TYPE draughting_titled_item = SELECT
    ( drawing_revision, drawing_sheet_revision);
END_TYPE;  -- 10303-101: drawing_definition_schema


TYPE effectivity_item = SELECT
    ( action, action_method, action_method_relationship,
    action_property, action_relationship,
```

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```
    assembly_component_usage_substitute, class_system,
    configuration_design, configuration_item,
    configured_effectivity_assignment, document_file,
    draughting_model, drawing_revision, general_property,
    material_designation,
    mechanical_design_geometric_presentation_representation,
    presentation_area, product, product_concept,
    product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, shape_aspect, shape_representation);
END_TYPE;  -- 10303-214: automotive_design


TYPE electric_current_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE event_occurrence_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_person_and_organization_assignment,
    approval_status, assembly_component_usage_substitute,
    certification, class, class_system, configuration_design,
    configuration_effectivity, configuration_item,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, executed_action,
    general_property, material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design
```

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```
TYPE external_identification_item = SELECT
    ( document_file, externally_defined_class,
    externally_defined_general_property, product_definition);
END_TYPE;  -- 10303-214: automotive_design


TYPE fill_area_style_tile_shape_select = SELECT
    ( fill_area_style_tile_symbol_with_style);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE fill_style_select = SELECT
    ( fill_area_style_colour, externally_defined_tile_style,
    fill_area_style_tiles, externally_defined_hatch_style,
    fill_area_style_hatching);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE font_select = SELECT
    ( pre_defined_text_font, externally_defined_text_font);
END_TYPE;  -- 10303-46: presentation_resource_schema


TYPE founded_item_select = SELECT
    ( founded_item, representation_item);
END_TYPE;  -- 10303-43: representation_schema


TYPE geometric_set_select = SELECT
    ( point, curve, surface);
END_TYPE;  -- 10303-42: geometric_model_schema


TYPE group_item = SELECT
    ( geometric_representation_item, mapped_item,
    product_concept_feature, shape_aspect, styled_item,
    topological_representation_item);
END_TYPE;  -- 10303-214: automotive_design


TYPE hiding_or_blanking_select = SELECT
    ( presentation_area, presentation_view, annotation_fill_area);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE hour_in_day = INTEGER;
 WHERE
  wr1 : {0<=SELF<=24};
END_TYPE;  -- 10303-41: date_time_schema
```

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```
TYPE id_attribute_select = SELECT
    ( action, address, product_category, property_definition,
    shape_aspect, shape_aspect_relationship,
    application_context, group, organizational_project,
    representation);
END_TYPE;  -- 10303-41: basic_attribute_schema


TYPE identification_item = SELECT
    ( action, action_directive, action_method, action_property,
    applied_identification_assignment, approval_status, class,
    class_system, configuration_item, dimensional_size,
    document_file, document_type, draughting_model,
    effectivity, general_property, measure_representation_item,
    mechanical_design_geometric_presentation_representation,
    organization, person_and_organization, presentation_area,
    product, product_concept, product_concept_feature,
    product_concept_feature_category, product_definition,
    product_definition_formation,
    product_definition_relationship, property_definition,
    property_definition_relationship,
    security_classification_level, shape_aspect_relationship,
    shape_representation);
END_TYPE;  -- 10303-214: automotive_design


TYPE identifier = STRING;
END_TYPE;  -- 10303-41: support_resource_schema


TYPE interpolation_type = ENUMERATION OF
     (undefined,synchronous,linear);
END_TYPE;  -- 10303-105: kinematic_analysis_control_and_result_schema


TYPE invisibility_context = SELECT
    ( presentation_representation, presentation_set);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE invisible_item = SELECT
    ( styled_item, presentation_layer_assignment, representation);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE kinematic_analysis_definition = SELECT
    ( interpolated_configuration_sequence);
END_TYPE;  -- 10303-105: kinematic_analysis_control_and_result_schema
```

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```
TYPE kinematic_frame_background = SELECT
    ( point, curve, surface);
END_TYPE;  -- 10303-105: kinematic_structure_schema


TYPE kinematic_result = SELECT
    ( interpolated_configuration_sequence, resulting_path);
END_TYPE;  -- 10303-105: kinematic_analysis_control_and_result_schema


TYPE knot_type = ENUMERATION OF
     (uniform_knots,quasi_uniform_knots,
      piecewise_bezier_knots,unspecified);
END_TYPE;  -- 10303-42: geometry_schema


TYPE label = STRING;
END_TYPE;  -- 10303-41: support_resource_schema


TYPE language_item = SELECT
    ( representation);
END_TYPE;  -- 10303-214: automotive_design


TYPE layered_item = SELECT
    ( presentation_representation, representation_item);
END_TYPE;  -- 10303-46: presentation_organization_schema


TYPE length_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE limit_condition = ENUMERATION OF
     (maximum_material_condition,least_material_condition,
      regardless_of_feature_size);
END_TYPE;  -- 10303-47: shape_aspect_definition_schema


TYPE list_of_reversible_topology_item =
               LIST[0:?] OF reversible_topology_item;
END_TYPE;  -- 10303-42: topology_schema


TYPE list_representation_item =
               LIST[1:?] OF representation_item;
END_TYPE;  -- 10303-43: representation_schema
```

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```
TYPE luminous_intensity_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE marker_select = SELECT
    ( pre_defined_marker);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE mass_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE measure_value = SELECT
    ( length_measure, mass_measure, time_measure,
    electric_current_measure,
    thermodynamic_temperature_measure,
    celsius_temperature_measure, amount_of_substance_measure,
    luminous_intensity_measure, plane_angle_measure,
    solid_angle_measure, area_measure, volume_measure,
    ratio_measure, parameter_value, numeric_measure,
    context_dependent_measure, descriptive_measure,
    positive_length_measure, positive_plane_angle_measure,
    positive_ratio_measure, count_measure);
END_TYPE;  -- 10303-41: measure_schema


TYPE minute_in_hour = INTEGER;
 WHERE
  wr1 : {0<=SELF<=59};
END_TYPE;  -- 10303-41: date_time_schema


TYPE month_in_year_number = INTEGER;
 WHERE
  wr1 : {1<=SELF<=12};
END_TYPE;  -- 10303-41: date_time_schema


TYPE motion_parameter_measure = SELECT
    ( parameter_value, measure_with_unit);
END_TYPE;  -- 10303-105: kinematic_motion_representation_schema


TYPE multi_language_attribute_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, alternate_product_relationship,
    application_context, approval_relationship,
    assembly_component_usage_substitute, certification,
```

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```
    configuration_design, configuration_item, contract,
    data_environment, date_role, date_time_role,
    descriptive_representation_item, document_relationship,
    draughting_title, effectivity, effectivity_relationship,
    event_occurrence, external_source, general_property,
    general_property_relationship,
    geometric_representation_item, geometric_tolerance, group,
    group_relationship, identification_role, kinematic_pair,
    mapped_item, name_assignment, organization_relationship,
    organization_role, organizational_project,
    organizational_project_relationship, pair_actuator,
    person_and_organization_role,
    presentation_layer_assignment, process_product_association,
    product, product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_relationship, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute,
    product_related_product_category, property_definition,
    property_definition_relationship, representation,
    representation_relationship,
    requirement_for_action_resource, resource_property,
    resource_requirement_type, security_classification,
    shape_aspect, shape_aspect_relationship, styled_item,
    time_interval_role, topological_representation_item,
    uncertainty_measure_with_unit, uncertainty_qualifier,
    versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE name_attribute_select = SELECT
    ( action_request_solution, address, configuration_design,
    context_dependent_shape_representation, derived_unit,
    effectivity, person_and_organization, product_definition,
    product_definition_substitute,
    property_definition_representation);
END_TYPE;  -- 10303-41: basic_attribute_schema


TYPE name_item = SELECT
    ( kinematic_joint, kinematic_link, kinematic_structure);
END_TYPE;  -- 10303-214: automotive_design


TYPE null_style = ENUMERATION OF
     (null);
END_TYPE;  -- 10303-46: presentation_appearance_schema
```

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```
TYPE numeric_measure = NUMBER;
END_TYPE;  -- 10303-41: measure_schema


TYPE organization_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_identification_assignment,
    applied_organization_assignment,
    applied_person_and_organization_assignment, approval,
    approval_status, assembly_component_usage_substitute,
    certification, class, class_system, configuration_design,
    configuration_effectivity, configuration_item,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, effectivity,
    event_occurrence, executed_action, general_property,
    material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE organizational_project_item = SELECT
    ( executed_action, product_concept);
END_TYPE;  -- 10303-214: automotive_design


TYPE parameter_value = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE pcurve_or_surface = SELECT
    ( pcurve, surface);
END_TYPE;  -- 10303-42: geometry_schema


TYPE person_and_organization_item = SELECT
```

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```
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_organization_assignment,
    applied_person_and_organization_assignment,
    approval_status, assembly_component_usage_substitute,
    certification, class, class_system, configuration_design,
    configuration_effectivity, configuration_item,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, event_occurrence,
    executed_action, general_property, material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE person_organization_select = SELECT
    ( person, organization, person_and_organization);
END_TYPE;  -- 10303-41: person_organization_schema


TYPE plane_angle_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE positive_length_measure = length_measure;
 WHERE
  wr1 : SELF > 0.0;
END_TYPE;  -- 10303-41: measure_schema


TYPE positive_plane_angle_measure = plane_angle_measure;
 WHERE
  wr1 : SELF > 0.0;
END_TYPE;  -- 10303-41: measure_schema


TYPE positive_ratio_measure = ratio_measure;
```

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```
 WHERE
  wr1 : SELF > 0.0;
END_TYPE;  -- 10303-41: measure_schema


TYPE preferred_surface_curve_representation = ENUMERATION OF
     (curve_3d,pcurve_s1,pcurve_s2);
END_TYPE;  -- 10303-42: geometry_schema


TYPE presentable_text = STRING;
END_TYPE;  -- 10303-46: presentation_resource_schema


TYPE presentation_representation_select = SELECT
    ( presentation_representation, presentation_set);
END_TYPE;  -- 10303-46: presentation_organization_schema


TYPE presentation_size_assignment_select = SELECT
    ( presentation_view, presentation_area, area_in_set);
END_TYPE;  -- 10303-46: presentation_organization_schema


TYPE presentation_style_select = SELECT
    ( pre_defined_presentation_style, point_style, curve_style,
    surface_style_usage, symbol_style, fill_area_style,
    text_style, approximation_tolerance,
    externally_defined_style, null_style);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE presented_item_select = SELECT
    ( action, action_method, action_relationship, product_concept,
    product_concept_feature, product_concept_feature_category,
    product_definition, product_definition_formation,
    product_definition_relationship);
END_TYPE;  -- 10303-214: automotive_design


TYPE product_or_formation_or_definition = SELECT
    ( product, product_definition_formation, product_definition);
END_TYPE;  -- 10303-41: document_schema


TYPE product_or_presentation_space = ENUMERATION OF
     (product_shape_space,presentation_area_space);
END_TYPE;  -- 10303-46: presentation_appearance_schema
```

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```
TYPE property_or_shape_select = SELECT
    ( property_definition, shape_definition);
END_TYPE;  -- 10303-49: process_property_schema


TYPE ratio_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE rendering_properties_select = SELECT
    ( surface_style_reflectance_ambient, surface_style_transparent);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE represented_definition = SELECT
    ( general_property, property_definition,
    property_definition_relationship, shape_aspect,
    shape_aspect_relationship);
END_TYPE;  -- 10303-41: product_property_representation_schema


TYPE reversible_topology = SELECT
    ( reversible_topology_item, list_of_reversible_topology_item,
    set_of_reversible_topology_item);
END_TYPE;  -- 10303-42: topology_schema


TYPE reversible_topology_item = SELECT
    ( edge, path, face, face_bound, closed_shell, open_shell);
END_TYPE;  -- 10303-42: topology_schema


TYPE rigid_placement = SELECT
    ( axis2_placement_3d);
END_TYPE;  -- 10303-105: kinematic_structure_schema


TYPE role_select = SELECT
    ( action_assignment, action_request_assignment,
    approval_assignment, approval_date_time,
    certification_assignment, contract_assignment,
    document_reference, effectivity_assignment,
    group_assignment, name_assignment,
    security_classification_assignment);
END_TYPE;  -- 10303-41: basic_attribute_schema


TYPE rotational_range_measure = SELECT
    ( plane_angle_measure, unlimited_range);
END_TYPE;  -- 10303-105: kinematic_structure_schema
```

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```
TYPE second_in_minute = REAL;
 WHERE
  wr1 : {0<=SELF<=60.0};
END_TYPE;  -- 10303-41: date_time_schema


TYPE security_classification_item = SELECT
    ( action, action_directive, action_property,
    applied_action_assignment,
    assembly_component_usage_substitute, class_system,
    configuration_design, configuration_effectivity,
    configured_effectivity_assignment, document_file,
    draughting_model, drawing_revision, executed_action,
    general_property, material_designation,
    mechanical_design_geometric_presentation_representation,
    organizational_project, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_category, product_definition,
    product_definition_formation,
    product_definition_relationship, property_definition,
    resource_property, shape_representation,
    versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE set_of_reversible_topology_item =
                      SET[0:?] OF reversible_topology_item;
END_TYPE;  -- 10303-42: topology_schema


TYPE set_representation_item =
                      SET[1:?] OF representation_item;
END_TYPE;  -- 10303-43: representation_schema


TYPE shading_curve_method = ENUMERATION OF
     (constant_colour,linear_colour);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE shading_surface_method = ENUMERATION OF
     (constant_shading,colour_shading,dot_shading,normal_shading);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE shape_definition = SELECT
    ( product_definition_shape, shape_aspect,
    shape_aspect_relationship);
END_TYPE;  -- 10303-41: product_property_definition_schema
```

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```
TYPE shape_tolerance_select = SELECT
    ( geometric_tolerance, plus_minus_tolerance);
END_TYPE;  -- 10303-47: shape_tolerance_schema


TYPE shell = SELECT
    ( open_shell, closed_shell);
END_TYPE;  -- 10303-42: topology_schema


TYPE si_prefix = ENUMERATION OF
     (exa,peta,tera,giga,mega,kilo,hecto,deca,deci,
      centi,milli,micro,nano,pico,femto,atto);
END_TYPE;  -- 10303-41: measure_schema


TYPE si_unit_name = ENUMERATION OF
     (metre,gram,second,ampere,kelvin,mole,candela,radian,steradian,hertz,
      newton,pascal,joule,watt,coulomb,volt,farad,ohm,siemens,weber,tesla,
      henry,degree_celsius,lumen,lux,becquerel,gray,sievert);
END_TYPE;  -- 10303-41: measure_schema


TYPE size_select = SELECT
    ( positive_length_measure, measure_with_unit, descriptive_measure);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE solid_angle_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE source = ENUMERATION OF
     (made,bought,not_known);
END_TYPE;  -- 10303-41: product_definition_schema


TYPE source_item = SELECT
    (identifier);
END_TYPE;  -- 10303-41: external_reference_schema


TYPE spatial_rotation = SELECT
    ( ypr_rotation, rotation_about_direction);
END_TYPE;  -- 10303-105: kinematic_structure_schema


TYPE specified_item = SELECT
```

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```
    ( drawing_revision);
END_TYPE;  -- 10303-214: automotive_design


TYPE style_context_select = SELECT
    ( group, presentation_layer_assignment, representation,
    representation_item, presentation_set);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE supported_item = SELECT
    ( action_directive, action, action_method);
END_TYPE;  -- 10303-41: action_schema


TYPE surface_boundary = SELECT
    ( boundary_curve, degenerate_pcurve);
END_TYPE;  -- 10303-42: geometry_schema


TYPE surface_model = SELECT
    ( shell_based_surface_model, face_based_surface_model);
END_TYPE;  -- 10303-42: geometric_model_schema


TYPE surface_side = ENUMERATION OF
     (positive,negative,both);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE surface_side_style_select = SELECT
    ( surface_side_style);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE surface_style_element_select = SELECT
    ( surface_style_fill_area, surface_style_boundary,
    surface_style_silhouette, surface_style_segmentation_curve,
    surface_style_control_grid, surface_style_parameter_line,
    surface_style_rendering);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE surface_tolerance_deviation = positive_length_measure;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE surface_tolerance_parameter = REAL;
END_TYPE;  -- 10303-46: presentation_appearance_schema
```

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```
TYPE symbol_style_select = SELECT
    ( symbol_colour);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE text = STRING;
END_TYPE;  -- 10303-41: support_resource_schema


TYPE text_alignment = label;
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE text_delineation = label;
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE text_or_character = SELECT
    ( annotation_text, annotation_text_character,
    defined_character_glyph, composite_text, text_literal);
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE text_path = ENUMERATION OF
     (left,right,up,down);
END_TYPE;  -- 10303-46: presentation_definition_schema


TYPE thermodynamic_temperature_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE time_interval_item = SELECT
    ( action, action_directive, action_method, action_property,
    action_relationship, action_request_solution,
    alternate_product_relationship, applied_action_assignment,
    applied_classification_assignment,
    applied_person_and_organization_assignment,
    approval_status, assembly_component_usage_substitute,
    certification, class, class_system, configuration_design,
    configuration_effectivity, configuration_item,
    configured_effectivity_assignment, contract, document_file,
    draughting_model, drawing_revision, executed_action,
    general_property, material_designation,
    mechanical_design_geometric_presentation_representation,
    organization_relationship, organizational_project,
    person_and_organization, presentation_area, product,
    product_concept, product_concept_feature,
    product_concept_feature_association,
```

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```
    product_concept_feature_category,
    product_concept_feature_category_usage, product_definition,
    product_definition_formation,
    product_definition_formation_relationship,
    product_definition_relationship,
    product_definition_substitute, property_definition,
    requirement_for_action_resource, resource_property,
    security_classification, security_classification_level,
    shape_representation, versioned_action_request);
END_TYPE;  -- 10303-214: automotive_design


TYPE time_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema


TYPE tolerance_deviation_select = SELECT
    ( curve_tolerance_deviation, surface_tolerance_deviation);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE tolerance_method_definition = SELECT
    ( tolerance_value, limits_and_fits);
END_TYPE;  -- 10303-47: shape_tolerance_schema


TYPE tolerance_parameter_select = SELECT
    ( curve_tolerance_parameter, surface_tolerance_parameter);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE tolerance_select = SELECT
    ( approximation_tolerance_deviation,
    approximation_tolerance_parameter);
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE transformation = SELECT
    ( item_defined_transformation,
    functionally_defined_transformation);
END_TYPE;  -- 10303-43: representation_schema


TYPE transition_code = ENUMERATION OF
     (discontinuous,continuous,cont_same_gradient,
      cont_same_gradient_same_curvature);
END_TYPE;  -- 10303-42: geometry_schema
```

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```
TYPE translational_range_measure = SELECT
    ( length_measure, unlimited_range);
END_TYPE;  -- 10303-105: kinematic_structure_schema


TYPE trimming_preference = ENUMERATION OF
     (cartesian,parameter,unspecified);
END_TYPE;  -- 10303-42: geometry_schema


TYPE trimming_select = SELECT
    ( cartesian_point, parameter_value);
END_TYPE;  -- 10303-42: geometry_schema


TYPE u_direction_count = INTEGER;
 WHERE
  wr1 : SELF > 1;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE unit = SELECT
    ( named_unit, derived_unit);
END_TYPE;  -- 10303-41: measure_schema


TYPE unlimited_range = ENUMERATION OF
     (unlimited);
END_TYPE;  -- 10303-105: kinematic_structure_schema


TYPE v_direction_count = INTEGER;
 WHERE
  wr1 : SELF > 1;
END_TYPE;  -- 10303-46: presentation_appearance_schema


TYPE value_qualifier = SELECT
    ( precision_qualifier, type_qualifier, uncertainty_qualifier);
END_TYPE;  -- 10303-45: qualified_measure_schema


TYPE vector_or_direction = SELECT
    ( vector, direction);
END_TYPE;  -- 10303-42: geometry_schema


TYPE volume_measure = REAL;
END_TYPE;  -- 10303-41: measure_schema
```

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```
 TYPE wireframe_model = SELECT
     ( edge_based_wireframe_model);
 END_TYPE;  -- 10303-42: geometric_model_schema


 TYPE year_number = INTEGER;
 END_TYPE;  -- 10303-41: date_time_schema


 TYPE ypr_enumeration = ENUMERATION OF
      (yaw,pitch,roll);
 END_TYPE;  -- 10303-105: kinematic_structure_schema


 TYPE ypr_rotation = ARRAY[ypr_index(yaw):ypr_index(roll)] OF
       plane_angle_measure;
 END_TYPE;  -- 10303-105: kinematic_structure_schema


 ENTITY abs_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY acos_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY action;
  name : label;
  description : OPTIONAL text;
  chosen_method : action_method;
  DERIVE
   id : identifier := get_id_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: action_schema


 ENTITY action_assignment
  ABSTRACT SUPERTYPE;
  assigned_action : action;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema
```

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```
ENTITY action_directive;
 name : label;
 description : OPTIONAL text;
 analysis : text;
 comment : text;
 requests : SET[1:?] OF versioned_action_request;
END_ENTITY;  -- 10303-41: action_schema


ENTITY action_method;
 name : label;
 description : OPTIONAL text;
 consequence : text;
 purpose : text;
END_ENTITY;  -- 10303-41: action_schema


ENTITY action_method_relationship;
 name : label;
 description : OPTIONAL text;
 relating_method : action_method;
 related_method : action_method;
END_ENTITY;  -- 10303-41: action_schema


ENTITY action_property;
 name : label;
 description : text;
 definition : characterized_action_definition;
END_ENTITY;  -- 10303-49: process_property_schema


ENTITY action_property_representation;
 name : label;
 description : text;
 property : action_property;
 representation : representation;
END_ENTITY;  -- 10303-49: process_property_representation_schema


ENTITY action_relationship;
 name : label;
 description : OPTIONAL text;
 relating_action : action;
 related_action : action;
END_ENTITY;  -- 10303-41: action_schema


ENTITY action_request_assignment
 ABSTRACT SUPERTYPE;
```

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```
  assigned_action_request : versioned_action_request;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY action_request_solution;
  method : action_method;
  request : versioned_action_request;
  DERIVE
   description : text := get_description_value(SELF);
   name : label := get_name_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: action_schema


 ENTITY action_request_status;
  status : label;
  assigned_request : versioned_action_request;
 END_ENTITY;  -- 10303-41: action_schema


 ENTITY action_resource;
  name : label;
  description : OPTIONAL text;
  usage : SET[1:?] OF supported_item;
  kind : action_resource_type;
 END_ENTITY;  -- 10303-41: action_schema


 ENTITY action_resource_requirement;
  name : label;
  description : text;
  kind : resource_requirement_type;
  operations : SET[1:?] OF characterized_action_definition;
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY action_resource_type;
  name : label;
 END_ENTITY;  -- 10303-41: action_schema
```

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```
 ENTITY action_status;
  status : label;
  assigned_action : executed_action;
 END_ENTITY;  -- 10303-41: action_schema


 ENTITY address;
  internal_location : OPTIONAL label;
  street_number : OPTIONAL label;
  street : OPTIONAL label;
  postal_box : OPTIONAL label;
  town : OPTIONAL label;
  region : OPTIONAL label;
  postal_code : OPTIONAL label;
  country : OPTIONAL label;
  facsimile_number : OPTIONAL label;
  telephone_number : OPTIONAL label;
  electronic_mail_address : OPTIONAL label;
  telex_number : OPTIONAL label;
  DERIVE
   name : label := get_name_value(SELF);
   url : identifier := get_id_value(SELF);
  WHERE
 wr1: EXISTS ( internal_location ) OR EXISTS ( street_number
     ) OR EXISTS ( street ) OR EXISTS ( postal_box ) OR
     EXISTS ( town ) OR EXISTS ( region ) OR EXISTS (
     postal_code ) OR EXISTS ( country ) OR EXISTS (
     facsimile_number ) OR EXISTS ( telephone_number ) OR
     EXISTS ( electronic_mail_address ) OR EXISTS (
     telex_number ) ;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY advanced_brep_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | ( NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MANIFOLD_SOLID_BREP' ,
     'AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( it <* SELF.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MANIFOLD_SOLID_BREP' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
     ) ) ) >0;
 wr3: SIZEOF ( QUERY ( msb <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'MANIFOLD_SOLID_BREP' IN TYPEOF (
     it ) ) ) | ( NOT ( SIZEOF ( QUERY ( csh <* msb_shells (
     msb ) | ( NOT ( SIZEOF ( QUERY ( fcs <* csh\
     connected_face_set.cfs_faces | ( NOT (
     'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fcs ) )
     ) ) ) =  0 ) ) ) ) =  0 ) ) ) ) =  0;
```

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```
 wr4: SIZEOF ( QUERY ( msb <* QUERY ( it <* items | (
     'AUTOMOTIVE_DESIGN.'+ 'MANIFOLD_SOLID_BREP' IN TYPEOF (
     it ) ) ) | ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_CLOSED_SHELL'
     IN TYPEOF ( msb\ manifold_solid_brep.outer ) ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( brv <* QUERY ( it <* items | (
     'AUTOMOTIVE_DESIGN.'+ 'BREP_WITH_VOIDS' IN TYPEOF ( it )
     ) ) | ( NOT ( SIZEOF ( QUERY ( csh <* brv\
     brep_with_voids.voids | ( csh\ oriented_closed_shell.
     orientation ) ) ) =  0 ) ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( mi <* QUERY ( it <* items | (
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) )
     | ( NOT ( 'AUTOMOTIVE_DESIGN.'+
     'ADVANCED_BREP_SHAPE_REPRESENTATION' IN TYPEOF ( mi\
     mapped_item.mapping_source.mapped_representation ) ) ) )
     ) =  0;
END_ENTITY;  -- 10303-514: aic_advanced_brep


 ENTITY advanced_face
  SUBTYPE OF (face_surface);
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'ELEMENTARY_SURFACE' ,
     'AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_SURFACE',
     'AUTOMOTIVE_DESIGN.'+ 'SWEPT_SURFACE']* TYPEOF (
     face_geometry ) ) =  1;
 wr2: SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* bounds |
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
     ) ) | NOT ( SIZEOF ( QUERY ( oe <* elp_fbnds.bound\
     path.edge_list | NOT ( 'AUTOMOTIVE_DESIGN.'+ 'EDGE_CURVE'
     IN TYPEOF ( oe\ oriented_edge.edge_element ) ) ) ) =  0
     ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* bounds |
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
     ) ) | NOT ( SIZEOF ( QUERY ( oe <* elp_fbnds.bound\
     path.edge_list | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'LINE' , 'AUTOMOTIVE_DESIGN.'+ 'CONIC' ,
     'AUTOMOTIVE_DESIGN.'+ 'POLYLINE' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_CURVE' , 'AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE']*
     TYPEOF ( oe.edge_element\ edge_curve.edge_geometry ) )
     =  1 ) ) ) =  0 ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* bounds |
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
     ) ) | NOT ( SIZEOF ( QUERY ( oe <* elp_fbnds.bound\
     path.edge_list | NOT ( ( ( ( 'AUTOMOTIVE_DESIGN.'+
     'VERTEX_POINT' IN TYPEOF ( oe\ edge.edge_start ) ) AND
     ( 'AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' IN TYPEOF ( oe\
     edge.edge_start\ vertex_point.vertex_geometry ) ) ) )
     AND ( ( 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT' IN TYPEOF (
     oe\ edge.edge_end ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'CARTESIAN_POINT' IN TYPEOF ( oe\ edge.edge_end\
     vertex_point.vertex_geometry ) ) ) ) ) =  0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* bounds |
```

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```
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
      ) ) | 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_PATH' IN TYPEOF (
      elp_fbnds.bound ) ) ) =  0;
  wr6: ( NOT ( 'AUTOMOTIVE_DESIGN.'+ 'SWEPT_SURFACE' IN TYPEOF
      ( face_geometry ) ) ) OR ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'LINE' , 'AUTOMOTIVE_DESIGN.'+
      'CONIC' , 'AUTOMOTIVE_DESIGN.'+ 'POLYLINE' ,
      'AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE']* TYPEOF (
      face_geometry\ swept_surface.swept_curve ) ) =  1 ) ;
  wr7: SIZEOF ( QUERY ( vlp_fbnds <* QUERY ( bnds <* bounds |
      'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP' IN TYPEOF ( bnds.
      bound ) ) | NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT'
      IN TYPEOF ( vlp_fbnds\ face_bound.bound\ vertex_loop.
      loop_vertex ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
      'CARTESIAN_POINT' IN TYPEOF ( vlp_fbnds\ face_bound.
      bound\ vertex_loop.loop_vertex\
      vertex_point.vertex_geometry ) ) ) ) ) =  0;
  wr8: SIZEOF ( QUERY ( bnd <* bounds | NOT ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' , 'AUTOMOTIVE_DESIGN.'+
      'VERTEX_LOOP']* TYPEOF ( bnd.bound ) ) =  1 ) ) ) =  0;
  wr9: SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* bounds |
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
      ) ) | NOT ( SIZEOF ( QUERY ( oe <* elp_fbnds.bound\
      path.edge_list | ( 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_CURVE'
      IN TYPEOF ( oe\ oriented_edge.edge_element\ edge_curve.
      edge_geometry ) ) AND ( NOT ( SIZEOF ( QUERY ( sc_ag <*
      oe.edge_element\ edge_curve.edge_geometry\ surface_curve.
      associated_geometry | NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PCURVE'
      IN TYPEOF ( sc_ag ) ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0;
  wr10: ( ( NOT ( 'AUTOMOTIVE_DESIGN.'+ 'SWEPT_SURFACE' IN
      TYPEOF ( face_geometry ) ) ) OR ( ( NOT (
      'AUTOMOTIVE_DESIGN.'+ 'POLYLINE' IN TYPEOF (
      face_geometry\ swept_surface.swept_curve ) ) ) OR (
      SIZEOF ( face_geometry\ swept_surface.swept_curve\
      polyline.points ) >=3 ) ) ) AND ( SIZEOF ( QUERY (
      elp_fbnds <* QUERY ( bnds <* bounds |
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF ( bnds.bound
      ) ) | NOT ( SIZEOF ( QUERY ( oe <* elp_fbnds.bound\
      path.edge_list | ( 'AUTOMOTIVE_DESIGN.'+ 'POLYLINE' IN
      TYPEOF ( oe\ oriented_edge.edge_element\ edge_curve.
      edge_geometry ) ) AND ( NOT ( SIZEOF ( oe\
      oriented_edge.edge_element\ edge_curve.edge_geometry\
      polyline.points ) >=3 ) ) ) ) =  0 ) ) ) =  0 ) ;
END_ENTITY;  -- 10303-511: aic_topologically_bounded_surface


 ENTITY alternate_product_relationship;
  name : label;
  definition : OPTIONAL text;
  alternate : product;
  base : product;
  basis : text;
```

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```
  UNIQUE
   ur1 : alternate,base;
  WHERE
 wr1:alternate:<>:base;
END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY amount_of_substance_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'AMOUNT_OF_SUBSTANCE_UNIT' IN
     TYPEOF ( SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY amount_of_substance_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  1.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY and_expression
  SUBTYPE OF (multiple_arity_boolean_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY angular_dimension
  SUBTYPE OF (dimension_curve_directed_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY angular_location
  SUBTYPE OF (dimensional_location);
  angle_selection : angle_relator;
 END_ENTITY;  -- 10303-47: shape_dimension_schema


 ENTITY angular_size
  SUBTYPE OF (dimensional_size);
  angle_selection : angle_relator;
```

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```
 END_ENTITY;  -- 10303-47: shape_dimension_schema


 ENTITY angularity_tolerance
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) <3;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY annotation_curve_occurrence
  SUBTYPE OF (annotation_occurrence);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF (
     SELF\styled_item.item ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_fill_area
  SUBTYPE OF (geometric_representation_item);
  boundaries : SET[1:?] OF curve;
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_fill_area_occurrence
  SUBTYPE OF (annotation_occurrence);
  fill_style_target : point;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_FILL_AREA' IN TYPEOF (
     SELF.item ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_occurrence
  SUPERTYPE OF (ONEOF(annotation_curve_occurrence,
                annotation_fill_area_occurrence,annotation_text_occurrence,
                annotation_symbol_occurrence))
  SUBTYPE OF (styled_item);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( SELF ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_occurrence_associativity
  SUBTYPE OF (annotation_occurrence_relationship);
  WHERE
 wr1: SIZEOF ( TYPEOF ( SELF.related_annotation_occurrence )
     *['AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_FILL_AREA_OCCURRENCE' ,
```

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```
     'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_CURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'LEADER_CURVE'] ) =  1;
END_ENTITY;  -- 10303-520: aic_associative_draughting_elements


 ENTITY annotation_occurrence_relationship;
  name : label;
  description : text;
  relating_annotation_occurrence : annotation_occurrence;
  related_annotation_occurrence : annotation_occurrence;
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_subfigure_occurrence
  SUBTYPE OF (annotation_symbol_occurrence);
  WHERE
 wr1: SIZEOF ( QUERY ( sty <* SELF.styles | NOT ( SIZEOF (
     sty.styles ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( sty <* SELF.styles | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'NULL_STYLE' IN TYPEOF ( sty.
     styles[1] ) ) ) ) =  0;
 wr3: ( 'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL' IN TYPEOF (
     SELF.item ) ) ;
 wr4: ( 'AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_SUBFIGURE_REPRESENTATION' IN TYPEOF (
     SELF.item\ mapped_item.mapping_source.
     mapped_representation ) ) ;
END_ENTITY;  -- 10303-504: aic_draughting_annotation


 ENTITY annotation_symbol
  SUBTYPE OF (mapped_item);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'SYMBOL_REPRESENTATION_MAP' IN
     TYPEOF ( SELF\mapped_item.mapping_source ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'SYMBOL_TARGET' IN TYPEOF (
     SELF\mapped_item.mapping_target ) ;
 wr3:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( SELF ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_symbol_occurrence
  SUBTYPE OF (annotation_occurrence);
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL' ,
     'AUTOMOTIVE_DESIGN.'+ 'DEFINED_SYMBOL']* TYPEOF (
     SELF\styled_item.item ) ) >0;
END_ENTITY;  -- 10303-46: presentation_definition_schema
```

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```
 ENTITY annotation_text
  SUBTYPE OF (mapped_item);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' IN TYPEOF (
     SELF\mapped_item.mapping_target ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'TEXT_STRING_REPRESENTATION' IN
     TYPEOF ( SELF\mapped_item.mapping_source.
     mapped_representation ) ;
 wr3:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( SELF ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_text_character
  SUBTYPE OF (mapped_item);
  alignment : text_alignment;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'CHARACTER_GLYPH_SYMBOL' IN TYPEOF
     ( SELF\mapped_item.mapping_source.mapped_representation )
     ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' IN TYPEOF (
     SELF\mapped_item.mapping_target ) ;
 wr3:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( SELF ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY annotation_text_occurrence
  SUBTYPE OF (annotation_occurrence);
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL' ,
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_TEXT' ,
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_TEXT_CHARACTER' ,
     'AUTOMOTIVE_DESIGN.'+ 'DEFINED_CHARACTER_GLYPH' ,
     'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT']* TYPEOF (
     SELF\styled_item.item ) ) >0;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY apex
  SUBTYPE OF (derived_shape_aspect);
 END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY application_context;
  application : label;
  DERIVE
   description : text := get_description_value(SELF);
   id : identifier := get_id_value(SELF);
  INVERSE
   context_elements : SET[1:?] OF application_context_element FOR
```

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```
                    frame_of_reference;
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY application_context_element
  SUPERTYPE OF (ONEOF(product_concept_context,product_context,
                product_definition_context));
  name : label;
  frame_of_reference : application_context;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY application_context_relationship;
  name : label;
  description : OPTIONAL text;
  relating_context : application_context;
  related_context : application_context;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY application_protocol_definition;
  status : label;
  application_interpreted_model_schema_name : label;
  application_protocol_year : year_number;
  application : application_context;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY applied_action_assignment
  SUBTYPE OF (action_assignment);
  items : SET[1:?] OF action_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_action_request_assignment
  SUBTYPE OF (action_request_assignment);
  items : SET[1:?] OF action_request_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_approval_assignment
  SUBTYPE OF (approval_assignment);
  items : SET[1:?] OF approval_item;
 END_ENTITY;  -- 10303-214: automotive_design
```

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```
ENTITY applied_area
 SUBTYPE OF (shape_aspect);
 WHERE
wr1: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
wr2: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {2<=SIZEOF ( pdr.
    used_representation.items ) <=3} ) ) =  1;
wr3: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
    ['orientation' , 'effective length' , 'maximum length' ] )
    ) ) >0 ) ) ) =  0;
wr4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'orientation' )
    AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
    ) ) ) =  1 ) ) ) =  1;
wr5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'effective length' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'
    + 'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
wr6: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'effective length' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'
    + 'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
wr7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
```

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```
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar.description =  'applied area usage' ) AND ( (
     'AUTOMOTIVE_DESIGN.' + 'THREAD' IN TYPEOF ( sar.
     relating_shape_aspect.of_shape.definition ) ) OR ( (
     'AUTOMOTIVE_DESIGN.' +
     'EXTERNALLY_DEFINED_FEATURE_DEFINITION' IN TYPEOF ( sar.
     relating_shape_aspect.of_shape.definition ) ) AND ( sar.
     relating_shape_aspect.of_shape.definition\
     externally_defined_item.item_id =  'external thread' )
     AND ( sar.relating_shape_aspect.of_shape.definition\
     externally_defined_item.source.source_id =
     'external thread specification' ) ) ) AND ( sar.
     relating_shape_aspect.of_shape.definition.description =
     'partial area occurrence' ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_certification_assignment
  SUBTYPE OF (certification_assignment);
  items : SET[1:?] OF certification_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_classification_assignment
  SUBTYPE OF (classification_assignment);
  items : SET[1:?] OF classification_item;
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CLASS' IN TYPEOF (
     SELF.assigned_class ) ) OR ( SIZEOF ( QUERY ( i <*
     SELF.items | SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'ACTION' ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_DIRECTIVE' ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_METHOD' ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_PROPERTY' ,
     'AUTOMOTIVE_DESIGN.' + 'APPLICATION_CONTEXT' ,
     'AUTOMOTIVE_DESIGN.' + 'APPROVAL_STATUS' ,
     'AUTOMOTIVE_DESIGN.' + 'ASSEMBLY_COMPONENT_USAGE' ,
     'AUTOMOTIVE_DESIGN.' + 'CONFIGURATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'CONTRACT' , 'AUTOMOTIVE_DESIGN.' +
     'DOCUMENT_TYPE' , 'AUTOMOTIVE_DESIGN.' +
     'FEATURE_DEFINITION' , 'AUTOMOTIVE_DESIGN.' +
     'GENERAL_PROPERTY' , 'AUTOMOTIVE_DESIGN.' +
     'MATERIAL_DESIGNATION' , 'AUTOMOTIVE_DESIGN.' +
     'ORGANIZATIONAL_PROJECT' , 'AUTOMOTIVE_DESIGN.' + 'PRODUCT'
     , 'AUTOMOTIVE_DESIGN.' + 'PRODUCT_CONCEPT' ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_CONCEPT_FEATURE_CATEGORY' ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION_FORMATION' ,
     'AUTOMOTIVE_DESIGN.' + 'PROPERTY_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.' + 'RESOURCE_PROPERTY' ,
     'AUTOMOTIVE_DESIGN.' + 'SECURITY_CLASSIFICATION_LEVEL' ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT' ,
```

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      'AUTOMOTIVE_DESIGN.' + 'VERSIONED_ACTION_REQUEST']* TYPEOF
      ( i ) ) <>1 ) ) =  0 ) ;
  wr2: NOT ( ( 'AUTOMOTIVE_DESIGN.' + 'GROUP' IN TYPEOF (
      SELF.assigned_class ) ) AND ( SELF.assigned_class\ group.
      name =  'E' ) AND ( SELF.assigned_class\ group.
      description =  'dimensioning principle' ) ) OR ( SIZEOF (
      QUERY ( i <* SELF.items | NOT ( 'AUTOMOTIVE_DESIGN.' +
      'PLUS_MINUS_TOLERANCE' IN TYPEOF ( i ) ) ) ) =  0 ) ;
  wr3: NOT ( ( 'AUTOMOTIVE_DESIGN.' + 'CLASS_SYSTEM' IN TYPEOF
      ( SELF.assigned_class ) ) AND ( SELF.role.name =
      'class system membership' ) ) OR ( SIZEOF ( QUERY ( i <*
      SELF.items | SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'APPROVAL_STATUS' , 'AUTOMOTIVE_DESIGN.' + 'CLASS' ,
      'AUTOMOTIVE_DESIGN.' + 'DESCRIPTIVE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.' + 'DOCUMENT_TYPE' ,
      'AUTOMOTIVE_DESIGN.' + 'SECURITY_CLASSIFICATION_LEVEL' ,
      'AUTOMOTIVE_DESIGN.' + 'APPROVAL_STATUS']* TYPEOF ( i ) )
      <>1 ) ) =  0 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_contract_assignment
  SUBTYPE OF (contract_assignment);
  items : SET[1:?] OF contract_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_date_and_time_assignment
  SUBTYPE OF (date_and_time_assignment);
  items : SET[1:?] OF date_and_time_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_date_assignment
  SUBTYPE OF (date_assignment);
  items : SET[1:?] OF date_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'actual end' ) ) OR
      item_correlation ( SELF.items , ['ACTION' ,
      'ORGANIZATIONAL_PROJECT' , 'EFFECTIVITY'] ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_document_reference
  SUBTYPE OF (document_reference);
  items : SET[1:?] OF document_reference_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'general tolerance definition'
      ) ) OR item_correlation ( SELF.items , ['REPRESENTATION']
      ) ;
 wr2: ( SELF.role.name =  'general tolerance definition' ) OR
```

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```
     item_correlation ( SELF.items , ['ACTION' ,
     'ACTION_DIRECTIVE' , 'ACTION_METHOD' ,
     'ACTION_RELATIONSHIP' , 'APPLIED_ACTION_ASSIGNMENT' ,
     'APPROVAL' , 'CERTIFICATION' , 'CLASS' , 'CLASS_SYSTEM' ,
     'CONFIGURATION_DESIGN' , 'CONFIGURATION_ITEM' , 'CONTRACT'
     , 'FEATURE_DEFINITION' , 'GENERAL_PROPERTY' ,
     'MATERIAL_DESIGNATION' , 'ORGANIZATION' ,
     'ORGANIZATIONAL_PROJECT' , 'PERSON' , 'PRODUCT_CONCEPT' ,
     'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' , 'PRODUCT_DEFINITION' ,
     'PRODUCT_DEFINITION_FORMATION' ,
     'PRODUCT_DEFINITION_FORMATION_RELATIONSHIP' ,
     'PRODUCT_DEFINITION_RELATIONSHIP' ,
     'PRODUCT_DEFINITION_SUBSTITUTE' ,
     'PRODUCT_RELATED_PRODUCT_CATEGORY' , 'PROPERTY_DEFINITION'
     , 'REPRESENTATION' , 'RESOURCE_REQUIREMENT_TYPE' ,
     'SECURITY_CLASSIFICATION' , 'SHAPE_ASPECT' ,
     'SHAPE_ASPECT_RELATIONSHIP' , 'VERSIONED_ACTION_REQUEST'] )
     ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_document_usage_constraint_assignment
  SUBTYPE OF (document_usage_constraint_assignment);
  items : SET[1:?] OF document_reference_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET[1:?] OF effectivity_item;
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.' + 'SERIAL_NUMBERED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( SELF.assigned_effectivity ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_event_occurrence_assignment
  SUBTYPE OF (event_occurrence_assignment);
  items : SET[1:?] OF event_occurrence_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_external_identification_assignment
  SUBTYPE OF (external_identification_assignment);
  items : SET[1:?] OF external_identification_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =
     'alternative document id and location' ) ) OR
```

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```
    item_correlation ( SELF.items , ['DOCUMENT_FILE'] ) ;
 wr2: ( NOT ( SELF.role.name =  'version' ) ) OR
    item_correlation ( SELF.items , ['EXTERNALLY_DEFINED_CLASS'
    , 'EXTERNALLY_DEFINED_GENERAL_PROPERTY'] ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_group_assignment
  SUBTYPE OF (group_assignment);
  items : SET[1:?] OF group_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'exclusiveness' ) ) OR
    item_correlation ( SELF.items , ['ACTION'] ) ;
 wr2: ( NOT ( SELF.role.name =  'simultaneity' ) ) OR
    item_correlation ( SELF.items , ['ACTION'] ) ;
 wr3: ( NOT ( SELF.role.name =
    'specification category member' ) ) OR item_correlation (
    SELF.items , ['PRODUCT_CONCEPT_FEATURE'] ) ;
 wr4: ( NOT ( SELF.role.name =  'group membership' ) ) OR
    item_correlation ( SELF.items ,
    ['GEOMETRIC_REPRESENTATION_ITEM' , 'SHAPE_ASPECT'] ) ;
 wr5: ( NOT ( SELF.role.name =  'group membership' ) ) OR ( (
    SIZEOF ( SELF.items ) =  SIZEOF ( QUERY ( i <*
    SELF.items | 'AUTOMOTIVE_DESIGN.' +
    'GEOMETRIC_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) ) OR
    ( SIZEOF ( SELF.items ) =  SIZEOF ( QUERY ( i <*
    SELF.items | 'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT' IN
    TYPEOF ( i ) ) ) ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_identification_assignment
  SUBTYPE OF (identification_assignment);
  items : SET[1:?] OF identification_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'version' ) ) OR
    item_correlation ( SELF.items , ['ACTION' ,
    'ACTION_DIRECTIVE' , 'SHAPE_REPRESENTATION' , 'EFFECTIVITY'
    , 'PRODUCT_CONCEPT' , 'CONFIGURATION_ITEM' ,
    'PRODUCT_DEFINITION' , 'PRODUCT_CONCEPT_FEATURE' ,
    'DOCUMENT_FILE' , 'CLASS' ,
    'APPLIED_IDENTIFICATION_ASSIGNMENT' , 'DRAUGHTING_MODEL' ,
    'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
    'PRESENTATION_AREA'] ) ;
 wr2: ( NOT ( SELF.role.name =  'lot context' ) ) OR
    item_correlation ( SELF.items , ['PRODUCT_DEFINITION'] ) ;
 wr3: ( NOT ( SELF.role.name =  'property change id context' )
    ) OR item_correlation ( SELF.items ,
    ['PROPERTY_DEFINITION_RELATIONSHIP' ,
    'SHAPE_ASPECT_RELATIONSHIP' , 'ACTION_PROPERTY'] ) ;
 wr4: ( NOT ( SELF.role.name =  'size id' ) ) OR
    item_correlation ( SELF.items , ['DIMENSIONAL_SIZE'] ) ;
```

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```
 wr5: ( NOT ( SELF.role.name =  'model change id' ) ) OR
     item_correlation ( SELF.items , ['PROPERTY_DEFINITION' ,
     'ACTION_PROPERTY'] ) ;
 wr6: ( NOT ( SELF.role.name =  'alias' ) ) OR
     item_correlation ( SELF.items , ['APPLICATION_CONTEXT' ,
     'APPROVAL_STATUS' , 'ASSEMBLY_COMPONENT_USAGE' , 'CLASS' ,
     'CLASS_SYSTEM' , 'DOCUMENT_TYPE' , 'DRAUGHTING_MODEL' ,
     'GENERAL_PROPERTY' ,
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION' ,
     'ORGANIZATION' , 'PRODUCT' , 'PRODUCT_CONCEPT' ,
     'PRODUCT_CONCEPT_FEATURE' ,
     'PRODUCT_CONCEPT_FEATURE_CATEGORY' , 'PRODUCT_DEFINITION' ,
     'PRODUCT_DEFINITION_FORMATION' , 'PROPERTY_DEFINITION' ,
     'SECURITY_CLASSIFICATION_LEVEL' , 'SHAPE_REPRESENTATION'] )
     ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_ineffectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET[1:?] OF effectivity_item;
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'LOT_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.' + 'SERIAL_NUMBERED_EFFECTIVITY' ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION_EFFECTIVITY']*
     TYPEOF ( SELF.assigned_effectivity ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_name_assignment
  SUBTYPE OF (name_assignment);
  items : SET[1:?] OF name_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'kinematic element name' ) )
     OR item_correlation ( SELF.items , ['KINEMATIC_STRUCTURE'
     , 'KINEMATIC_JOINT' , 'KINEMATIC_LINK'] ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_organization_assignment
  SUBTYPE OF (organization_assignment);
  items : SET[1:?] OF organization_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'organization in contract' ) )
     OR item_correlation ( SELF.items , ['CONTRACT'] ) ;
 wr2: ( NOT ( SELF.role.name =  'signing for contract' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_ORGANIZATION_ASSIGNMENT'] ) ;
 wr3: ( NOT ( SELF.role.name =  'validity context' ) ) OR
     item_correlation ( SELF.items , ['ACTION_PROPERTY' ,
     'RESOURCE_PROPERTY' , 'PROPERTY_DEFINITION'] ) ;
```

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```
 wr4: ( NOT ( SELF.role.name =  'alias scope' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_IDENTIFICATION_ASSIGNMENT'] ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_organizational_project_assignment
  SUBTYPE OF (organizational_project_assignment);
  items : SET[1:?] OF organizational_project_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_person_and_organization_assignment
  SUBTYPE OF (person_and_organization_assignment);
  items : SET[1:?] OF person_and_organization_item;
  WHERE
 wr1: ( NOT ( SELF.role.name =  'signing for contract' ) ) OR
     item_correlation ( SELF.items ,
     ['APPLIED_ORGANIZATION_ASSIGNMENT'] ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_presented_item
  SUBTYPE OF (presented_item);
  items : SET[1:?] OF presented_item_select;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_security_classification_assignment
  SUBTYPE OF (security_classification_assignment);
  items : SET[1:?] OF security_classification_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY applied_time_interval_assignment
  SUBTYPE OF (time_interval_assignment);
  items : SET[1:?] OF time_interval_item;
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY approval;
  status : approval_status;
  level : label;
 END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approval_assignment
  ABSTRACT SUPERTYPE;
  assigned_approval : approval;
```

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```
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY approval_date_time;
  date_time : date_time_select;
  dated_approval : approval;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approval_person_organization;
  person_organization : person_organization_select;
  authorized_approval : approval;
  role : approval_role;
 END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approval_relationship;
  name : label;
  description : OPTIONAL text;
  relating_approval : approval;
  related_approval : approval;
 END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approval_role;
  role : label;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approval_status;
  name : label;
 END_ENTITY;  -- 10303-41: approval_schema


 ENTITY approximation_tolerance;
```

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```
  tolerance : tolerance_select;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY approximation_tolerance_deviation;
  tessellation_type : approximation_method;
  tolerances : SET[1:2] OF tolerance_deviation_select;
  definition_space : product_or_presentation_space;
  WHERE
 wr1: ( HIINDEX ( SELF.tolerances ) =  1 ) XOR ( TYPEOF (
     SELF.tolerances[1] ) <> TYPEOF ( SELF.tolerances[2] ) ) ;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY approximation_tolerance_parameter;
  tolerances : SET[1:2] OF tolerance_parameter_select;
  WHERE
 wr1: ( HIINDEX ( SELF.tolerances ) =  1 ) XOR ( TYPEOF (
     SELF.tolerances[1] ) <> TYPEOF ( SELF.tolerances[2] ) ) ;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY area_in_set;
  area : presentation_area;
  in_set : presentation_set;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY area_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'AREA_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY area_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  2.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema
```

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```
 ENTITY asin_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY assembly_component_usage
  SUPERTYPE OF (ONEOF(next_assembly_usage_occurrence,
                 specified_higher_usage_occurrence,
                 promissory_usage_occurrence))
  SUBTYPE OF (product_definition_usage);
  reference_designator : OPTIONAL identifier;
 END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY assembly_component_usage_substitute;
  name : label;
  definition : OPTIONAL text;
  base : assembly_component_usage;
  substitute : assembly_component_usage;
  UNIQUE
   ur1 : base,substitute;
  WHERE
 wr1:base.relating_product_definition:=:substitute.
     relating_product_definition;
 wr2:base:<>:substitute;
END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY atan_function
  SUBTYPE OF (binary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY attribute_classification_assignment
  ABSTRACT SUPERTYPE;
  assigned_class : group;
  attribute_name : label;
  role : classification_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY attribute_language_assignment
  SUBTYPE OF (attribute_classification_assignment);
  items : SET[1:?] OF attribute_language_item;
  DERIVE
   language : label := SELF\attribute_classification_assignment.
              assigned_class.name;
  WHERE
 wr1:SELF\attribute_classification_assignment.role.name IN
     ['primary' , 'translated'];
```

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```
 wr2:'AUTOMOTIVE_DESIGN.' + 'LANGUAGE' IN TYPEOF (
     SELF\attribute_classification_assignment.assigned_class )
     ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY attribute_value_assignment
  ABSTRACT SUPERTYPE;
  attribute_name : label;
  attribute_value : attribute_type;
  role : attribute_value_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY attribute_value_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY axis1_placement
  SUBTYPE OF (placement);
  axis : OPTIONAL direction;
  DERIVE
   z : direction := NVL(normalise(axis), dummy_gri ||
                              direction([0.0,0.0,1.0]));
  WHERE
 wr1:SELF\geometric_representation_item.dim =  3;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY axis2_placement_2d
  SUBTYPE OF (placement);
  ref_direction : OPTIONAL direction;
  DERIVE
   p : LIST[2:2] OF direction := build_2axes(ref_direction);
  WHERE
 wr1:SELF\geometric_representation_item.dim =  2;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY axis2_placement_3d
  SUBTYPE OF (placement);
  axis : OPTIONAL direction;
  ref_direction : OPTIONAL direction;
  DERIVE
   p : LIST[3:3] OF direction := build_axes(axis,ref_direction);
  WHERE
 wr1:SELF\placement.location.dim =  3;
 wr2: ( NOT ( EXISTS ( axis ) ) ) OR ( axis.dim =  3 ) ;
```

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```
 wr3: ( NOT ( EXISTS ( ref_direction ) ) ) OR (
     ref_direction.dim =  3 ) ;
 wr4: ( NOT ( EXISTS ( axis ) ) ) OR ( NOT ( EXISTS (
     ref_direction ) ) ) OR ( cross_product ( axis ,
     ref_direction ) .magnitude>0.0 ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY b_spline_curve
  SUPERTYPE OF (ONEOF(uniform_curve,b_spline_curve_with_knots,
                          quasi_uniform_curve,bezier_curve)
                 ANDOR rational_b_spline_curve)
  SUBTYPE OF (bounded_curve);
  degree : INTEGER;
  control_points_list : LIST[2:?] OF cartesian_point;
  curve_form : b_spline_curve_form;
  closed_curve : LOGICAL;
  self_intersect : LOGICAL;
  DERIVE
   upper_index_on_control_points : INTEGER :=
                               (SIZEOF(control_points_list) - 1);
   control_points : ARRAY[0:upper_index_on_control_points]
                    OF cartesian_point :=
                    list_to_array(control_points_list,0,
                    upper_index_on_control_points);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'UNIFORM_CURVE' IN TYPEOF ( SELF
     ) ) OR ( 'AUTOMOTIVE_DESIGN.'+ 'QUASI_UNIFORM_CURVE' IN
     TYPEOF ( SELF ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'BEZIER_CURVE' IN TYPEOF ( SELF ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE_WITH_KNOTS' IN
     TYPEOF ( SELF ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY b_spline_curve_with_knots
  SUBTYPE OF (b_spline_curve);
  knot_multiplicities : LIST[2:?] OF INTEGER;
  knots : LIST[2:?] OF parameter_value;
  knot_spec : knot_type;
  DERIVE
   upper_index_on_knots : INTEGER := SIZEOF(knots);
  WHERE
 wr1:constraints_param_b_spline ( degree , upper_index_on_knots
     , upper_index_on_control_points , knot_multiplicities ,
     knots ) ;
 wr2: SIZEOF ( knot_multiplicities ) =  upper_index_on_knots;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY b_spline_surface
```

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```
  SUPERTYPE OF (ONEOF(b_spline_surface_with_knots,uniform_surface,
                quasi_uniform_surface,bezier_surface) ANDOR
                rational_b_spline_surface)
  SUBTYPE OF (bounded_surface);
  u_degree : INTEGER;
  v_degree : INTEGER;
  control_points_list : LIST[2:?] OF LIST[2:?] OF cartesian_point;
  surface_form : b_spline_surface_form;
  u_closed : LOGICAL;
  v_closed : LOGICAL;
  self_intersect : LOGICAL;
  DERIVE
   u_upper : INTEGER := SIZEOF(control_points_list) - 1;
   v_upper : INTEGER := SIZEOF(control_points_list[1]) - 1;
   control_points : ARRAY[0:u_upper] OF ARRAY[0:v_upper]
                    OF cartesian_point :=
                    make_array_of_array(control_points_list,0,
                            u_upper,0,v_upper);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'UNIFORM_SURFACE' IN TYPEOF (
     SELF ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'QUASI_UNIFORM_SURFACE' IN TYPEOF ( SELF ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'BEZIER_SURFACE' IN TYPEOF ( SELF )
     ) OR ( 'AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_SURFACE_WITH_KNOTS'
     IN TYPEOF ( SELF ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY b_spline_surface_with_knots
  SUBTYPE OF (b_spline_surface);
  u_multiplicities : LIST[2:?] OF INTEGER;
  v_multiplicities : LIST[2:?] OF INTEGER;
  u_knots : LIST[2:?] OF parameter_value;
  v_knots : LIST[2:?] OF parameter_value;
  knot_spec : knot_type;
  DERIVE
   knot_u_upper : INTEGER := SIZEOF(u_knots);
   knot_v_upper : INTEGER := SIZEOF(v_knots);
  WHERE
 wr1:constraints_param_b_spline ( SELF\b_spline_surface.
     u_degree , knot_u_upper , SELF\b_spline_surface.u_upper ,
     u_multiplicities , u_knots ) ;
 wr2:constraints_param_b_spline ( SELF\b_spline_surface.
     v_degree , knot_v_upper , SELF\b_spline_surface.v_upper ,
     v_multiplicities , v_knots ) ;
 wr3: SIZEOF ( u_multiplicities ) =  knot_u_upper;
 wr4: SIZEOF ( v_multiplicities ) =  knot_v_upper;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY background_colour
  SUBTYPE OF (colour);
```

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```
 presentation : area_or_view;
 UNIQUE
  ur1 : presentation;
END_ENTITY;  -- 10303-46: presentation_organization_schema


ENTITY barring_hole
 SUBTYPE OF (feature_definition);
 WHERE
wr1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'hole profile' ) AND ( sa.description =
    'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'CIRCULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
    'NGON_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
    'RECTANGULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
    'CLOSED_PATH_PROFILE']* TYPEOF ( sar.
    relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =  1;
wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'barring profile' ) AND ( sa.description =
    'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) ) ) =  1 ) ) ) =  1;
wr3: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) =  1 ) AND ( SIZEOF ( QUERY (
    pdr <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {1<=SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) =  1 ) ;
wr4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
    ['orientation' , 'base radius' ] ) ) ) >0 ) ) ) =  0;
wr5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
    used_representation.items | ( i.name =  'base radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <>1
    ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY bead
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
    pdr <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) >2 ) ) ) =  0 ) );
 wr2: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
    ['orientation' , 'base radius' ] ) ) ) >0 ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'base radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) >1
    ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'sweep path' ) AND ( sa.description =
    'path feature component occurrence' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
    ( sar.relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
 wr5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'bead profile' ) AND ( sa.description =
    'open profile occurrence' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
```

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```
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.description =
     'profile usage' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'OPEN_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'PARTIAL_CIRCULAR_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'ROUNDED_U_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'SQUARE_U_PROFILE' , 'AUTOMOTIVE_DESIGN.' + 'TEE_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'VEE_PROFILE']* TYPEOF ( sar.
     relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     sa.name =  'end condition' ) AND ( sa.description =
     'bead end occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) ) (
     'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.name =  'bead end usage' )
     AND ( sar.description =  'end condition at path start' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'BEAD_END' IN TYPEOF ( sar.
     relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
 wr7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     sa.name =  'end condition' ) AND ( sa.description =
     'bead end occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.name =  'bead end usage' )
     AND ( sar.description =  'end condition at path end' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'BEAD_END' IN TYPEOF ( sar.
     relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY bead_end
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN  ['linear' , 'open' , 'radiused'];
 wr3: ( SELF.description<>'linear' ) XOR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) >0 ) ;
 wr4: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  2 ) ) ) =  1 ) ;
 wr5: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
```

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```
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'end length' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1 ) ;
 wr6: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'end shape' )
    AND ( i\ descriptive_representation_item.description IN
    ['straight' , 'tapered'] ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) ) )
    =  1 ) ) ) =  1 ) ;
 wr7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.name =  'bead end usage' ) AND ( sar.description
    IN  [ 'end condition at path start' ,
    'end condition at path end' ] ) AND ( 'AUTOMOTIVE_DESIGN.'
    + 'BEAD' IN TYPEOF ( sar.related_shape_aspect.of_shape.
    definition ) ) AND ( sar.related_shape_aspect.of_shape.
    definition\ characterized_object.name =  'end condition' )
    AND ( sar.related_shape_aspect.of_shape.definition\
    characterized_object.description =  'bead end occurrence'
    ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY bezier_curve
  SUBTYPE OF (b_spline_curve);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY bezier_surface
  SUBTYPE OF (b_spline_surface);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY binary_boolean_expression
  ABSTRACT SUPERTYPE OF (ONEOF(xor_expression,equals_expression))
  SUBTYPE OF (boolean_expression,binary_generic_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY binary_function_call
```

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```
 ABSTRACT SUPERTYPE OF (atan_function)
 SUBTYPE OF (binary_numeric_expression);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY binary_generic_expression
 ABSTRACT SUPERTYPE
 SUBTYPE OF (generic_expression);
 operands : LIST[2:2] OF generic_expression;
END_ENTITY;  -- 13584-20: generic_expressions_schema


ENTITY binary_numeric_expression
 ABSTRACT SUPERTYPE OF (ONEOF(minus_expression,
                         div_expression,
                         mod_expression,
                        slash_expression,power_expression,
                        binary_function_call
                        ))
 SUBTYPE OF (numeric_expression,binary_generic_expression);
 SELF\binary_generic_expression.operands : LIST[2:2]
                 OF numeric_expression;
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY block
 SUBTYPE OF (geometric_representation_item);
 position : axis2_placement_3d;
 x : positive_length_measure;
 y : positive_length_measure;
 z : positive_length_measure;
END_ENTITY;  -- 10303-42: geometric_model_schema


ENTITY boolean_expression
 ABSTRACT SUPERTYPE OF (ONEOF(simple_boolean_expression,
                         unary_boolean_expression,
                         binary_boolean_expression,
                         multiple_arity_boolean_expression,
                         comparison_expression,
                         interval_expression))
 SUBTYPE OF (expression);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY boolean_literal
 SUBTYPE OF (simple_boolean_expression,generic_literal);
 the_value : BOOLEAN;
END_ENTITY;  -- 13584-20: expressions_schema
```

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```
ENTITY boolean_result
 SUBTYPE OF (geometric_representation_item);
 operator : boolean_operator;
 first_operand : boolean_operand;
 second_operand : boolean_operand;
END_ENTITY;  -- 10303-42: geometric_model_schema


ENTITY boolean_variable
 SUBTYPE OF (simple_boolean_expression,variable);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY boss
 SUBTYPE OF (feature_definition);
 WHERE
wr1:SELF.description IN  ['circular' , 'rectangular' ,
    'complex'];
wr2: ( SELF.description<>'circular' ) OR ( SIZEOF ( QUERY (
    sa <* get_shape_aspects ( SELF ) | ( sa.description =
    'circular profile occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'CIRCULAR_CLOSED_PROFILE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1 ) ;
wr3: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
    sa <* get_shape_aspects ( SELF ) | ( sa.description =
    'enclosed boundary occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'CLOSED_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
    'NGON_CLOSED_PROFILE']* TYPEOF ( sar.
    relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =  1 ) ;
wr4: ( SELF.description<>'rectangular' ) OR ( SIZEOF ( QUERY
    ( sa <* get_shape_aspects ( SELF ) | ( sa.description =
    'rectangular profile occurrence' ) AND ( SIZEOF ( QUERY
    ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'RECTANGULAR_CLOSED_PROFILE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1 ) ;
wr5: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
```

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```
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
    pdr <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND NOT ( {1<=SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) ) =  0 ) ;
wr6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
    ['orientation' , 'fillet radius' ] ) ) ) >0 ) ) ) =  0;
wr7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'fillet radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) >1
    ) ) ) =  0;
wr8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'boss hight occurrence' ) AND ( SIZEOF
    ( QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.name =  'boss hight' ) AND (
    sar.description =  'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
    ( sar.relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description =  'linear' ) ) ) =  1 )
    ) ) =  1;
wr9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'top condition occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'boss top usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'BOSS_TOP' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
wr10: NOT ( SELF.description IN  ['rectangular' , 'complex'] )
    OR ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) |
    ( sa.description =  'change in boundary occurrence' ) AND
    ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'taper usage' ) AND (
```

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    'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
    relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description IN  [ 'angle taper' ,
    'directed taper' ] ) ) ) =  1 ) ) ) <=1 ) ;
 wr11: ( SELF.description<>'circular' ) OR ( SIZEOF ( QUERY (
    sa <* get_shape_aspects ( SELF ) | ( sa.description =
    'change in diameter occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =  'taper usage'
    ) AND ( 'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
    relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description IN  [ 'angle taper' ,
    'diameter taper' ] ) ) ) =  1 ) ) ) <=1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY boss_top
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
    TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN  ['planar' , 'complex'];
 wr3: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) ;
 wr4: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) ;
 wr5: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) ;
 wr6: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.name =  'boss top usage' ) AND ( sar.description
    IN  [ 'boss height start' , 'boss height end' ] ) AND (
    'AUTOMOTIVE_DESIGN.' + 'BOSS' IN TYPEOF ( sar.
    related_shape_aspect ) ) AND ( sar.related_shape_aspect.
    name =  'top condition occurrence' ) ) ) =  1;
 wr7: ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
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```
     used_representation ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) >1 ) ) ) =  0 ) ;
 wr8: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( ( SIZEOF ( pdr.
     used_representation.items ) =  0 ) XOR ( SIZEOF ( QUERY
     ( i <* pdr.used_representation.items | ( i.name =
     'top radius' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY boundary_curve
  SUBTYPE OF (composite_curve_on_surface);
  WHERE
 wr1:SELF\composite_curve.closed_curve;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY bounded_curve
  SUPERTYPE OF (ONEOF(polyline,b_spline_curve,trimmed_curve,bounded_pcurve,
                bounded_surface_curve,composite_curve))
  SUBTYPE OF (curve);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY bounded_pcurve
  SUBTYPE OF (pcurve,bounded_curve);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'BOUNDED_CURVE' IN TYPEOF (
     SELF\pcurve.reference_to_curve.items[1] ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY bounded_surface
  SUPERTYPE OF (ONEOF(b_spline_surface,rectangular_trimmed_surface,
                curve_bounded_surface,rectangular_composite_surface))
  SUBTYPE OF (surface);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY bounded_surface_curve
```

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```
  SUBTYPE OF (surface_curve,bounded_curve);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'BOUNDED_CURVE' IN TYPEOF (
     SELF\surface_curve.curve_3d ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY box_domain;
  corner : cartesian_point;
  xlength : positive_length_measure;
  ylength : positive_length_measure;
  zlength : positive_length_measure;
  WHERE
 wr1: SIZEOF ( QUERY ( item <* USEDIN ( SELF , '' ) | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'BOXED_HALF_SPACE' IN TYPEOF ( item
     ) ) ) ) =  0;
END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY boxed_half_space
  SUBTYPE OF (half_space_solid);
  enclosure : box_domain;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY brep_with_voids
  SUBTYPE OF (manifold_solid_brep);
  voids : SET[1:?] OF oriented_closed_shell;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY calendar_date
  SUBTYPE OF (date);
  day_component : day_in_month_number;
  month_component : month_in_year_number;
  WHERE
 wr1:valid_calendar_date ( SELF ) ;
END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY camera_image
  SUBTYPE OF (mapped_item);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'CAMERA_USAGE' IN TYPEOF (
     SELF\mapped_item.mapping_source ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'PLANAR_BOX' IN TYPEOF (
     SELF\mapped_item.mapping_target ) ;
 wr3:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_ITEM' IN
     TYPEOF ( SELF ) ;
END_ENTITY;  -- 10303-46: presentation_organization_schema
```

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```
 ENTITY camera_image_2d_with_scale
  SUBTYPE OF (camera_image);
  DERIVE
   scale : positive_ratio_measure := (SELF\mapped_item.mapping_target\
           planar_extent.size_in_x) / (SELF\mapped_item.mapping_source.
           mapping_origin\camera_model_d2.view_window\
                   planar_extent.size_in_x);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.' + 'CAMERA_MODEL_D2' IN TYPEOF (
     SELF\mapped_item.mapping_source.mapping_origin ) ) ;
 wr2:aspect_ratio ( SELF\mapped_item.mapping_target ) =
     aspect_ratio ( SELF\mapped_item.mapping_source.
     mapping_origin\ camera_model_d2.view_window ) ;
 wr3:SELF\mapped_item.mapping_source.mapping_origin\
     camera_model_d2.view_window_clipping;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY camera_image_3d_with_scale
  SUBTYPE OF (camera_image);
  DERIVE
   scale : positive_ratio_measure := ((SELF\mapped_item.mapping_target\
           planar_extent.size_in_x) / (SELF\mapped_item.mapping_source.
           mapping_origin\camera_model_d3.perspective_of_volume
           .view_window.size_in_x));
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'CAMERA_MODEL_D3' IN TYPEOF (
     SELF\mapped_item.mapping_source.mapping_origin ) ) ;
 wr2:aspect_ratio ( SELF\mapped_item.mapping_target ) =
     aspect_ratio ( SELF\mapped_item.mapping_source.
     mapping_origin\ camera_model_d3.perspective_of_volume.
     view_window ) ;
 wr3:SELF\mapped_item.mapping_source.mapping_origin\
     camera_model_d3.perspective_of_volume.front_plane_clipping
     AND SELF\mapped_item.mapping_source.mapping_origin\
     camera_model_d3.perspective_of_volume.
     view_volume_sides_clipping;
 wr4: ( SELF\mapped_item.mapping_target\ planar_extent.
     size_in_x>0 ) AND ( SELF\mapped_item.mapping_target\
     planar_extent.size_in_y>0 ) ;
 wr5: ( SELF\mapped_item.mapping_source.mapping_origin\
     camera_model_d3.perspective_of_volume.view_window.
     size_in_x>0 ) AND ( SELF\mapped_item.mapping_source.
     mapping_origin\ camera_model_d3.perspective_of_volume.
     view_window.size_in_y>0 ) ;
 wr6: ( 'AUTOMOTIVE_DESIGN.' + 'AXIS2_PLACEMENT_2D' IN TYPEOF
     ( SELF\mapped_item.mapping_target\ planar_box.placement )
     ) AND NOT ( 'AUTOMOTIVE_DESIGN.' + 'AXIS2_PLACEMENT_3D'
     IN TYPEOF ( SELF\mapped_item.mapping_target\ planar_box.
     placement ) ) ;
END_ENTITY;  -- 10303-517: aic_mechanical_design_geometric_presentation
```

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```
 ENTITY camera_model
  SUPERTYPE OF (ONEOF(camera_model_d2,camera_model_d3))
  SUBTYPE OF (geometric_representation_item);
  WHERE
 wr1: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ITEM_DEFINED_TRANSFORMATION.' + 'TRANSFORM_ITEM_1' ) ) +
     SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_MAP.'+ 'MAPPING_ORIGIN' ) ) ) >0;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'STYLED_ITEM.'+ 'ITEM' ) ) =  0;
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY camera_model_d2
  SUBTYPE OF (camera_model);
  view_window : planar_box;
  view_window_clipping : BOOLEAN;
  WHERE
 wr1:SELF\geometric_representation_item.dim =  2;
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY camera_model_d3
  SUBTYPE OF (camera_model);
  view_reference_system : axis2_placement_3d;
  perspective_of_volume : view_volume;
  WHERE
 wr1: ( dot_product ( SELF.view_reference_system.p[3] ,
     SELF.perspective_of_volume.view_window.placement.p[3] )
     =  1.0 ) AND ( SELF.view_reference_system.location.
     coordinates[3] =  SELF.perspective_of_volume.view_window.
     placement.location.coordinates[3] ) ;
 wr2:SELF\geometric_representation_item.dim =  3;
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY camera_model_d3_with_hlhsr
  SUBTYPE OF (camera_model_d3);
  hidden_line_surface_removal : BOOLEAN;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY camera_usage
  SUBTYPE OF (representation_map);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_REPRESENTATION'
     IN TYPEOF ( SELF\representation_map.
     mapped_representation ) ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'CAMERA_MODEL' IN TYPEOF (
     SELF\representation_map.mapping_origin ) ;
END_ENTITY;  -- 10303-46: presentation_organization_schema
```

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```
 ENTITY cartesian_point
  SUBTYPE OF (point);
  coordinates : LIST[1:3] OF length_measure;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY cartesian_transformation_operator
  SUPERTYPE OF (ONEOF(cartesian_transformation_operator_2d,
                cartesian_transformation_operator_3d))
  SUBTYPE OF (geometric_representation_item,
                        functionally_defined_transformation
              );
  axis1 : OPTIONAL direction;
  axis2 : OPTIONAL direction;
  local_origin : cartesian_point;
  scale : OPTIONAL REAL;
  DERIVE
   scl : REAL := NVL(scale,1.0);
  WHERE
 wr1:scl>0.0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY cartesian_transformation_operator_2d
  SUBTYPE OF (cartesian_transformation_operator);
  DERIVE
   u : LIST[2:2] OF direction := base_axis(2,SELF\
       cartesian_transformation_operator.axis1,SELF\
       cartesian_transformation_operator.axis2,?);
  WHERE
 wr1:SELF\geometric_representation_item.dim =  2;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY cartesian_transformation_operator_3d
  SUBTYPE OF (cartesian_transformation_operator);
  axis3 : OPTIONAL direction;
  DERIVE
   u : LIST[3:3] OF direction := base_axis(3,SELF\
       cartesian_transformation_operator.axis1,SELF\
       cartesian_transformation_operator.axis2,axis3);
  WHERE
 wr1:SELF\geometric_representation_item.dim =  3;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY celsius_temperature_measure_with_unit
  SUBTYPE OF (measure_with_unit);
```

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```
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'THERMODYNAMIC_TEMPERATURE_UNIT' IN
     TYPEOF ( SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY centre_of_symmetry
  SUBTYPE OF (derived_shape_aspect);
  WHERE
 wr1: SIZEOF ( QUERY ( sadr <* SELF\derived_shape_aspect.
     deriving_relationships | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'SYMMETRIC_SHAPE_ASPECT' IN TYPEOF ( sadr\
     shape_aspect_relationship.related_shape_aspect ) ) ) ) =
     0;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY certification;
  name : label;
  purpose : text;
  kind : certification_type;
 END_ENTITY;  -- 10303-41: certification_schema


 ENTITY certification_assignment
  ABSTRACT SUPERTYPE;
  assigned_certification : certification;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.' + 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY certification_type;
  description : label;
 END_ENTITY;  -- 10303-41: certification_schema


 ENTITY chamfer
  SUBTYPE OF (transition_feature);
  WHERE
 wr1: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
     ( 'AUTOMOTIVE_DESIGN.' + 'CHAMFER_OFFSET' IN TYPEOF (
     sar.related_shape_aspect ) ) AND ( sar.
     related_shape_aspect.description =  'first offset' ) ) )
```

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```
     =  1;
 wr2: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
     ( 'AUTOMOTIVE_DESIGN.' + 'CHAMFER_OFFSET' IN TYPEOF (
     sar.related_shape_aspect ) ) AND ( sar.
     related_shape_aspect.description =  'second offset' ) ) )
     =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'chamfer face' ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY chamfer_offset
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:SELF.description IN  [ 'first offset' , 'second offset' ];
 wr2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  1 ) ) ) =  1;
 wr4: ( SELF.description<> 'first offset' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'offset amount' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1 ) ;
 wr5: ( SELF.description<> 'second offset' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( ( SIZEOF ( QUERY ( i <*
     pdr.used_representation.items | ( i.name =
     'offset amount' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
```

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```
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) OR ( SIZEOF ( QUERY ( i <* pdr.used_representation.
      items | ( i.name =  'offset angle' ) AND (
      'AUTOMOTIVE_DESIGN.' + 'PLANE_ANGLE_MEASURE_WITH_UNIT' IN
      TYPEOF ( i ) ) ) ) =  1 ) ) ) ) =  1 ) ;
 wr6: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
      ( 'AUTOMOTIVE_DESIGN.' + 'CHAMFER' IN TYPEOF ( sar.
      relating_shape_aspect ) ) ) ) >=1;
 wr7: ( SELF.description<> 'first offset' ) OR ( SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'first face shape' ) ) ) =  1
      ) ;
 wr8: ( SELF.description<> 'second offset' ) OR ( SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'second face shape' ) ) ) =  1
      ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY character_glyph_symbol
  SUBTYPE OF (symbol_representation);
  character_box : planar_extent;
  baseline_ratio : ratio_measure;
  DERIVE
   box_height : length_measure := character_box.size_in_y;
  WHERE
 wr1:{0.0<=baseline_ratio<=1.0};
 wr2:item_in_context ( SELF.character_box , SELF\representation.
      context_of_items ) ;
 wr3:'AUTOMOTIVE_DESIGN.'+ 'POSITIVE_LENGTH_MEASURE' IN TYPEOF
      ( SELF.box_height ) ;
END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY characterized_class
  SUBTYPE OF (characterized_object,class);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY characterized_object;
  name : label;
  description : OPTIONAL text;
```

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```
END_ENTITY;  -- 10303-41: product_property_definition_schema


ENTITY circle
 SUBTYPE OF (conic);
 radius : positive_length_measure;
END_ENTITY;  -- 10303-42: geometry_schema


ENTITY circular_closed_profile
 SUBTYPE OF (shape_aspect);
 WHERE
wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
    TYPEOF ( SELF.of_shape.definition ) ;
wr2: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
wr3: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  2 ) ) ) =  1;
wr4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'orientation' )
    AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
    ) ) ) =  1 ) ) ) =  1;
wr5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'diameter' ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


ENTITY circular_pattern
 SUBTYPE OF (replicate_feature);
 WHERE
wr1: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
```

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```
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) ) ) =  1 ) AND ( SIZEOF ( QUERY
      ( pdr <* get_property_definition_representations ( SELF ) |
      ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND  {2<=SIZEOF ( pdr.
      used_representation.items ) <=5} ) ) =  1 ) ;
  wr2: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'diameter' ) AND
      ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) <=1;
  wr3: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =
      'base feature rotation' ) AND ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.' + 'PLANE_ANGLE_MEASURE_WITH_UNIT']*
      TYPEOF ( i ) ) =  2 ) ) ) =  1 ) ) ) <=1;
  wr4: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =
      'number of features' ) AND ( 'AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
      'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
      measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1;
  wr5: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'angular spacing'
      ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY circular_runout_tolerance
```

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```
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) <=2;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY class
  SUBTYPE OF (group);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY class_system
  SUBTYPE OF (group);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY class_usage_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
  items : SET[1:?] OF class_usage_effectivity_context_item;
  WHERE
 wr1:SELF.role.name =  'class usage influence' ;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | NOT (
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF ( i
     ) ) ) ) =  0;
 wr3: ( 'AUTOMOTIVE_DESIGN.' + 'APPLIED_EFFECTIVITY_ASSIGNMENT'
     IN TYPEOF ( SELF.assigned_effectivity_assignment ) ) AND
     ( SIZEOF ( TYPEOF ( SELF.assigned_effectivity_assignment.
     assigned_effectivity ) ) = 1 ) AND (
     SELF.assigned_effectivity_assignment.assigned_effectivity.
     id =  'class usage' ) AND ( SIZEOF ( QUERY ( i <*
     SELF.assigned_effectivity_assignment\
     applied_effectivity_assignment.items | NOT (
     'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_CONCEPT_FEATURE_CATEGORY_USAGE' IN TYPEOF ( i )
     ) ) ) =  0 ) );
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY classification_assignment
  ABSTRACT SUPERTYPE;
  assigned_class : group;
  role : classification_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY classification_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: management_resources_schema
```

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```
 ENTITY closed_path_profile
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  1 ) ) ) =  1;
 wr4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'orientation' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
     ) ) ) =  1 ) ) ) =  1;
 wr5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | 'AUTOMOTIVE_DESIGN.' + 'PATH_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr.used_representation ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'PATH_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( SIZEOF (
     QUERY ( i <* pdr.used_representation.items | ( i.name
     =  'profile shape' ) ) ) =  1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY closed_shell
  SUBTYPE OF (connected_face_set);
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY coaxiality_tolerance
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) <=2;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY colour;
```

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```
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY colour_rgb
  SUBTYPE OF (colour_specification);
  red : REAL;
  green : REAL;
  blue : REAL;
  WHERE
 wr1:{0.0<=red<=1.0};
 wr2:{0.0<=green<=1.0};
 wr3:{0.0<=blue<=1.0};
END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY colour_specification
  SUBTYPE OF (colour);
  name : label;
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY common_datum
  SUBTYPE OF (composite_shape_aspect,datum);
  WHERE
 wr1: SIZEOF ( SELF.component_relationships ) =  2;
 wr2: SIZEOF ( QUERY ( sar <* SELF.component_relationships |
     NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'DATUM' IN TYPEOF ( sar.
     related_shape_aspect ) ) AND NOT ( 'AUTOMOTIVE_DESIGN.'+
     'COMMON_DATUM' IN TYPEOF ( sar.related_shape_aspect ) )
     ) ) ) =  0;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY comparison_equal
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_expression
  ABSTRACT SUPERTYPE OF (ONEOF(comparison_equal,comparison_greater,
                         comparison_greater_equal,comparison_less,
                         comparison_less_equal,comparison_not_equal,
                         like_expression))
  SUBTYPE OF (boolean_expression,binary_generic_expression);
  SELF\binary_generic_expression.operands : LIST[2:2] OF expression;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'NUMERIC_EXPRESSION' IN TYPEOF
     ( SELF\binary_generic_expression.operands[1] ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'NUMERIC_EXPRESSION' IN TYPEOF (
     SELF\binary_generic_expression.operands[2] ) ) ) OR ( (
```

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```
     'AUTOMOTIVE_DESIGN.'+ 'BOOLEAN_EXPRESSION' IN TYPEOF (
     SELF\binary_generic_expression.operands[1] ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'BOOLEAN_EXPRESSION' IN TYPEOF (
     SELF\binary_generic_expression.operands[2] ) ) ) OR ( (
     'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     SELF\binary_generic_expression.operands[1] ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     SELF\binary_generic_expression.operands[2] ) ) ) ;
END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_greater
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_greater_equal
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_less
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_less_equal
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY comparison_not_equal
  SUBTYPE OF (comparison_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY composite_curve
  SUBTYPE OF (bounded_curve);
  segments : LIST[1:?] OF composite_curve_segment;
  self_intersect : LOGICAL;
  DERIVE
   n_segments : INTEGER := SIZEOF(segments);
   closed_curve : LOGICAL := segments[n_segments].
                      transition <> discontinuous;
  WHERE
 wr1: ( ( NOT closed_curve ) AND ( SIZEOF ( QUERY ( temp <*
     segments | temp.transition =  discontinuous ) ) =  1 ) )
     OR ( ( closed_curve ) AND ( SIZEOF ( QUERY ( temp <*
     segments | temp.transition =  discontinuous ) ) =  0 ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema
```

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```
 ENTITY composite_curve_on_surface
  SUPERTYPE OF (boundary_curve)
  SUBTYPE OF (composite_curve);
  DERIVE
   basis_surface : SET[0:2] OF surface := get_basis_surface(SELF);
  WHERE
 wr1: SIZEOF ( basis_surface ) >0;
 wr2:constraints_composite_curve_on_surface ( SELF ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY composite_curve_segment
  SUBTYPE OF (founded_item);
  transition : transition_code;
  same_sense : BOOLEAN;
  parent_curve : curve;
  INVERSE
   using_curves : BAG[1:?] OF composite_curve FOR segments;
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'BOUNDED_CURVE' IN TYPEOF (
     parent_curve ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY composite_hole
  SUBTYPE OF (compound_feature);
  WHERE
 wr1:SELF\characterized_object.description IN  ['counterbore' ,
     'countersunk'];
 wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
     ( sa ) ) AND ( sa.name =  'compound feature in solid' )
     AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | 'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP'
     IN TYPEOF ( sar ) ) ) =  2 ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
     ( sa ) ) AND ( sa.name =  'compound feature in solid' )
     AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | 'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP'
     IN TYPEOF ( sar ) ) ) =  2 ) AND ( SIZEOF (
     get_round_holes_for_composite_hole ( bag_to_set ( USEDIN (
     sa ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) ) ) ) =  2 ) ) ) =  1;
 wr4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
     ( sa ) ) AND ( sa.name =  'compound feature in solid' )
     AND ( SIZEOF ( QUERY ( rh1 <*
     get_round_holes_for_composite_hole ( bag_to_set ( USEDIN (
```

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```
      sa ,
      'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
      ) ) ) | ( SIZEOF ( QUERY ( rh2 <*
      get_round_holes_for_composite_hole ( bag_to_set ( USEDIN (
      sa ,
      'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
      ) ) ) | ( rh1:<>:rh2 ) AND ( get_diameter_for_round_hole (
      rh1 ) =  get_diameter_for_round_hole ( rh2 ) ) ) =  0 ) )
      ) =  0 ) ) ) =  1;
  wr5: ( SELF.description<>'countersunk' ) OR ( SIZEOF ( QUERY
      ( sa <* get_shape_aspects ( SELF ) | ( 'AUTOMOTIVE_DESIGN.'
      + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) AND ( sa.
      name =  'compound feature in solid' ) AND ( SIZEOF (
      QUERY ( rh <* get_round_holes_for_composite_hole (
      bag_to_set ( USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
      ) ) ) | ( SIZEOF ( QUERY ( sa1 <* get_shape_aspects ( rh
      ) | ( sa.description =  'change in diameter occurrence' )
      AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa1 ,
      'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
      ) | ( sar.description =  'taper usage' ) AND (
      'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
      relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1 ) ) ) =  1 )
      ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY composite_shape_aspect
  SUBTYPE OF (shape_aspect);
  INVERSE
   component_relationships : SET[2:?] OF shape_aspect_relationship FOR
                             relating_shape_aspect;
 END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY composite_text
  SUBTYPE OF (geometric_representation_item);
  collected_text : SET[2:?] OF text_or_character;
  WHERE
 wr1:acyclic_composite_text ( SELF , SELF.collected_text ) ;
END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY composite_text_with_associated_curves
  SUBTYPE OF (composite_text);
  associated_curves : SET[1:?] OF curve;
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY composite_text_with_blanking_box
  SUBTYPE OF (composite_text);
```

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 blanking : planar_box;
END_ENTITY;  -- 10303-46: presentation_definition_schema


ENTITY composite_text_with_extent
 SUBTYPE OF (composite_text);
 extent : planar_extent;
END_ENTITY;  -- 10303-46: presentation_definition_schema


ENTITY compound_feature
 SUBTYPE OF (feature_definition);
 WHERE
wr1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name IN  [ 'compound feature in solid' ,
    'compound feature in panel' ] ) AND ( 'AUTOMOTIVE_DESIGN.'
    + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) ) ) =  1;
wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
    ( sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) )
    >0 ) ) ) =  0;
wr3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
    ( sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'INSTANCED_FEATURE' , 'AUTOMOTIVE_DESIGN.' +
    'PLACED_FEATURE' , 'AUTOMOTIVE_DESIGN.' + 'APPLIED_AREA' ,
    'AUTOMOTIVE_DESIGN.' + 'TRANSITION_FEATURE']* TYPEOF (
    sar.related_shape_aspect ) ) =  1 ) ) ) >0 ) ) ) =  0;
wr4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
    ( sa ) ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLACED_FEATURE' IN TYPEOF (
    sar.related_shape_aspect ) ) AND ( SIZEOF ( QUERY ( pdr
    <* get_property_definition_representations ( sar.
    related_shape_aspect.of_shape.definition ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'element placement' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'PLACEMENT' IN TYPEOF ( i ) ) ) ) <>1 ) ) ) >0 ) ) ) >0 )
    ) ) =  0;
wr5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'compound feature in solid' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
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    ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'TRANSITION_FEATURE' , 'AUTOMOTIVE_DESIGN.' + 'BOSS' ,
    'AUTOMOTIVE_DESIGN.' + 'APPLIED_AREA']* TYPEOF ( sar.
    related_shape_aspect ) ) + SIZEOF ( ['AUTOMOTIVE_DESIGN.'
    + 'SLOT' , 'AUTOMOTIVE_DESIGN.' + 'POCKET' ,
    'AUTOMOTIVE_DESIGN.' + 'ROUND_HOLE' , 'AUTOMOTIVE_DESIGN.'
    + 'RIB' , 'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE']*
    TYPEOF ( sar.related_shape_aspect.of_shape.definition )
    ) =  0 ) ) ) >0 ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'compound feature in panel' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'TRANSITION_FEATURE']* TYPEOF ( sar.related_shape_aspect
    ) ) + SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'BEAD' ,
    'AUTOMOTIVE_DESIGN.' + 'HOLE_IN_PANEL' ,
    'AUTOMOTIVE_DESIGN.' + 'FEATURE_IN_PANEL' ,
    'AUTOMOTIVE_DESIGN.' + 'JOGGLE' , 'AUTOMOTIVE_DESIGN.' +
    'LOCATOR' , 'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE']*
    TYPEOF ( sar.related_shape_aspect.of_shape.definition )
    ) =  0 ) ) ) >0 ) ) ) =  0;
 wr7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'compound feature in panel' ) AND ( SIZEOF (
    QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE' IN TYPEOF
    ( sar.related_shape_aspect.of_shape.definition ) ) AND
    ( sar.related_shape_aspect.name =
    'compound feature in solid' ) ) ) >0 ) ) ) + SIZEOF (
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.name =
    'compound feature in solid' ) AND ( SIZEOF ( QUERY ( sar
    <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE' IN TYPEOF
    ( sar.related_shape_aspect.of_shape.definition ) ) AND
    ( sar.related_shape_aspect.name =
    'compound feature in panel' ) ) ) >0 ) ) ) =  0;
END_ENTITY; -- 10303-214: automotive_design


 ENTITY compound_representation_item
  SUBTYPE OF (representation_item);
  item_element : compound_item_definition;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY compound_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.' +
    'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF (
```

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     SELF.context_of_items ) ) AND ( SELF.context_of_items\
     geometric_representation_context.
     coordinate_space_dimension =  3 ) ;
 wr2: SIZEOF ( QUERY ( cbsr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.' + 'FACE_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'
     + 'AXIS2_PLACEMENT_3D']* TYPEOF ( cbsr_i ) ) <>1 ) ) =  0;
 wr3: SIZEOF ( QUERY ( cbsr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.' + 'FACE_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM']* TYPEOF ( cbsr_i ) )
     =  1 ) ) >0;
 wr4: SIZEOF ( QUERY ( cbsr_i <* SELF.items | (
     'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM' IN TYPEOF ( cbsr_i )
     ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'COMPOUND_SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.' +
     'EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.' +
     'NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION']* TYPEOF (
     cbsr_i\ mapped_item.mapping_source ) ) <>1 ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY concat_expression
  SUBTYPE OF (string_expression,multiple_arity_generic_expression);
  SELF\multiple_arity_generic_expression.operands : LIST[2:?] OF
                                                    string_expression;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY concentricity_tolerance
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) =  1;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY concept_feature_operator;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-44: product_concept_schema


 ENTITY concept_feature_relationship;
  name : label;
  description : OPTIONAL text;
  relating_product_concept_feature : product_concept_feature;
  related_product_concept_feature : product_concept_feature;
 END_ENTITY;  -- 10303-44: product_concept_schema
```

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ENTITY concept_feature_relationship_with_condition
 SUBTYPE OF (concept_feature_relationship);
 conditional_operator : concept_feature_operator;
END_ENTITY;  -- 10303-44: product_concept_schema


ENTITY conditional_concept_feature
 SUBTYPE OF (product_concept_feature);
 condition : concept_feature_relationship_with_condition;
END_ENTITY;  -- 10303-44: product_concept_schema


ENTITY configurable_item
 SUBTYPE OF (configuration_item);
 item_concept_feature : SET[1:?] OF product_concept_feature_association;
END_ENTITY;  -- 10303-44: configuration_management_schema


ENTITY configuration_definition;
 pair_values : SET[1:?] OF pair_value;
 t_parameter : motion_parameter_measure;
END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


ENTITY configuration_design;
 configuration : configuration_item;
 design : configuration_design_item;
 DERIVE
  name : label := get_name_value(SELF);
  description : text := get_description_value(SELF);
 UNIQUE
  ur1 : configuration,design;
 WHERE
wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
    'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-44: configuration_management_schema


ENTITY configuration_effectivity
 SUBTYPE OF (product_definition_effectivity);
 configuration : configuration_design;
 UNIQUE
  ur1 : configuration,usage,id;
 WHERE
wr1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_USAGE' IN
    TYPEOF ( SELF\product_definition_effectivity.usage ) ;
```

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```
END_ENTITY;  -- 10303-44: configuration_management_schema


 ENTITY configuration_interpolation;
  previous_configuration_definition : configuration_definition;
  next_configuration_definition : configuration_definition;
  interpolation : interpolation_type;
 END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY configuration_item;
  id : identifier;
  name : label;
  description : OPTIONAL text;
  item_concept : product_concept;
  purpose : OPTIONAL label;
 END_ENTITY;  -- 10303-44: configuration_management_schema


 ENTITY configured_effectivity_assignment
  SUBTYPE OF (effectivity_assignment);
  items : SET[1:?] OF configured_effectivity_item;
  WHERE
 wr1: ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'EFFECTIVITY']*
     TYPEOF ( SELF.assigned_effectivity ) ) =  1 ) AND (
     SELF.assigned_effectivity.id = 'configuration validity' )
     ;
 wr2: SIZEOF ( SELF.items ) =  1;
 wr3: SIZEOF ( QUERY ( i <* SELF.items | NOT (
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF ( i
     ) ) OR NOT ( i\ product_definition.frame_of_reference.
     name IN  [ 'conceptual definition' , 'part occurrence' ,
     'functional definition' , 'alternative definition' ] ) ) )
     =  0;
 wr4:SELF.role.name IN  ['design' , 'usage'];
 wr5: ( SELF.role.name<>'design' ) OR ( SIZEOF ( QUERY ( i
     <* SELF.items | ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_DEFINITION' IN TYPEOF ( i ) ) AND ( i\
     product_definition.frame_of_reference.name =
     'part occurrence' ) ) ) =  0 ) ;
 wr6: ( SELF.role.name<>'usage' ) OR ( SIZEOF ( QUERY ( i <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION'
     IN TYPEOF ( i ) ) AND ( i\ product_definition.
     frame_of_reference.name =  'conceptual definition' ) ) )
     =  0 ) ;
 wr7:SELF.role.description IN  ['exception' , 'inherited' ,
     'local'];
 wr8: SIZEOF ( QUERY ( x <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'EFFECTIVITY_CONTEXT_ASSIGNMENT.' +
     'ASSIGNED_EFFECTIVITY_ASSIGNMENT' ) | 'AUTOMOTIVE_DESIGN.'
     + 'CONFIGURED_EFFECTIVITY_CONTEXT_ASSIGNMENT' IN TYPEOF (
```

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     x ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY configured_effectivity_context_assignment
  SUBTYPE OF (effectivity_context_assignment);
  items : SET[1:?] OF configured_effectivity_context_item;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'CONFIGURED_EFFECTIVITY_ASSIGNMENT'
     IN TYPEOF ( SELF.assigned_effectivity_assignment ) ;
 wr2: SIZEOF ( SELF.items ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY conic
  SUPERTYPE OF (ONEOF(circle,ellipse,hyperbola,parabola))
  SUBTYPE OF (curve);
  position : axis2_placement;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY conical_surface
  SUBTYPE OF (elementary_surface);
  radius : length_measure;
  semi_angle : plane_angle_measure;
  WHERE
 wr1:radius>=0.0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY connected_edge_set
  SUBTYPE OF (topological_representation_item);
  ces_edges : SET[1:?] OF edge;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY connected_face_set
  SUPERTYPE OF (ONEOF(closed_shell,open_shell))
  SUBTYPE OF (topological_representation_item);
  cfs_faces : SET[1:?] OF face;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY connected_face_sub_set
  SUBTYPE OF (connected_face_set);
  parent_face_set : connected_face_set;
 END_ENTITY;  -- 10303-42: topology_schema
```

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 ENTITY constructive_geometry_representation
  SUBTYPE OF (representation);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF (
     SELF.context_of_items ) ) AND ( {2<=SELF.context_of_items\
     geometric_representation_context.
     coordinate_space_dimension<=3} ) ;
 wr2: SIZEOF ( QUERY ( cgr_i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'PLACEMENT' , 'AUTOMOTIVE_DESIGN.'
     + 'CURVE' , 'AUTOMOTIVE_DESIGN.' + 'EDGE' ,
     'AUTOMOTIVE_DESIGN.' + 'FACE' , 'AUTOMOTIVE_DESIGN.' +
     'POINT' , 'AUTOMOTIVE_DESIGN.' + 'SURFACE' ,
     'AUTOMOTIVE_DESIGN.' + 'FACE_SURFACE' ,
     'AUTOMOTIVE_DESIGN.' + 'VERTEX_POINT']* TYPEOF ( cgr_i ) )
     <>1 ) ) =  0;
 wr3: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_RELATIONSHIP.' + 'REP_2' ) ) >0;
 wr4: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_MAP.' + 'MAPPED_REPRESENTATION' ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY constructive_geometry_representation_relationship
  SUBTYPE OF (representation_relationship);
  WHERE
 wr1: (
     SELF.rep_1.context_of_items:=:SELF.rep_2.context_of_items )
     AND ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF (
     SELF.rep_1.context_of_items ) ) ;
 wr2:'AUTOMOTIVE_DESIGN.' +
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION' IN TYPEOF (
     SELF.rep_2 ) ;
 wr3: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'SHAPE_REPRESENTATION' ,
     'AUTOMOTIVE_DESIGN.' +
     'CONSTRUCTIVE_GEOMETRY_REPRESENTATION']* TYPEOF (
     SELF.rep_1 ) ) =  1;
 wr4: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_RELATIONSHIP_WITH_TRANSFORMATION' IN
     TYPEOF ( SELF ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY contact_ratio_representation
  SUBTYPE OF (representation);
  WHERE
 wr1: ( SIZEOF ( SELF.items ) =  1 ) AND ( SIZEOF ( QUERY (
     i <* SELF.items | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'VALUE_RANGE']* TYPEOF ( i ) ) =  1 ) AND ( i.name =
     'ratio value' ) ) ) =  1 ) ;
```

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```
 wr2: ( SIZEOF ( QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) | pdr.name =
     'contact ratio reference' ) ) =  1 ) AND ( SIZEOF (
     QUERY ( pdr <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) | ( pdr.name =
     'contact ratio reference' ) AND ( 'AUTOMOTIVE_DESIGN.' +
     'PHYSICALLY_MODELLED_PRODUCT_DEFINITION' IN TYPEOF ( pdr.
     definition.definition ) ) ) ) =  1 ) ;
 wr3: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) ) =  1 ) AND ( SIZEOF ( QUERY (
     pdr <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN
     ( pdr.definition , 'AUTOMOTIVE_DESIGN.' +
     'GENERAL_PROPERTY_ASSOCIATION.' + 'DERIVED_DEFINITION' ) |
     ( 'AUTOMOTIVE_DESIGN.' + 'GENERAL_PROPERTY' IN TYPEOF (
     gpa.base_definition ) ) AND ( gpa.base_definition.name
     =  'surface_condition' ) ) ) =  1 ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY context_dependent_invisibility
  SUBTYPE OF (invisibility);
  presentation_context : invisibility_context;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY context_dependent_over_riding_styled_item
  SUBTYPE OF (over_riding_styled_item);
  style_context : SET[1:2] OF style_context_select;
  WHERE
 wr1: ( SIZEOF ( QUERY ( sc <* SELF.style_context |
     'AUTOMOTIVE_DESIGN.'+ 'REPRESENTATION' IN TYPEOF ( sc ) )
     ) =  1 ) AND ( SIZEOF ( QUERY ( sc <* SELF.style_context
     | 'AUTOMOTIVE_DESIGN.'+ 'REPRESENTATION_ITEM' IN TYPEOF (
     sc ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY context_dependent_shape_representation;
  representation_relation : shape_representation_relationship;
  represented_product_relation : product_definition_shape;
  DERIVE
   description : text := get_description_value(SELF);
   name : label := get_name_value(SELF);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'PRODUCT_DEFINITION_RELATIONSHIP' IN
```

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```
     TYPEOF ( SELF.represented_product_relation.definition ) ;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
 wr3: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_property_representation_schema


 ENTITY context_dependent_unit
  SUBTYPE OF (named_unit);
  name : label;
 END_ENTITY;  -- 10303-41: measure_schema


 ENTITY contract;
  name : label;
  purpose : text;
  kind : contract_type;
 END_ENTITY;  -- 10303-41: contract_schema


 ENTITY contract_assignment
  ABSTRACT SUPERTYPE;
  assigned_contract : contract;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY contract_type;
  description : label;
 END_ENTITY;  -- 10303-41: contract_schema


 ENTITY conversion_based_unit
  SUBTYPE OF (named_unit);
  name : label;
  conversion_factor : measure_with_unit;
 END_ENTITY;  -- 10303-41: measure_schema


 ENTITY coordinated_universal_time_offset;
  hour_offset : INTEGER;
  minute_offset : OPTIONAL INTEGER;
  sense : ahead_or_behind;
  DERIVE
   actual_minute_offset : INTEGER := NVL(minute_offset,0);
```

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```
  WHERE
 wr1:{0<=hour_offset<=24};
 wr2:{0<=actual_minute_offset<=59};
 wr3: NOT ( ( ( hour_offset<>0 ) OR ( actual_minute_offset<>0
     ) ) AND ( sense =  exact ) ) ;
END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY cos_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY csg_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1:SELF.context_of_items\ geometric_representation_context.
     coordinate_space_dimension =  3;
 wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'CSG_SOLID' , 'AUTOMOTIVE_DESIGN.'+
     'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT_3D'
     , 'AUTOMOTIVE_DESIGN.'+ 'SOLID_REPLICA' ,
     'AUTOMOTIVE_DESIGN.'+ 'REVOLVED_FACE_SOLID' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTRUDED_FACE_SOLID']* TYPEOF ( it
     ) ) <>1 ) ) =  0;
 wr3: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( 'AUTOMOTIVE_DESIGN.'+ 'CSG_SHAPE_REPRESENTATION' IN
     TYPEOF ( mi\ mapped_item.mapping_source.
     mapped_representation ) ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( sr <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'SOLID_REPLICA' IN TYPEOF ( it ) )
     | SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CSG_SOLID' ,
     'AUTOMOTIVE_DESIGN.'+ 'REVOLVED_FACE_SOLID' ,
     'AUTOMOTIVE_DESIGN.'+ 'EXTRUDED_FACE_SOLID']* TYPEOF ( sr\
     solid_replica.parent_solid ) ) =  0 ) ) =  0;
 wr5: SIZEOF ( QUERY ( it <* SELF.items | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT_3D' IN TYPEOF ( it
     ) ) ) ) >0;
END_ENTITY;  -- 10303-515: aic_csg


 ENTITY csg_solid
  SUBTYPE OF (solid_model);
  tree_root_expression : csg_select;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY curve
  SUPERTYPE OF (ONEOF(line,conic,pcurve,surface_curve,offset_curve_2d,
                offset_curve_3d,curve_replica))
```

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```
  SUBTYPE OF (geometric_representation_item);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY curve_bounded_surface
  SUBTYPE OF (bounded_surface);
  basis_surface : surface;
  boundaries : SET[1:?] OF boundary_curve;
  implicit_outer : BOOLEAN;
  WHERE
 wr1: ( NOT implicit_outer ) OR ( SIZEOF ( QUERY ( temp <*
     boundaries | 'AUTOMOTIVE_DESIGN.'+ 'OUTER_BOUNDARY_CURVE'
     IN TYPEOF ( temp ) ) ) =  0 ) ;
 wr2: ( NOT ( implicit_outer ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'BOUNDED_SURFACE' IN TYPEOF ( basis_surface ) ) ;
 wr3: SIZEOF ( QUERY ( temp <* boundaries |
     'AUTOMOTIVE_DESIGN.'+ 'OUTER_BOUNDARY_CURVE' IN TYPEOF (
     temp ) ) ) <=1;
 wr4: SIZEOF ( QUERY ( temp <* boundaries | ( temp\
     composite_curve_on_surface.
     basis_surface[1]<>SELF.basis_surface ) ) ) =  0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY curve_dimension
  SUBTYPE OF (dimension_curve_directed_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY curve_replica
  SUBTYPE OF (curve);
  parent_curve : curve;
  transformation : cartesian_transformation_operator;
  WHERE
 wr1:transformation.dim =  parent_curve.dim;
 wr2:acyclic_curve_replica ( SELF , parent_curve ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY curve_style;
  name : label;
  curve_font : curve_font_or_scaled_curve_font_select;
  curve_width : size_select;
  curve_colour : colour;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY curve_style_font;
  name : label;
  pattern_list : LIST[1:?] OF curve_style_font_pattern;
```

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```
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY curve_style_font_pattern;
 visible_segment_length : positive_length_measure;
 invisible_segment_length : positive_length_measure;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY curve_style_rendering;
 rendering_method : shading_curve_method;
 rendering_properties : surface_rendering_properties;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY cylindrical_pair
 SUBTYPE OF (kinematic_pair);
END_ENTITY;  -- 10303-105: kinematic_structure_schema


ENTITY cylindrical_pair_range
 SUBTYPE OF (simple_pair_range);
 SELF\simple_pair_range.applies_to_pair : cylindrical_pair;
 lower_limit_actual_translation : translational_range_measure;
 upper_limit_actual_translation : translational_range_measure;
 lower_limit_actual_rotation : rotational_range_measure;
 upper_limit_actual_rotation : rotational_range_measure;
 WHERE
wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
    lower_limit_actual_translation ) ) OR (
    'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
    upper_limit_actual_translation ) ) ) XOR (
    lower_limit_actual_translation<upper_limit_actual_translation
    ) ;
wr2: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
    lower_limit_actual_rotation ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
    'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_actual_rotation
    ) ) ) XOR (
    lower_limit_actual_rotation<upper_limit_actual_rotation ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


ENTITY cylindrical_pair_value
 SUBTYPE OF (pair_value);
 SELF\pair_value.applies_to_pair : cylindrical_pair;
 actual_translation : length_measure;
 actual_rotation : plane_angle_measure;
END_ENTITY;  -- 10303-105: kinematic_structure_schema
```

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```
 ENTITY cylindrical_surface
  SUBTYPE OF (elementary_surface);
  radius : positive_length_measure;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY cylindricity_tolerance
  SUBTYPE OF (geometric_tolerance);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_TOLERANCE_WITH_DATUM_REFERENCE' IN TYPEOF (
     SELF ) ) ;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY data_environment;
  name : label;
  description : text;
  elements : SET[1:?] OF property_definition_representation;
 END_ENTITY;  -- 10303-45: material_property_representation_schema


 ENTITY date
  SUPERTYPE OF (calendar_date);
  year_component : year_number;
 END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY date_and_time;
  date_component : date;
  time_component : local_time;
 END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY date_and_time_assignment
  ABSTRACT SUPERTYPE;
  assigned_date_and_time : date_and_time;
  role : date_time_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY date_assignment
  ABSTRACT SUPERTYPE;
  assigned_date : date;
  role : date_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY date_role;
```

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```
  name : label;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY date_time_role;
  name : label;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY dated_effectivity
  SUBTYPE OF (effectivity);
  effectivity_end_date : OPTIONAL date_time_or_event_occurrence;
  effectivity_start_date : date_time_or_event_occurrence;
 END_ENTITY;  -- 10303-41: effectivity_schema


 ENTITY datum
  SUBTYPE OF (shape_aspect);
  identification : identifier;
  INVERSE
   established_by_relationships : SET[1:?] OF shape_aspect_relationship FOR
                                  related_shape_aspect;
  WHERE
 wr1: SIZEOF ( QUERY ( x <* SELF\datum.
     established_by_relationships | SIZEOF ( TYPEOF ( x\
     shape_aspect_relationship.relating_shape_aspect )
     *['AUTOMOTIVE_DESIGN.'+ 'DATUM_FEATURE' ,
     'AUTOMOTIVE_DESIGN.'+ 'DATUM_TARGET'] ) <>1 ) ) =  0;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY datum_feature
  SUBTYPE OF (shape_aspect);
  INVERSE
   feature_basis_relationship : shape_aspect_relationship FOR
                                relating_shape_aspect;
  WHERE
 wr1: SIZEOF ( QUERY ( sar <* bag_to_set ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'DATUM' IN TYPEOF ( sar\ shape_aspect_relationship.
```

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```
    related_shape_aspect ) ) ) ) =  0;
 wr2:SELF\shape_aspect.product_definitional =  TRUE;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY datum_feature_callout
  SUBTYPE OF (draughting_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY datum_reference;
  precedence : INTEGER;
  referenced_datum : datum;
  WHERE
 wr1:precedence>0;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY datum_target
  SUBTYPE OF (shape_aspect);
  target_id : identifier;
  INVERSE
   target_basis_relationship : shape_aspect_relationship FOR
                               relating_shape_aspect;
  WHERE
 wr1: SIZEOF ( QUERY ( sar <* bag_to_set ( USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATING_SHAPE_ASPECT' ) ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
    'DATUM' IN TYPEOF ( sar\shape_aspect_relationship.
    related_shape_aspect ) ) ) ) =  0;
 wr2:SELF\shape_aspect.product_definitional =  TRUE;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY datum_target_callout
  SUBTYPE OF (draughting_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY default_tolerance_table
  SUBTYPE OF (representation);
  WHERE
 wr1: SIZEOF ( QUERY ( i <* SELF.items | NOT (
    'AUTOMOTIVE_DESIGN.' + 'DEFAULT_TOLERANCE_TABLE_CELL' IN
    TYPEOF ( i ) ) ) ) =  0;
 wr2: ( SIZEOF ( QUERY ( rr <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION_RELATIONSHIP.' +
    'REP_1' ) | rr.name<> 'general tolerance definition' ) )
    =  0 ) AND ( SIZEOF ( QUERY ( rr <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION_RELATIONSHIP.' +
```

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```
     'REP_1' ) | ( rr.name =  'general tolerance definition' )
     AND ( rr.rep_2.name<> 'default tolerances' ) ) ) =  0 )
     AND ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_RELATIONSHIP.' + 'REP_2' ) ) =  0 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY default_tolerance_table_cell
  SUBTYPE OF (compound_representation_item);
  WHERE
 wr1: SIZEOF ( QUERY ( x <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION.' + 'ITEMS' ) |
     'AUTOMOTIVE_DESIGN.' + 'DEFAULT_TOLERANCE_TABLE' IN
     TYPEOF ( x ) ) ) =  1;
 wr2:default_tolerance_table_cell_wr2 (
     SELF\compound_representation_item.item_element ) ;
 wr3:default_tolerance_table_cell_wr3 (
     SELF\compound_representation_item.item_element ) ;
 wr4:default_tolerance_table_cell_wr4 (
     SELF\compound_representation_item.item_element ) ;
 wr5:default_tolerance_table_cell_wr5 (
     SELF\compound_representation_item.item_element ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY defined_character_glyph
  SUBTYPE OF (geometric_representation_item);
  definition : defined_glyph_select;
  placement : axis2_placement;
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY defined_symbol
  SUBTYPE OF (geometric_representation_item);
  definition : defined_symbol_select;
  target : symbol_target;
 END_ENTITY; -- 10303-46: presentation_definition_schema


 ENTITY definitional_representation
  SUBTYPE OF (representation);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'PARAMETRIC_REPRESENTATION_CONTEXT'
     IN TYPEOF ( SELF\representation.context_of_items ) ;
END_ENTITY;  -- 10303-43: representation_schema


 ENTITY degenerate_pcurve
  SUBTYPE OF (point);
  basis_surface : surface;
```

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```
  reference_to_curve : definitional_representation;
  WHERE
 wr1: SIZEOF ( reference_to_curve\ representation.items ) =
     1;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF (
     reference_to_curve\ representation.items[1] ) ;
 wr3:reference_to_curve\ representation.
     items[1]\geometric_representation_item.dim =  2;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY degenerate_toroidal_surface
  SUBTYPE OF (toroidal_surface);
  select_outer : BOOLEAN;
  WHERE
 wr1:major_radius<minor_radius;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY derived_shape_aspect
  SUPERTYPE OF (ONEOF(apex,centre_of_symmetry,geometric_alignment,
                geometric_intersection,parallel_offset,perpendicular_to,
                extension,tangent))
  SUBTYPE OF (shape_aspect);
  INVERSE
   deriving_relationships : SET[1:?] OF shape_aspect_relationship FOR
                            relating_shape_aspect;
  WHERE
 wr1: SIZEOF ( QUERY ( dr <* SELF\derived_shape_aspect.
     deriving_relationships | NOT ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_DERIVING_RELATIONSHIP' IN TYPEOF ( dr ) ) )
     ) =  0;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY derived_unit;
  elements : SET[1:?] OF derived_unit_element;
  DERIVE
   name : label := get_name_value(SELF);
  WHERE
 wr1: ( SIZEOF ( elements ) >1 ) OR ( ( SIZEOF ( elements )
     =  1 ) AND ( elements[1].exponent<>1.0 ) ) ;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY derived_unit_element;
  unit : named_unit;
  exponent : REAL;
 END_ENTITY;  -- 10303-41: measure_schema
```

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```
ENTITY derived_unit_variable
 SUBTYPE OF (derived_unit,variable_semantics);
 INVERSE
  associated_variable_environment : environment FOR semantics;
END_ENTITY;  -- 10303-214: automotive_design


ENTITY description_attribute;
 attribute_value : text;
 described_item : description_attribute_select;
END_ENTITY;  -- 10303-41: basic_attribute_schema


ENTITY descriptive_representation_item
 SUBTYPE OF (representation_item);
 description : text;
END_ENTITY;  -- 10303-45: qualified_measure_schema


ENTITY diameter_dimension
 SUBTYPE OF (dimension_curve_directed_callout);
END_ENTITY;  -- 10303-506: aic_draughting_elements


ENTITY dimension_callout_component_relationship
 SUBTYPE OF (draughting_callout_relationship);
 WHERE
wr1:SELF.name IN  ['prefix' , 'suffix'];
wr2:'AUTOMOTIVE_DESIGN.'+ 'STRUCTURED_DIMENSION_CALLOUT' IN
    TYPEOF ( SELF.relating_draughting_callout ) ;
wr3: SIZEOF ( TYPEOF ( SELF.related_draughting_callout )
    *['AUTOMOTIVE_DESIGN.'+ 'LEADER_DIRECTED_CALLOUT' ,
    'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_DIRECTED_CALLOUT' ,
    'AUTOMOTIVE_DESIGN.'+ 'DIMENSION_CURVE_DIRECTED_CALLOUT' ,
    'AUTOMOTIVE_DESIGN.'+ 'STRUCTURED_DIMENSION_CALLOUT'] ) =
    0;
wr4:SELF.related_draughting_callout.
    contents*SELF.relating_draughting_callout.contents =
    SELF.related_draughting_callout.contents;
wr5: ( ( SELF.name =  'prefix' ) AND ( SIZEOF ( QUERY ( ato
    <* QUERY ( con <* SELF.related_draughting_callout.
    contents | ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( con ) ) ) | NOT
    ( ato.name =  'prefix text' ) ) ) =  0 ) ) ;
wr6: ( ( SELF.name =  'suffix' ) AND ( SIZEOF ( QUERY ( ato
    <* QUERY ( con <* SELF.related_draughting_callout.
    contents | ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( con ) ) ) | NOT
```

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```
     ( ato.name =  'suffix text' ) ) ) =  0 ) ) ;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY dimension_callout_relationship
  SUBTYPE OF (draughting_callout_relationship);
  WHERE
 wr1:SELF.name IN  ['primary' , 'secondary'];
 wr2: SIZEOF ( TYPEOF ( SELF.relating_draughting_callout )
     *['AUTOMOTIVE_DESIGN.'+ 'ANGULAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'CURVE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'DIAMETER_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'LEADER_DIRECTED_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'LINEAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'ORDINATE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'RADIUS_DIMENSION'] ) >=1;
 wr3: SIZEOF ( TYPEOF ( SELF.related_draughting_callout )
     *['AUTOMOTIVE_DESIGN.'+ 'DIMENSION_CURVE_DIRECTED_CALLOUT'
     , 'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_DIRECTED_CALLOUT' ,
     'AUTOMOTIVE_DESIGN.'+ 'LEADER_DIRECTED_CALLOUT'] ) =  0;
 wr4:SELF.related_draughting_callout.
     contents*SELF.relating_draughting_callout.contents =
     SELF.related_draughting_callout.contents;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY dimension_curve
  SUBTYPE OF (annotation_curve_occurrence);
  WHERE
 wr1: ( SIZEOF ( QUERY ( dct <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'TERMINATOR_SYMBOL.'+
     'ANNOTATED_CURVE' ) | ( ( 'AUTOMOTIVE_DESIGN.' +
     'DIMENSION_CURVE_TERMINATOR' IN TYPEOF ( dct ) ) ) ) )
     <=2 ) ;
 wr2: SIZEOF ( QUERY ( dcdc <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_CALLOUT.'+ 'CONTENTS' )
     | ( 'AUTOMOTIVE_DESIGN.' +
     'DIMENSION_CURVE_DIRECTED_CALLOUT' IN TYPEOF ( dcdc ) ) )
     ) >=1;
 wr3: ( SIZEOF ( QUERY ( dct1 <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'TERMINATOR_SYMBOL.'+
     'ANNOTATED_CURVE' ) | ( ( 'AUTOMOTIVE_DESIGN.' +
     'DIMENSION_CURVE_TERMINATOR' IN TYPEOF ( dct1 ) ) AND (
     dct1.role =  origin ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
     dct2 <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'TERMINATOR_SYMBOL.'+ 'ANNOTATED_CURVE' ) | ( (
     'AUTOMOTIVE_DESIGN.' + 'DIMENSION_CURVE_TERMINATOR' IN
     TYPEOF ( dct2 ) ) AND ( dct2.role =  target ) ) ) ) <=1 )
     ;
END_ENTITY;  -- 10303-101: draughting_element_schema
```

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```
 ENTITY dimension_curve_directed_callout
  SUBTYPE OF (draughting_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( d_c <* SELF\draughting_callout.
     contents | 'AUTOMOTIVE_DESIGN.'+ 'DIMENSION_CURVE' IN (
     TYPEOF ( d_c ) ) ) ) =  1;
 wr2: SIZEOF ( SELF\draughting_callout.contents ) >=2;
END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY dimension_curve_terminator
  SUBTYPE OF (terminator_symbol);
  role : dimension_extent_usage;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'DIMENSION_CURVE' IN TYPEOF (
     SELF\terminator_symbol.annotated_curve ) ;
END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY dimension_pair
  SUBTYPE OF (draughting_callout_relationship);
  WHERE
 wr1:SELF.name IN  ['chained' , 'parallel'];
 wr2: SIZEOF ( TYPEOF ( SELF.relating_draughting_callout )
     *['AUTOMOTIVE_DESIGN.'+ 'ANGULAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'CURVE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'DIAMETER_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'LINEAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'ORDINATE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'RADIUS_DIMENSION'] ) =  1;
 wr3: SIZEOF ( TYPEOF ( SELF.related_draughting_callout )
     *['AUTOMOTIVE_DESIGN.'+ 'ANGULAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'CURVE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'DIAMETER_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'LINEAR_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'ORDINATE_DIMENSION' ,
     'AUTOMOTIVE_DESIGN.'+ 'RADIUS_DIMENSION'] ) =  1;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY dimension_related_tolerance_zone_element;
  related_dimension : dimensional_location;
  related_element : tolerance_zone_definition;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY dimension_text_associativity
  SUBTYPE OF (text_literal,mapped_item);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'SHAPE_DIMENSION_REPRESENTATION'
     IN TYPEOF ( SELF\mapped_item.mapping_source.
```

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```
     mapped_representation ) ) ;
 wr2: ( 'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT' IN TYPEOF (
     SELF\mapped_item.mapping_target ) ) ;
 wr3: SIZEOF ( QUERY ( ato <* QUERY ( si <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.STYLED_ITEM.ITEM' ) | (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_TEXT_OCCURRENCE' IN
     TYPEOF ( si ) ) ) | NOT ( SIZEOF ( QUERY ( dc <* USEDIN
     ( ato , 'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_CALLOUT.'+
     'CONTENTS' ) | ( 'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT'
     IN TYPEOF ( dc ) ) ) *[SELF\mapped_item.mapping_target]
     ) =  1 ) ) ) =  0;
END_ENTITY;  -- 10303-520: aic_associative_draughting_elements


 ENTITY dimensional_characteristic_representation;
  dimension : dimensional_characteristic;
  representation : shape_dimension_representation;
 END_ENTITY;  -- 10303-47: shape_dimension_schema


 ENTITY dimensional_exponents;
  length_exponent : REAL;
  mass_exponent : REAL;
  time_exponent : REAL;
  electric_current_exponent : REAL;
  thermodynamic_temperature_exponent : REAL;
  amount_of_substance_exponent : REAL;
  luminous_intensity_exponent : REAL;
 END_ENTITY;  -- 10303-41: measure_schema


 ENTITY dimensional_location
  SUPERTYPE OF (ONEOF(angular_location,dimensional_location_with_path))
  SUBTYPE OF (shape_aspect_relationship);
 END_ENTITY;  -- 10303-47: shape_dimension_schema


 ENTITY dimensional_location_with_path
  SUBTYPE OF (dimensional_location);
  path : shape_aspect;
 END_ENTITY;  -- 10303-47: shape_dimension_schema


 ENTITY dimensional_size
  SUPERTYPE OF (ONEOF(angular_size,dimensional_size_with_path));
  applies_to : shape_aspect;
  name : label;
  WHERE
 wr1:applies_to.product_definitional =  TRUE;
END_ENTITY;  -- 10303-47: shape_dimension_schema
```

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```
ENTITY dimensional_size_with_path
 SUBTYPE OF (dimensional_size);
 path : shape_aspect;
END_ENTITY;  -- 10303-47: shape_dimension_schema


ENTITY directed_action
 SUBTYPE OF (executed_action);
 directive : action_directive;
END_ENTITY;  -- 10303-41: action_schema


ENTITY directed_angle
 SUBTYPE OF (shape_aspect);
 WHERE
wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
    TYPEOF ( SELF.of_shape.definition ) ;
wr2: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
wr3: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  1 ) ) ) =  1;
wr4:SELF.description IN  [ 'punch direction' , 'profile normal'
    , 'surface normal' ];
wr5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'angle' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
    ) =  1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


ENTITY directed_dimensional_location
 SUBTYPE OF (dimensional_location);
END_ENTITY;  -- 10303-214: automotive_design


ENTITY direction
 SUBTYPE OF (geometric_representation_item);
 direction_ratios : LIST[2:3] OF REAL;
```

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```
  WHERE
 wr1: SIZEOF ( QUERY ( tmp <* direction_ratios | tmp<>0.0 ) )
     >0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY direction_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( SELF.items ) =  1;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'
     + 'DIRECTION' IN TYPEOF ( i ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY div_expression
  SUBTYPE OF (binary_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY document;
  id : identifier;
  name : label;
  description : OPTIONAL text;
  kind : document_type;
  INVERSE
   representation_types : SET[0:?] OF document_representation_type FOR
                          represented_document;
 END_ENTITY;  -- 10303-41: document_schema


 ENTITY document_file
  SUBTYPE OF (document,characterized_object);
  WHERE
 wr1:SELF\characterized_object.name =  '';
 wr2: NOT EXISTS ( SELF\characterized_object.description ) ;
 wr3: SIZEOF ( QUERY ( drt <* SELF\document.
     representation_types | drt.name IN  ['digital' ,
     'physical'] ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY document_product_association;
  name : label;
  description : OPTIONAL text;
  relating_document : document;
  related_product : product_or_formation_or_definition;
 END_ENTITY;  -- 10303-41: document_schema
```

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```
 ENTITY document_product_equivalence
  SUBTYPE OF (document_product_association);
  WHERE
 wr1:SELF.name =  'equivalence';
 wr2: NOT ( 'AUTOMOTIVE_DESIGN.' + 'PRODUCT' IN TYPEOF (
     SELF.related_product ) ) OR ( ( SELF.relating_document.
     kind.product_data_type =
     'configuration controlled document' ) AND ( SIZEOF (
     QUERY ( prpc <* USEDIN ( SELF.related_product ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_RELATED_PRODUCT_CATEGORY.'
     + 'PRODUCTS' ) | prpc.name =  'document' ) ) =  1 ) ) ;
 wr3: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_DEFINITION_FORMATION' IN TYPEOF (
     SELF.related_product ) ) OR ( ( SELF.relating_document.
     kind.product_data_type =
     'configuration controlled document version' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( SELF.related_product\
     product_definition_formation.of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc.name =  'document' ) ) =  1 ) ) ;
 wr4: NOT ( 'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN
     TYPEOF ( SELF.related_product ) ) OR ( (
     SELF.relating_document.kind.product_data_type =
     'configuration controlled document definition' ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( SELF.related_product\
     product_definition.formation.of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc.name =  'document' ) ) =  1 ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY document_reference
  ABSTRACT SUPERTYPE;
  assigned_document : document;
  source : label;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY document_relationship;
  name : label;
  description : OPTIONAL text;
  relating_document : document;
  related_document : document;
 END_ENTITY;  -- 10303-41: document_schema


 ENTITY document_representation_type;
```

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```
 name : label;
 represented_document : document;
END_ENTITY;  -- 10303-41: document_schema


ENTITY document_type;
 product_data_type : label;
END_ENTITY;  -- 10303-41: document_schema


ENTITY document_usage_constraint;
 source : document;
 subject_element : label;
 subject_element_value : text;
END_ENTITY;  -- 10303-41: document_schema


ENTITY document_usage_constraint_assignment
 ABSTRACT SUPERTYPE;
 assigned_document_usage : document_usage_constraint;
 role : document_usage_role;
END_ENTITY;  -- 10303-41: management_resources_schema


ENTITY document_usage_role;
 name : label;
 description : OPTIONAL text;
END_ENTITY;  -- 10303-41: management_resources_schema


ENTITY draughting_annotation_occurrence
 SUBTYPE OF (annotation_occurrence);
 WHERE
wr1: ( NOT ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_CURVE_OCCURRENCE' IN TYPEOF ( SELF ) ) ) OR
    ( SIZEOF ( QUERY ( sty <* SELF.styles | NOT ( ( SIZEOF
    ( sty.styles ) =  1 ) AND ( 'AUTOMOTIVE_DESIGN.'+
    'CURVE_STYLE' IN TYPEOF ( sty.styles[1] ) ) ) ) ) =  0 )
    ;
wr2: ( NOT ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_FILL_AREA_OCCURRENCE' IN TYPEOF ( SELF ) ) )
    OR ( SIZEOF ( QUERY ( sty <* SELF.styles | NOT ( (
    SIZEOF ( sty.styles ) =  1 ) AND ( 'AUTOMOTIVE_DESIGN.'+
    'FILL_AREA_STYLE' IN TYPEOF ( sty.styles[1] ) ) ) ) ) =
    0 ) ;
wr3: ( NOT ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_FILL_AREA_OCCURRENCE' IN TYPEOF ( SELF ) ) )
    OR ( SIZEOF ( QUERY ( bound <* SELF.item\
    annotation_fill_area.boundaries | NOT ( SIZEOF ( QUERY
    ( si <* USEDIN ( bound , 'AUTOMOTIVE_DESIGN.' +
```

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```
    'STYLED_ITEM.'+ 'ITEM' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'ANNOTATION_CURVE_OCCURRENCE' IN TYPEOF ( si ) ) ) >0 )
    ) ) =  0 ) ;
wr4: ( NOT ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_SYMBOL_OCCURRENCE' IN TYPEOF ( SELF ) ) ) OR
    ( SIZEOF ( QUERY ( sty <* SELF.styles | NOT ( ( SIZEOF
    ( sty.styles ) =  1 ) AND ( SIZEOF ( TYPEOF ( sty.
    styles[1] ) *['AUTOMOTIVE_DESIGN.'+ 'SYMBOL_STYLE' ,
    'AUTOMOTIVE_DESIGN.'+ 'NULL_STYLE'] ) =  1 ) ) ) ) =  0 ) ;
wr5: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_SYMBOL_OCCURRENCE' IN TYPEOF ( SELF ) ) AND
    ( 'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL' IN TYPEOF (
    SELF.item ) ) ) ) OR ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_SYMBOL_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_SUBFIGURE_REPRESENTATION']* TYPEOF (
    SELF.item\ mapped_item.mapping_source.
    mapped_representation ) ) =  1 ) ;
wr6: ( NOT ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) ) OR (
    SIZEOF ( QUERY ( sty <* SELF.styles | NOT ( ( SIZEOF (
    sty.styles ) =  1 ) AND ( 'AUTOMOTIVE_DESIGN.'+
    'TEXT_STYLE' IN TYPEOF ( sty.styles[1] ) ) ) ) =  0 )
    ;
wr7: ( ( 'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_TEXT_OCCURRENCE' IN
    TYPEOF ( SELF ) ) ) OR ( SIZEOF ( TYPEOF ( SELF.item )
    *['AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' ,
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL'] ) =  1 ) ;
wr8: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' IN TYPEOF (
    SELF.item ) ) ) ) OR ( SIZEOF ( QUERY ( tl <* SELF.item\
    composite_text.collected_text | NOT (
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL' IN TYPEOF ( tl ) ) )
    ) =  0 ) ;
wr9: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL' IN TYPEOF (
    SELF.item ) ) ) ) OR ( SELF.item\ text_literal.alignment
    IN  [ 'baseline left' , 'baseline centre' ,
    'baseline right' ] ) ;
wr10: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' IN TYPEOF (
    SELF.item ) ) ) ) OR ( SIZEOF ( QUERY ( tl <* QUERY (
    text <* SELF.item\ composite_text.collected_text | (
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL' IN TYPEOF ( text ) )
    ) | NOT ( tl\ text_literal.alignment IN  [
    'baseline left' , 'baseline centre' , 'baseline right' ] )
    ) ) =  0 ) ;
wr11: NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' IN TYPEOF (
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    SELF.item ) ) ) OR check_text_alignment ( SELF.item ) ;
wr12: NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' IN TYPEOF (
    SELF.item ) ) ) OR check_text_font ( SELF.item ) ;
wr13: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'COMPOSITE_TEXT' IN TYPEOF (
    SELF.item ) ) ) ) OR ( SIZEOF ( QUERY ( tl <* QUERY (
    text <* SELF.item\ composite_text.collected_text | (
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL' IN TYPEOF ( text ) )
    ) | NOT ( SIZEOF ( TYPEOF ( tl ) *['AUTOMOTIVE_DESIGN.'
    + 'TEXT_LITERAL_WITH_BLANKING_BOX' , 'AUTOMOTIVE_DESIGN.' +
    'TEXT_LITERAL_WITH_ASSOCIATED_CURVES'] ) =  0 ) ) ) =  0 ))
    ;
wr14: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'TEXT_LITERAL_WITH_ASSOCIATED_CURVES'
    IN TYPEOF ( SELF.item ) ) ) OR ( SIZEOF ( QUERY (
    crv <* SELF.item\ text_literal_with_associated_curves.
    associated_curves | NOT ( SIZEOF ( QUERY ( si <* USEDIN
    ( crv , 'AUTOMOTIVE_DESIGN.STYLED_ITEM.ITEM' ) | (
    'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_CURVE_OCCURRENCE' IN
    TYPEOF ( si ) ) ) >0 ) ) ) =  0 ) ;
wr15: ( NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'ANNOTATION_TEXT_OCCURRENCE' IN TYPEOF ( SELF ) ) AND (
    'AUTOMOTIVE_DESIGN.'+
    'COMPOSITE_TEXT_WITH_ASSOCIATED_CURVES' IN TYPEOF (
    SELF.item ) ) ) OR ( SIZEOF ( QUERY ( crv <*
    SELF.item\ composite_text_with_associated_curves.
    associated_curves | NOT ( SIZEOF ( QUERY ( si <* USEDIN
    ( crv , 'AUTOMOTIVE_DESIGN.STYLED_ITEM.ITEM' ) | (
    'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_CURVE_OCCURRENCE' IN
    TYPEOF ( si ) ) ) >0 ) ) ) =  0 ) ;
wr16: SIZEOF ( QUERY ( cs <* QUERY ( sty <* SELF.styles | (
    'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF ( sty.
    styles[1] ) ) ) | NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'LENGTH_MEASURE_WITH_UNIT' IN TYPEOF ( cs.
    styles[1]\curve_style.curve_width ) ) AND (
    'AUTOMOTIVE_DESIGN.'+ 'POSITIVE_LENGTH_MEASURE' IN TYPEOF
    ( cs.styles[1]\curve_style.curve_width\
    measure_with_unit.value_component ) ) ) ) =  0;
wr17: SIZEOF ( QUERY ( fas <* QUERY ( sty <* SELF.styles | (
    'AUTOMOTIVE_DESIGN.'+ 'FILL_AREA_STYLE' IN TYPEOF ( sty.
    styles[1] ) ) ) | NOT ( ( SIZEOF ( QUERY ( fs <* fas.
    styles[1]\fill_area_style.fill_styles | (
    'AUTOMOTIVE_DESIGN.'+ 'FILL_AREA_STYLE_TILES' IN TYPEOF (
    fs ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( fst <* QUERY (
    fs <* fas.styles[1]\fill_area_style.fill_styles | (
    'AUTOMOTIVE_DESIGN.'+ 'FILL_AREA_STYLE_TILES' IN TYPEOF (
    fs ) ) ) | NOT ( SIZEOF ( fst\ fill_area_style_tiles.
    tiles ) =  1 ) ) ) =  0 ) ) ) ) =  0;
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 wr18: SIZEOF ( QUERY ( fas <* QUERY ( sty <* SELF.styles | (
     'AUTOMOTIVE_DESIGN.'+ 'FILL_AREA_STYLE' IN TYPEOF ( sty.
     styles[1] ) ) ) | NOT ( SIZEOF ( QUERY ( fsh <* QUERY (
     fs <* fas.styles[1]\fill_area_style.fill_styles | (
     'AUTOMOTIVE_DESIGN.'+ 'FILL_AREA_STYLE_HATCHING' IN
     TYPEOF ( fs ) ) ) | NOT ( fsh\ fill_area_style_hatching.
     point_of_reference_hatch_line:=:fsh\
     fill_area_style_hatching.pattern_start ) ) ) =  0 ) ) ) =
     0;
 wr19: SIZEOF ( QUERY ( ts <* QUERY ( sty <* SELF.styles | (
     'AUTOMOTIVE_DESIGN.'+ 'TEXT_STYLE' IN TYPEOF ( sty.
     styles[1] ) ) ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
     'TEXT_STYLE_WITH_BOX_CHARACTERISTICS' IN TYPEOF ( ts.
     styles[1] ) ) ) ) =  0;
 wr20: SIZEOF ( QUERY ( ts <* QUERY ( sty <* SELF.styles | (
     'AUTOMOTIVE_DESIGN.'+ 'TEXT_STYLE_WITH_BOX_CHARACTERISTICS'
     IN TYPEOF ( sty.styles[1] ) ) ) | NOT ( SIZEOF ( ts.
     styles[1]\text_style_with_box_characteristics.
     characteristics ) =  4 ) ) ) =  0;
END_ENTITY;  -- 10303-504: aic_draughting_annotation


 ENTITY draughting_callout
  SUBTYPE OF (geometric_representation_item);
  contents : SET[1:?] OF draughting_callout_element;
 END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY draughting_callout_relationship;
  name : label;
  description : text;
  relating_draughting_callout : draughting_callout;
  related_draughting_callout : draughting_callout;
 END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY draughting_elements
  SUBTYPE OF (draughting_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( l_c <* QUERY ( con <* SELF.contents |
     ( 'AUTOMOTIVE_DESIGN.'+ 'LEADER_CURVE' IN TYPEOF ( con )
     ) ) | NOT ( SIZEOF ( QUERY ( ldc <* USEDIN ( l_c ,
     'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_CALLOUT.'+ 'CONTENTS' )
     | ( 'AUTOMOTIVE_DESIGN.'+ 'LEADER_DIRECTED_CALLOUT' IN
     TYPEOF ( ldc ) ) ) ) <=1 ) ) ) =  0;
 wr2: NOT ( 'AUTOMOTIVE_DESIGN.'+
     'DIMENSION_CURVE_DIRECTED_CALLOUT' IN TYPEOF ( SELF ) )
     OR ( SIZEOF ( QUERY ( con <* SELF.contents | (
     'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_CURVE' IN TYPEOF ( con
     ) ) ) ) <=2 ) ;
 wr3: SIZEOF ( QUERY ( rc <* USEDIN ( SELF ,
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     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT_' +
     'RELATIONSHIP.'+ 'RELATING_DRAUGHTING_CALLOUT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIMENSION_CALLOUT_RELATIONSHIP' IN
     TYPEOF ( rc ) ) AND ( rc.name =  'primary' ) ) ) <=1;
 wr4: SIZEOF ( QUERY ( rc <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT_' +
     'RELATIONSHIP.'+ 'RELATING_DRAUGHTING_CALLOUT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIMENSION_CALLOUT_RELATIONSHIP' IN
     TYPEOF ( rc ) ) AND ( rc.name =  'secondary' ) ) ) <=1;
 wr5: SIZEOF ( QUERY ( sec <* QUERY ( rc <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT_' +
     'RELATIONSHIP.'+ 'RELATING_DRAUGHTING_CALLOUT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIMENSION_CALLOUT_RELATIONSHIP' IN
     TYPEOF ( rc ) ) AND ( rc.name =  'secondary' ) ) | NOT
     ( SIZEOF ( QUERY ( prim <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT_' +
     'RELATIONSHIP.'+ 'RELATING_DRAUGHTING_CALLOUT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIMENSION_CALLOUT_RELATIONSHIP' IN
     TYPEOF ( prim ) ) AND ( prim.name =  'primary' ) ) ) =
     1 ) ) ) =  0;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY draughting_model
  SUBTYPE OF (representation);
  UNIQUE
   ur1 : SELF\representation.name;
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT' , 'AUTOMOTIVE_DESIGN.'+ 'CAMERA_MODEL']*
     TYPEOF ( it ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) )
     | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_MODEL']* TYPEOF ( mi\ mapped_item.
     mapping_source.mapped_representation ) ) =  1 ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( smi <* QUERY ( si <* QUERY ( it <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN
     TYPEOF ( it ) ) ) | ( 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM'
     IN TYPEOF ( si\ styled_item.item ) ) ) | ( NOT ( (
     'AUTOMOTIVE_DESIGN.'+ 'SHAPE_REPRESENTATION' IN TYPEOF (
     smi\ styled_item.item\ mapped_item.mapping_source.
     mapped_representation ) ) AND ( SIZEOF ( QUERY ( sty <*
     smi\ styled_item.styles | ( NOT ( SIZEOF ( QUERY ( psa
     <* sty.styles | ( NOT ( 'AUTOMOTIVE_DESIGN.'+
     'CURVE_STYLE' IN TYPEOF ( psa ) ) ) ) ) =  1 ) ) ) ) =  1
     ) ) ) ) ) =  0;
END_ENTITY;  -- 10303-520: aic_associative_draughting_elements
```

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```
 ENTITY draughting_pre_defined_colour
  SUBTYPE OF (pre_defined_colour);
  WHERE
 wr1:SELF.name IN  ['red' , 'green' , 'blue' , 'yellow' ,
     'magenta' , 'cyan' , 'black' , 'white'];
END_ENTITY;  -- 10303-517: aic_mechanical_design_geometric_presentation


 ENTITY draughting_pre_defined_curve_font
  SUBTYPE OF (pre_defined_curve_font);
  WHERE
 wr1:SELF.name IN  ['continuous' , 'chain' , 'chain double dash'
     , 'dashed' , 'dotted'];
END_ENTITY;  -- 10303-517: aic_mechanical_design_geometric_presentation


 ENTITY draughting_pre_defined_text_font
  SUBTYPE OF (pre_defined_text_font);
  WHERE
 wr1:SELF.name IN  [ 'ISO 3098-1 font A' , 'ISO 3098-1 font B'
     ];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY draughting_specification_reference
  SUBTYPE OF (document_reference);
  specified_items : SET[1:?] OF specified_item;
  WHERE
 wr1: ( SELF.assigned_document.kind.product_data_type =
     'draughting specification' ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY draughting_subfigure_representation
  SUBTYPE OF (symbol_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( item <* SELF\representation.items |
     NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'DRAUGHTING_CALLOUT' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT']* TYPEOF ( item ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( item <* SELF\representation.items |
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_OCCURRENCE' ,
     'AUTOMOTIVE_DESIGN.'+ 'DRAUGHTING_CALLOUT']* TYPEOF ( item
     ) ) =  1 ) ) >=1;
 wr3: SIZEOF ( QUERY ( srm <* QUERY ( rm <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION_MAP.'+
     'MAPPED_REPRESENTATION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SYMBOL_REPRESENTATION_MAP' IN TYPEOF ( rm ) ) ) | NOT (
     SIZEOF ( QUERY ( a_s <* QUERY ( mi <* srm.map_usage | (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL' IN TYPEOF ( mi
```

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```
     ) ) ) | NOT ( SIZEOF ( QUERY ( aso <* USEDIN ( a_s ,
     'AUTOMOTIVE_DESIGN.' + 'STYLED_ITEM.'+ 'ITEM' ) | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SUBFIGURE_OCCURRENCE' IN
     TYPEOF ( aso ) ) ) ) =  0 ) ) ) =  0 ) ) ) >0;
 wr4: NOT ( acyclic_mapped_item_usage ( SELF ) ) ;
 wr5: SIZEOF ( SELF.context_of_items.
     representations_in_context ) =  1;
END_ENTITY;  -- 10303-504: aic_draughting_annotation


 ENTITY draughting_symbol_representation
  SUBTYPE OF (symbol_representation);
  UNIQUE
   ur1 : SELF\representation.name;
  WHERE
 wr1: SIZEOF ( QUERY ( item <* SELF\representation.items |
     NOT ( SIZEOF ( TYPEOF ( item ) *['AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_CURVE_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_SYMBOL_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_FILL_AREA_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_TEXT_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT'] ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( item <* SELF\representation.items | (
     SIZEOF ( TYPEOF ( item ) *['AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_CURVE_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_SYMBOL_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_FILL_AREA_OCCURRENCE' , 'AUTOMOTIVE_DESIGN.'+
     'ANNOTATION_TEXT_OCCURRENCE'] ) =  1 ) ) ) >=1;
 wr3: SIZEOF ( QUERY ( item <* SELF\representation.items |
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SUBFIGURE_OCCURRENCE' IN
     TYPEOF ( item ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( srm <* QUERY ( rm <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.'+ 'REPRESENTATION_MAP.'+
     'MAPPED_REPRESENTATION' ) | ( 'AUTOMOTIVE_DESIGN.'+
     'SYMBOL_REPRESENTATION_MAP' IN TYPEOF ( rm ) ) ) | NOT (
     SIZEOF ( QUERY ( a_s <* QUERY ( mi <* srm.map_usage | (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL' IN TYPEOF ( mi
     ) ) ) | NOT ( SIZEOF ( QUERY ( aso <* USEDIN ( a_s ,
     'AUTOMOTIVE_DESIGN.' + 'STYLED_ITEM.'+ 'ITEM' ) | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'ANNOTATION_SYMBOL_OCCURRENCE' IN
     TYPEOF ( aso ) ) ) ) =  0 ) ) ) =  0 ) ) ) >0;
 wr5: NOT ( acyclic_mapped_item_usage ( SELF ) ) ;
 wr6: SIZEOF ( SELF.context_of_items.
     representations_in_context ) =  1;
END_ENTITY;  -- 10303-504: aic_draughting_annotation


 ENTITY draughting_text_literal_with_delineation
  SUBTYPE OF (text_literal_with_delineation);
  WHERE
 wr1:SELF.delineation IN  ['underline' , 'overline'];
END_ENTITY;  -- 10303-504: aic_draughting_annotation
```

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```
 ENTITY draughting_title;
  items : SET[1:?] OF draughting_titled_item;
  language : label;
  contents : text;
 END_ENTITY;  -- 10303-101: drawing_definition_schema


 ENTITY drawing_definition;
  drawing_number : identifier;
  drawing_type : OPTIONAL label;
 END_ENTITY;  -- 10303-101: drawing_definition_schema


 ENTITY drawing_revision
  SUBTYPE OF (presentation_set);
  revision_identifier : identifier;
  drawing_identifier : drawing_definition;
  intended_scale : OPTIONAL text;
  UNIQUE
   ur1 : revision_identifier,drawing_identifier;
 END_ENTITY;  -- 10303-101: drawing_definition_schema


 ENTITY drawing_revision_sequence;
  predecessor : drawing_revision;
  successor : drawing_revision;
  WHERE
 wr1:predecessor:<>:successor;
END_ENTITY;  -- 10303-101: drawing_definition_schema


 ENTITY drawing_sheet_layout
  SUBTYPE OF (draughting_symbol_representation);
 END_ENTITY; -- 10303-214: automotive_design


 ENTITY drawing_sheet_revision
  SUBTYPE OF (presentation_area);
  revision_identifier : identifier;
  WHERE
 wr1: SIZEOF ( QUERY ( item <* SELF\representation.items | (
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN ( TYPEOF ( item )
     ) ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'DRAWING_SHEET_REVISION'
     IN ( TYPEOF ( item\ mapped_item.mapping_source.
     mapped_representation ) ) ) ) ) =  0;
END_ENTITY;  -- 10303-101: drawing_definition_schema
```

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```
 ENTITY drawing_sheet_revision_usage
  SUBTYPE OF (area_in_set);
  sheet_number : identifier;
  UNIQUE
   ur1 : sheet_number,in_set;
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'DRAWING_SHEET_REVISION' IN
     TYPEOF ( SELF\area_in_set.area ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'DRAWING_REVISION' IN TYPEOF (
     SELF\area_in_set.in_set ) ) ;
END_ENTITY;  -- 10303-101: drawing_definition_schema


 ENTITY edge
  SUPERTYPE OF (ONEOF(edge_curve,oriented_edge,subedge))
  SUBTYPE OF (topological_representation_item);
  edge_start : vertex;
  edge_end : vertex;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY edge_based_wireframe_model
  SUBTYPE OF (geometric_representation_item);
  ebwm_boundary : SET[1:?] OF connected_edge_set;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY edge_based_wireframe_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
     ) ) >=1;
 wr3: SIZEOF ( QUERY ( ebwm <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' IN
     TYPEOF ( it ) ) ) | NOT ( SIZEOF ( QUERY ( eb <* ebwm\
     edge_based_wireframe_model.ebwm_boundary | NOT ( SIZEOF
     ( QUERY ( edges <* eb.ces_edges | NOT (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_CURVE' IN TYPEOF ( edges ) )
     ) ) =  0 ) ) ) =  0 ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( ebwm <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' IN
     TYPEOF ( it ) ) ) | NOT ( SIZEOF ( QUERY ( eb <* ebwm\
     edge_based_wireframe_model.ebwm_boundary | NOT ( SIZEOF
     ( QUERY ( pline_edges <* QUERY ( edges <* eb.ces_edges |
     ( 'AUTOMOTIVE_DESIGN.'+ 'POLYLINE' IN TYPEOF ( edges\
```

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      edge_curve.edge_geometry ) ) ) | NOT ( SIZEOF (
      pline_edges\ edge_curve.edge_geometry\ polyline.points )
      >2 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
  wr5: SIZEOF ( QUERY ( ebwm <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' IN
      TYPEOF ( it ) ) ) | NOT ( SIZEOF ( QUERY ( eb <* ebwm\
      edge_based_wireframe_model.ebwm_boundary | NOT ( SIZEOF
      ( QUERY ( edges <* eb.ces_edges | NOT ( (
      'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT' IN TYPEOF ( edges.
      edge_start ) ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT'
      IN TYPEOF ( edges.edge_end ) ) ) ) ) =  0 ) ) ) =  0 ) )
      ) =  0;
  wr6: SIZEOF ( QUERY ( ebwm <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' IN
      TYPEOF ( it ) ) ) | NOT ( SIZEOF ( QUERY ( eb <* ebwm\
      edge_based_wireframe_model.ebwm_boundary | NOT ( SIZEOF
      ( QUERY ( edges <* eb.ces_edges | NOT (
      valid_wireframe_edge_curve ( edges\ edge_curve.
      edge_geometry ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
  wr7: SIZEOF ( QUERY ( ebwm <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'EDGE_BASED_WIREFRAME_MODEL' IN
      TYPEOF ( it ) ) ) | NOT ( SIZEOF ( QUERY ( eb <* ebwm\
      edge_based_wireframe_model.ebwm_boundary | NOT ( SIZEOF
      ( QUERY ( edges <* eb.ces_edges | NOT ( (
      valid_wireframe_vertex_point ( edges.edge_start\
      vertex_point.vertex_geometry ) ) AND (
      valid_wireframe_vertex_point ( edges.edge_end\
      vertex_point.vertex_geometry ) ) ) ) ) =  0 ) ) ) =  0 ) )
      ) =  0;
  wr8: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) )
      | NOT ( 'AUTOMOTIVE_DESIGN.' +
      'EDGE_BASED_WIREFRAME_SHAPE_REPRESENTATION' IN TYPEOF (
      mi\ mapped_item.mapping_source.mapped_representation ) )
      ) ) =  0;
  wr9:SELF.context_of_items\ geometric_representation_context.
      coordinate_space_dimension =  3;
END_ENTITY;  -- 10303-501: aic_edge_based_wireframe


 ENTITY edge_curve
  SUBTYPE OF (edge,geometric_representation_item);
  edge_geometry : curve;
  same_sense : BOOLEAN;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY edge_loop
  SUBTYPE OF (loop,path);
  DERIVE
   ne : INTEGER := SIZEOF(SELF\path.edge_list);
  WHERE
```

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```
 wr1: ( SELF\path.edge_list[1].edge_start ) :=: ( SELF\path.
     edge_list[ne].edge_end ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY edge_round
  SUBTYPE OF (transition_feature);
  WHERE
 wr1: ( SELF.description<> 'constant radius' ) XOR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1 ) ;
 wr2: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND  {1<=SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) =  1 ) ;
 wr3: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN  ['radius' ,
     'first offset' , 'second offset' ] ) ) ) >0 ) ) ) =  0 ) ;
 wr4: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'radius' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1 ) ;
 wr5: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'first offset' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <=1
     ) ) ) =  1 ) ;
 wr6: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
```

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```
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'second offset' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <=1
     ) ) ) =  1 ) ;
 wr7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'first face shape' ) ) ) = 1;
 wr8: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'second face shape' ) ) ) =
     1;
 wr9: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'edge round face' ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY effectivity
  SUPERTYPE OF (ONEOF(serial_numbered_effectivity,dated_effectivity,
                lot_effectivity,time_interval_based_effectivity));
  id : identifier;
  DERIVE
   name : label := get_name_value(SELF);
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: effectivity_schema


 ENTITY effectivity_assignment
  ABSTRACT SUPERTYPE;
  assigned_effectivity : effectivity;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
```

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END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY effectivity_context_assignment
  ABSTRACT SUPERTYPE;
  assigned_effectivity_assignment : effectivity_assignment;
  role : effectivity_context_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY effectivity_context_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY effectivity_relationship;
  name : label;
  description : OPTIONAL text;
  related_effectivity : effectivity;
  relating_effectivity : effectivity;
 END_ENTITY;  -- 10303-41: effectivity_schema


 ENTITY electric_current_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'ELECTRIC_CURRENT_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY electric_current_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  1.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY element_delivery
  SUBTYPE OF (action);
```

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```
  WHERE
 wr1: ( SIZEOF ( QUERY ( aa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ACTION_ASSIGNMENT.ASSIGNED_ACTION' ) |
     'AUTOMOTIVE_DESIGN.' + 'APPLIED_ACTION_ASSIGNMENT' IN
     TYPEOF ( aa ) ) ) =  1 ) AND ( SIZEOF ( QUERY ( aaa <*
     USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' + 'ACTION_ASSIGNMENT.'
     + 'ASSIGNED_ACTION' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( aaa ) ) AND (
     aaa.role.name =  'deliverable element' ) AND ( SIZEOF (
     aaa.items ) =  1 ) AND ( SIZEOF ( QUERY ( i <* aaa.
     items | ( 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( i ) ) AND (
     SIZEOF ( i\ applied_action_assignment.items ) =  1 ) AND
     ( SIZEOF ( QUERY ( i1 <* aaa\ applied_action_assignment.
     items | ( 'AUTOMOTIVE_DESIGN.' + 'CONFIGURATION_ITEM' IN
     TYPEOF ( i1 ) ) OR ( ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_DEFINITION' IN TYPEOF ( i1 ) ) AND (
     i1\product_definition.frame_of_reference.name =
     'physical occurrence' ) ) OR ( ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_DEFINITION_FORMATION' IN TYPEOF ( i1 ) ) AND (
     SIZEOF ( QUERY ( prpc <* USEDIN ( i1 ,
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_RELATED_PRODUCT_CATEGORY.'
     + 'PRODUCTS' ) | prpc\ product_category.name IN  ['part' ,
     'raw material' , 'tool'] ) ) =  1 ) ) ) =  1 ) ) ) =  1 )
     ) ) =  1 ) ;
 wr2: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_ORGANIZATION_ASSIGNMENT.' + 'ITEMS' ) ) =  1 )
     AND ( SIZEOF ( QUERY ( aoa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'APPLIED_ORGANIZATION_ASSIGNMENT.' +
     'ITEMS' ) | aoa.role.name =  'destination' ) ) =  1 ) ;
 wr3: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_PROPERTY.' + 'DEFINITION' ) ) =  1 ) AND ( SIZEOF
     ( QUERY ( ap <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_PROPERTY.' + 'DEFINITION' ) | SIZEOF ( USEDIN ( ap
     , 'AUTOMOTIVE_DESIGN.' + 'ACTION_PROPERTY_REPRESENTATION.'
     + 'PROPERTY' ) ) =  1 ) ) =  1 ) AND ( SIZEOF ( QUERY (
     ap <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_PROPERTY.' + 'DEFINITION' ) | SIZEOF ( QUERY (
     apr <* USEDIN ( ap , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_PROPERTY_REPRESENTATION.' + 'PROPERTY' ) | ( apr.
     representation.name =  'delivery quantity' ) AND (
     SIZEOF ( apr.representation.items ) =  1 ) AND (
     SIZEOF ( QUERY ( i <* apr.representation.items |
     SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'VALUE_RANGE']* TYPEOF ( i ) ) =  1 ) ) =  1 ) ) ) =  1 )
     ) =  1 ) ;
 wr4: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATING_ACTION' ) ) + SIZEOF (
     USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATED_ACTION' ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design
```

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```
ENTITY elementary_surface
 SUPERTYPE OF (ONEOF(plane,cylindrical_surface,conical_surface,
               spherical_surface,toroidal_surface))
 SUBTYPE OF (surface);
 position : axis2_placement_3d;
END_ENTITY;  -- 10303-42: geometry_schema


ENTITY ellipse
 SUBTYPE OF (conic);
 semi_axis_1 : positive_length_measure;
 semi_axis_2 : positive_length_measure;
END_ENTITY;  -- 10303-42: geometry_schema


ENTITY environment;
 syntactic_representation : generic_variable;
 semantics : variable_semantics;
END_ENTITY;  -- 13584-20: generic_expressions_schema


ENTITY equals_expression
 SUBTYPE OF (binary_boolean_expression);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY evaluated_degenerate_pcurve
 SUBTYPE OF (degenerate_pcurve);
 equivalent_point : cartesian_point;
END_ENTITY;  -- 10303-42: geometry_schema


ENTITY event_occurrence;
 id : identifier;
 name : label;
 description : OPTIONAL text;
END_ENTITY;  -- 10303-41: date_time_schema


ENTITY event_occurrence_assignment
 ABSTRACT SUPERTYPE;
 assigned_event_occurrence : event_occurrence;
 role : event_occurrence_role;
END_ENTITY;  -- 10303-41: management_resources_schema


ENTITY event_occurrence_context_assignment
```

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```
 ABSTRACT SUPERTYPE;
 assigned_event_occurrence_assignment : event_occurrence_assignment;
 role : event_occurrence_context_role;
END_ENTITY;  -- 10303-41: management_resources_schema


ENTITY event_occurrence_context_role;
 name : label;
 description : OPTIONAL text;
END_ENTITY;  -- 10303-41: date_time_schema


ENTITY event_occurrence_role;
 name : label;
 description : OPTIONAL text;
END_ENTITY;  -- 10303-41: date_time_schema


ENTITY exclusive_product_concept_feature_category
 SUBTYPE OF (product_concept_feature_category);
END_ENTITY;  -- 10303-214: automotive_design


ENTITY executed_action
 SUBTYPE OF (action);
END_ENTITY;  -- 10303-41: action_schema


ENTITY exp_function
 SUBTYPE OF (unary_function_call);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY expression
 ABSTRACT SUPERTYPE OF (ONEOF(numeric_expression,boolean_expression,
                        string_expression))
 SUBTYPE OF (generic_expression);
END_ENTITY;  -- 13584-20: expressions_schema


ENTITY expression_conversion_based_unit
 SUBTYPE OF (context_dependent_unit,variable_semantics);
 INVERSE
  associated_variable_environment : environment FOR semantics;
END_ENTITY;  -- 10303-214: automotive_design


ENTITY extension
 SUBTYPE OF (derived_shape_aspect);
```

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```
  WHERE
 wr1: SIZEOF ( SELF\derived_shape_aspect.
     deriving_relationships ) =  1;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY external_identification_assignment
  ABSTRACT SUPERTYPE
  SUBTYPE OF (identification_assignment);
  source : external_source;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY external_source;
  source_id : source_item;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.'+
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: external_reference_schema


 ENTITY externally_defined_character_glyph
  SUBTYPE OF (externally_defined_item);
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY externally_defined_class
  SUBTYPE OF (class,externally_defined_item);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY externally_defined_curve_font
  SUBTYPE OF (externally_defined_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY externally_defined_feature_definition
  SUBTYPE OF (feature_definition,externally_defined_item);
  WHERE
 wr1: ( SELF\externally_defined_item.item_id =
     'external thread' ) AND ( SELF\externally_defined_item.
     source.source_id =  'external feature specification' ) ;
 wr2: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_CLASSIFICATION_ASSIGNMENT.ITEMS'
     ) ) =  1 ) OR ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_DOCUMENT_REFERENCE.ITEMS' ) ) +
     SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.APPLIED_DOCUMENT_USAGE_CONSTRAINT_ASSIGNMENT.ITEMS'
```

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```
    ) ) =  1 ) ;
wr3: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND NOT ( {6<=SIZEOF ( pdr.
    used_representation.items ) <=7} ) ) ) =  0;
wr4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
    ( i.name =  'thread side' ) AND ( i\
    descriptive_representation_item.description IN
    ['internal' , 'external'] ) ) ) =  1 ) ) ) =  1;
wr5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
    ( i ) ) =  2 ) AND ( i.name =  'major diameter' ) ) ) =
    1 ) ) ) =  1;
wr6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'RATIO_MEASURE_WITH_UNIT']* TYPEOF
    ( i ) ) =  2 ) AND ( i.name =  'number of threads' ) ) )
    =  1 ) ) ) =  1;
wr7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
    ( i.name =  'fit class' ) ) ) =  1 ) ) ) =  1;
wr8: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
```

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    ( i.name =  'form' ) ) ) =  1 ) ) ) =  1;
 wr9: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
    ( i.name =  'hand' ) AND ( i\
    descriptive_representation_item.description IN  [
    'left hand' , 'right hand' ] ) ) ) =  1 ) ) ) =  1;
 wr10: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
    ( i.name =  'qualifier' ) ) ) =  1 ) ) ) <=1;
 wr11: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( NOT ( i.name IN  [
    'thread side' , 'major diameter' , 'number of threads' ,
    'fit class' , 'form' , 'hand' , 'qualifier'] ) ) ) ) >0 ) )
    ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY externally_defined_general_property
  SUBTYPE OF (general_property,externally_defined_item);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY externally_defined_hatch_style
  SUBTYPE OF (externally_defined_item,geometric_representation_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY externally_defined_item;
  item_id : source_item;
  source : external_source;
 END_ENTITY;  -- 10303-41: external_reference_schema


 ENTITY externally_defined_item_relationship;
  name : label;
  description : OPTIONAL text;
  relating_item : externally_defined_item;
```

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```
  related_item : externally_defined_item;
 END_ENTITY;  -- 10303-41: external_reference_schema


 ENTITY externally_defined_style
  SUBTYPE OF (externally_defined_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY externally_defined_symbol
  SUBTYPE OF (externally_defined_item);
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY externally_defined_text_font
  SUBTYPE OF (externally_defined_item);
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY externally_defined_tile_style
  SUBTYPE OF (externally_defined_item,geometric_representation_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY extruded_face_solid
  SUBTYPE OF (swept_face_solid);
  extruded_direction : direction;
  depth : positive_length_measure;
  WHERE
 wr1:dot_product ( ( SELF\swept_face_solid.swept_face.
     face_geometry\ elementary_surface.position.p[3] ) ,
     extruded_direction ) <>0.0;
END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY face
  SUPERTYPE OF (ONEOF(face_surface,subface,oriented_face))
  SUBTYPE OF (topological_representation_item);
  bounds : SET[1:?] OF face_bound;
  WHERE
 wr1: NOT ( mixed_loop_type_set ( list_to_set ( list_face_loops
     ( SELF ) ) ) ) ;
 wr2: SIZEOF ( QUERY ( temp <* bounds | 'AUTOMOTIVE_DESIGN.'+
     'FACE_OUTER_BOUND' IN TYPEOF ( temp ) ) ) <=1;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY face_based_surface_model
  SUBTYPE OF (geometric_representation_item);
```

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```
  fbsm_faces : SET[1:?] OF connected_face_set;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY face_bound
  SUBTYPE OF (topological_representation_item);
  bound : loop;
  orientation : BOOLEAN;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY face_outer_bound
  SUBTYPE OF (face_bound);
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY face_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( SELF.items ) =  1;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'FACE' , 'AUTOMOTIVE_DESIGN.' +
     'CLOSED_SHELL' , 'AUTOMOTIVE_DESIGN.' + 'OPEN_SHELL']*
     TYPEOF ( i ) ) =  1 ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY face_surface
  SUBTYPE OF (face,geometric_representation_item);
  face_geometry : surface;
  same_sense : BOOLEAN;
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_SURFACE' IN
     TYPEOF ( face_geometry ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY faceted_brep
  SUBTYPE OF (manifold_solid_brep);
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY faceted_brep_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* items | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( it <* items | SIZEOF (
```

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```
     ['AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
     ) ) >0;
 wr3: SIZEOF ( QUERY ( fbrep <* QUERY ( it <* items |
     'AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP' IN TYPEOF ( it ) ) |
     NOT ( SIZEOF ( QUERY ( csh <* msb_shells ( fbrep ) |
     NOT ( SIZEOF ( QUERY ( fcs <* csh\ connected_face_set.
     cfs_faces | NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'FACE_SURFACE'
     IN TYPEOF ( fcs ) ) AND ( ( 'AUTOMOTIVE_DESIGN.'+
     'PLANE' IN TYPEOF ( fcs\ face_surface.face_geometry ) )
     AND ( 'AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' IN TYPEOF
     ( fcs\ face_surface.face_geometry\ elementary_surface.
     position.location ) ) ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( fbrep <* QUERY ( it <* items |
     'AUTOMOTIVE_DESIGN.'+ 'FACETED_BREP' IN TYPEOF ( it ) ) |
     NOT ( SIZEOF ( QUERY ( csh <* msb_shells ( fbrep ) |
     NOT ( SIZEOF ( QUERY ( fcs <* csh\ connected_face_set.
     cfs_faces | NOT ( SIZEOF ( QUERY ( bnds <* fcs.bounds |
     'AUTOMOTIVE_DESIGN.'+ 'FACE_OUTER_BOUND' IN TYPEOF ( bnds
     ) ) ) =  1 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( msb <* QUERY ( it <* items |
     'AUTOMOTIVE_DESIGN.'+ 'MANIFOLD_SOLID_BREP' IN TYPEOF (
     it ) ) | 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_CLOSED_SHELL' IN
     TYPEOF ( msb\ manifold_solid_brep.outer ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( brv <* QUERY ( it <* items |
     'AUTOMOTIVE_DESIGN.'+ 'BREP_WITH_VOIDS' IN TYPEOF ( it )
     ) | NOT ( SIZEOF ( QUERY ( csh <* brv\ brep_with_voids.
     voids | csh\ oriented_closed_shell.orientation ) ) =  0 )
     ) ) =  0;
 wr7: SIZEOF ( QUERY ( mi <* QUERY ( it <* items |
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( 'AUTOMOTIVE_DESIGN.'+
     'FACETED_BREP_SHAPE_REPRESENTATION' IN TYPEOF ( mi\
     mapped_item.mapping_source.mapped_representation ) ) ) )
     =  0;
END_ENTITY;  -- 10303-512: aic_faceted_brep


 ENTITY feature_component_definition
  SUBTYPE OF (characterized_object);
  WHERE
 wr1: SIZEOF ( get_shape_aspects ( SELF ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY feature_component_relationship
  SUBTYPE OF (shape_aspect_relationship);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.' + 'TRANSITION_FEATURE' IN TYPEOF
     ( SELF.related_shape_aspect ) ) OR ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'FEATURE_DEFINITION' ,
     'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION']*
```

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```
    TYPEOF ( SELF.related_shape_aspect.of_shape.definition )
    ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY feature_definition
  SUBTYPE OF (characterized_object);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) <=1;
 wr2: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) =  0 ) OR ( SIZEOF ( QUERY (
    pdr <* get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name = 'orientation' )
    AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
    ) ) ) <=1 ) ) ) =  1 ) ;
 wr3: NOT ( ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'BARRING_HOLE'
    , 'AUTOMOTIVE_DESIGN.' + 'BEAD', 'AUTOMOTIVE_DESIGN.' +
    'HOLE_IN_PANEL' , 'AUTOMOTIVE_DESIGN.' + 'FEATURE_IN_PANEL'
    , 'AUTOMOTIVE_DESIGN.' + 'JOGGLE' , 'AUTOMOTIVE_DESIGN.' +
    'LOCATOR']* TYPEOF ( SELF ) ) =  1 ) OR (
    'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE' IN TYPEOF (
    SELF ) ) AND ( SIZEOF ( QUERY ( sa <* get_shape_aspects
    ( SELF ) | ( sa.name =  'compound feature in panel' ) ) )
    =  1 ) ) OR ( ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) ) <=1 ) AND ( (
    SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) ) =  0 ) OR (
    SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) AND ( pdr.
    used_representation.name =  'punch direction' ) ) ) =  1 )
    ) ) ;
 wr4: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) =  0 ) OR ( SIZEOF ( QUERY (
```

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      pdr <* get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( 'AUTOMOTIVE_DESIGN.' +
      'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF ( pdr.
      used_representation.context_of_items ) ) AND ( pdr.
      used_representation.context_of_items\
      geometric_representation_context.
      coordinate_space_dimension =  3 ) ) ) =  1 ) ;
  wr5: NOT ( ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'BOSS' ,
      'AUTOMOTIVE_DESIGN.' + 'RIB' , 'AUTOMOTIVE_DESIGN.' +
      'SLOT' , 'AUTOMOTIVE_DESIGN.' + 'ROUND_HOLE' ,
      'AUTOMOTIVE_DESIGN.' + 'POCKET']* TYPEOF ( SELF ) ) =  1 )
      OR ( 'AUTOMOTIVE_DESIGN.' + 'COMPOUND_FEATURE' IN TYPEOF
      ( SELF ) ) AND ( SIZEOF ( QUERY ( sa <*
      get_shape_aspects ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) AND ( sa.
      name =  'compound feature in solid' ) ) ) =  1 ) ) OR ( (
      SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) |
      'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr.used_representation ) ) ) =  1 ) AND (
      SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr.used_representation ) ) AND ( SIZEOF (
      QUERY ( i <* pdr.used_representation.items | ( i.name
      =  'orientation' ) AND ( 'AUTOMOTIVE_DESIGN.' +
      'PLACEMENT' IN TYPEOF ( i ) ) ) =  1 ) ) ) =  1 ) ) ;
  wr6: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'BEAD' ,
      'AUTOMOTIVE_DESIGN.' + 'BARRING_HOLE' ,
      'AUTOMOTIVE_DESIGN.' + 'BOSS' , 'AUTOMOTIVE_DESIGN.' +
      'COMPOUND_FEATURE' , 'AUTOMOTIVE_DESIGN.' +
      'EXTERNALLY_DEFINED_FEATURE_DEFINITION' ,
      'AUTOMOTIVE_DESIGN.' + 'FEATURE_IN_PANEL' ,
      'AUTOMOTIVE_DESIGN.' + 'GENERAL_FEATURE' ,
      'AUTOMOTIVE_DESIGN.' + 'HOLE_IN_PANEL' ,
      'AUTOMOTIVE_DESIGN.' + 'JOGGLE' , 'AUTOMOTIVE_DESIGN.' +
      'LOCATOR' , 'AUTOMOTIVE_DESIGN.' + 'POCKET' ,
      'AUTOMOTIVE_DESIGN.' + 'RIB' , 'AUTOMOTIVE_DESIGN.' +
      'REPLICATE_FEATURE' , 'AUTOMOTIVE_DESIGN.' + 'ROUND_HOLE' ,
      'AUTOMOTIVE_DESIGN.' + 'SLOT' , 'AUTOMOTIVE_DESIGN.' +
      'THREAD']* TYPEOF ( SELF ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY feature_in_panel
  SUBTYPE OF (feature_definition);
  WHERE
 wr1:SELF.description IN  ['pocket' , 'boss' , 'stairstep'];
 wr2: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
```

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```
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND NOT ( {2<=SIZEOF ( pdr.
    used_representation.items ) <=3} ) ) ) =  0;
wr3: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
    ['orientation' , 'base radius' , 'target radius' ] ) ) ) >0
    ) ) ) =  0;
wr4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'base radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
wr5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'target radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
wr6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'base boundary' ) AND ( sa.description IN  [
    'directed angle occurrence' , 'closed profile occurrence' ]
    ) ) ) =  1;
wr7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'target boundary' ) AND ( sa.description IN
    [ 'directed angle occurrence' , 'closed profile occurrence'
    ] ) ) ) =  1;
wr8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'directed angle occurrence' ) ) ) <=1;
wr9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'directed angle occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.name =  'directed angle usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'DIRECTED_ANGLE' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  SIZEOF (
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
```

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    description =  'directed angle occurrence' ) ) ) ;
 wr10: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'closed profile occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.description =  'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'CIRCULAR_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'NGON_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_CLOSED_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'CLOSED_PATH_PROFILE']* TYPEOF (
    sar.relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =
    SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description =  'closed profile occurrence' ) ) ) ;
 wr11: ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) |
    'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) ) <=1 ) AND (
    SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) AND NOT ( pdr.
    used_representation.name =  'target face' ) ) ) =  0 ) ;
 wr12: ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'target boundary' ) AND ( sa.description =
    'directed angle occurrence' ) ) ) =  0 ) OR ( SIZEOF (
    QUERY ( pdr <* get_property_definition_representations (
    SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY feature_pattern
  SUBTYPE OF (replicate_feature);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'added instance placement' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'PLACEMENT' IN TYPEOF ( i ) ) ) ) >1 ) ) ) =  1;
 wr2: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( 'AUTOMOTIVE_DESIGN.' +
    'PLACEMENT' IN TYPEOF ( i ) ) ) ) >0 ) ) ) =  0;
```

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END_ENTITY;  -- 10303-214: automotive_design


 ENTITY featured_shape
  SUBTYPE OF (product_definition_shape);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.definition ) ;
 wr2: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_RELATIONSHIP.' +
     'RELATED_PROPERTY_DEFINITION' ) ) =  1 ) AND ( SIZEOF (
     QUERY ( pdr <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_RELATIONSHIP.' +
     'RELATED_PROPERTY_DEFINITION' ) | ( pdr.name =
     'featured shape sequence' ) AND ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_DEFINITION_SHAPE' IN TYPEOF ( pdr.
     relating_property_definition ) ) AND ( pdr.
     relating_property_definition:<>:SELF ) ) ) =  1 );
 wr3: SIZEOF ( QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PROPERTY_DEFINITION_RELATIONSHIP.'
     + 'RELATED_PROPERTY_DEFINITION' ) | SELF.definition:=:pdr.
     relating_property_definition.definition ) ) =  1;
 wr4: SIZEOF ( QUERY ( sa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT' + 'OF_SHAPE' ) |
     SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'PLACED_FEATURE' ,
     'AUTOMOTIVE_DESIGN.' + 'INSTANCED_FEATURE']* TYPEOF ( sa )
     ) =  1 ) ) >=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY fill_area_style;
  name : label;
  fill_styles : SET[1:?] OF fill_style_select;
  WHERE
 wr1: SIZEOF ( QUERY ( fill_style <* SELF.fill_styles |
     'AUTOMOTIVE_DESIGN.' + 'FILL_AREA_STYLE_COLOUR' IN TYPEOF
     ( fill_style ) ) ) <=1;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY fill_area_style_colour;
  name : label;
  fill_colour : colour;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY fill_area_style_hatching
  SUBTYPE OF (geometric_representation_item);
  hatch_line_appearance : curve_style;
  start_of_next_hatch_line : one_direction_repeat_factor;
  point_of_reference_hatch_line : cartesian_point;
```

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 pattern_start : cartesian_point;
 hatch_line_angle : plane_angle_measure;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY fill_area_style_tile_symbol_with_style
 SUBTYPE OF (geometric_representation_item);
 symbol : annotation_symbol_occurrence;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY fill_area_style_tiles
 SUBTYPE OF (geometric_representation_item);
 tiling_pattern : two_direction_repeat_factor;
 tiles : SET[1:?] OF fill_area_style_tile_shape_select;
 tiling_scale : positive_ratio_measure;
END_ENTITY;  -- 10303-46: presentation_appearance_schema


ENTITY fillet
 SUBTYPE OF (transition_feature);
 WHERE
wr1: ( SELF.description<> 'constant radius' ) XOR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) ;
wr2: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {1<=SIZEOF ( pdr.
    used_representation.items ) <=3} ) ) =  1 ) ;
wr3: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN  ['radius' ,
    'first offset' , 'second offset' ] ) ) ) >0 ) ) ) =  0 ) ;
wr4: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
```

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     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1 ) ;
 wr5: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'first offset' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <=1
     ) ) ) =  1 ) ;
 wr6: ( SELF.description<> 'constant radius' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'second offset' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <=1
     ) ) ) =  1 ) ;
 wr7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( SIZEOF (
     QUERY ( i <* pdr.used_representation.items | ( i.name
     =  'first face shape' ) ) ) =  1 ) ) ) =  1;
 wr8: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( SIZEOF (
     QUERY ( i <* pdr.used_representation.items | ( i.name
     =  'second face shape' ) ) ) =  1 ) ) ) =  1;
 wr9: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( SIZEOF (
     QUERY ( i <* pdr.used_representation.items | ( i.name
     =  'fillet face' ) ) ) =  1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY flatness_tolerance
  SUBTYPE OF (geometric_tolerance);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_TOLERANCE_WITH_DATUM_REFERENCE' IN TYPEOF (
     SELF ) ) ;
```

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END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY format_function
  SUBTYPE OF (string_expression,binary_generic_expression);
  DERIVE
   value_to_format : generic_expression := SELF\binary_generic_expression.
                     operands[1];
   format_string : generic_expression := SELF\binary_generic_expression.
                   operands[2];
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'NUMERIC_EXPRESSION' ) IN
     TYPEOF ( value_to_format ) ) AND ( (
     'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' ) IN TYPEOF (
     format_string ) ) ;
END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY founded_item;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY founded_kinematic_path
  SUBTYPE OF (representation);
  SELF\representation.items : SET[1:?] OF kinematic_path;
  SELF\representation.context_of_items : geometric_representation_context;
  DERIVE
   paths : SET[1:?] OF kinematic_path := SELF\representation.items;
   founding : geometric_representation_context := SELF\representation.
              context_of_items;
 END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY fully_constrained_pair
  SUBTYPE OF (kinematic_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY functionally_defined_transformation;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY gear_pair
  SUBTYPE OF (kinematic_pair);
  radius_first_link : length_measure;
  radius_second_link : length_measure;
  bevel : plane_angle_measure;
  helical_angle : plane_angle_measure;
```

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  gear_ratio : REAL;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY gear_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : gear_pair;
  lower_limit_actual_rotation_1 : rotational_range_measure;
  upper_limit_actual_rotation_1 : rotational_range_measure;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_rotation_1 ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     upper_limit_actual_rotation_1 ) ) ) XOR (
     lower_limit_actual_rotation_1<upper_limit_actual_rotation_1
     ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY gear_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : gear_pair;
  actual_rotation_1 : plane_angle_measure;
  DERIVE
   actual_rotation_2 : plane_angle_measure := - actual_rotation_1 * SELF\
                       pair_value.applies_to_pair\gear_pair.gear_ratio;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY general_feature
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: ( SIZEOF ( get_property_definition_representations ( SELF
     ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) |
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1 ) ;
 wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
     description =  'course of travel occurrence' ) ) =  SIZEOF
     ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description =  'course of travel occurrence' ) AND (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
     sar.name =  'course of travel' ) ) ) =  1 ) ) ) ;
 wr3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
     description =  'course of travel occurrence' ) ) =  SIZEOF
     ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
     description =  'course of travel occurrence' ) AND (
```

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```
      SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
      'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
      ( sar.relating_shape_aspect ) ) ) ) =  1 ) ) ) ;
 wr4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | sa.
      description =  'boundary occurrence' ) ) =  SIZEOF (
      QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
      description =  'boundary occurrence' ) AND ( SIZEOF (
      QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
      TYPEOF ( sar ) ) AND ( sar.description =
      'profile usage' ) ) ) =  1 ) ) ) ;
 wr5: ( SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' + 'COMPOSITE_SHAPE_ASPECT' IN TYPEOF
      ( sa ) ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( sa <*
      get_shape_aspects ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'COMPOSITE_SHAPE_ASPECT' IN TYPEOF ( sa ) ) AND ( sa.
      name =  'general compound feature' ) AND ( SIZEOF (
      QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATING_SHAPE_ASPECT' ) |
      ( 'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP'
      IN TYPEOF ( sar ) ) AND ( 'AUTOMOTIVE_DESIGN.' +
      'INSTANCED_FEATURE' IN TYPEOF ( sar.related_shape_aspect
      ) ) ) ) >=2 ) ) ) <=1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY general_material_property
  SUBTYPE OF (general_property);
  WHERE
 wr1: SIZEOF ( QUERY ( gpa <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.GENERAL_PROPERTY_ASSOCIATION.' +
      'BASE_DEFINITION' ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
      'MATERIAL_PROPERTY' IN TYPEOF ( gpa.derived_definition )
      ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY general_property;
  id : identifier;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: product_property_definition_schema


 ENTITY general_property_association;
  name : label;
  description : OPTIONAL text;
```

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  base_definition : general_property;
  derived_definition : derived_property_select;
  WHERE
 wr1: SIZEOF ( USEDIN ( derived_definition ,
     'AUTOMOTIVE_DESIGN.' + 'GENERAL_PROPERTY_ASSOCIATION.' +
     'DERIVED_DEFINITION' ) ) =  1;
 wr2:derived_definition.name =  base_definition.name;
END_ENTITY;  -- 10303-41: product_property_definition_schema


 ENTITY general_property_relationship;
  name : label;
  description : OPTIONAL text;
  relating_property : general_property;
  related_property : general_property;
 END_ENTITY;  -- 10303-41: product_property_definition_schema


 ENTITY generic_expression
  ABSTRACT SUPERTYPE OF (ONEOF(simple_generic_expression,
                         unary_generic_expression,
                         binary_generic_expression,
                         multiple_arity_generic_expression));
  WHERE
 wr1:is_acyclic ( SELF ) ;
END_ENTITY;  -- 13584-20: generic_expressions_schema


 ENTITY generic_literal
  ABSTRACT SUPERTYPE
  SUBTYPE OF (simple_generic_expression);
 END_ENTITY;  -- 13584-20: generic_expressions_schema


 ENTITY generic_variable
  ABSTRACT SUPERTYPE
  SUBTYPE OF (simple_generic_expression);
  INVERSE
   interpretation : environment FOR syntactic_representation;
 END_ENTITY;  -- 13584-20: generic_expressions_schema


 ENTITY geometric_alignment
  SUBTYPE OF (derived_shape_aspect);
  WHERE
 wr1: SIZEOF ( SELF\derived_shape_aspect.
     deriving_relationships ) >1;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema
```

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```
 ENTITY geometric_curve_set
  SUBTYPE OF (geometric_set);
  WHERE
 wr1: SIZEOF ( QUERY ( temp <* SELF\geometric_set.elements |
     'AUTOMOTIVE_DESIGN.'+ 'SURFACE' IN TYPEOF ( temp ) ) ) =
     0;
END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY geometric_intersection
  SUBTYPE OF (derived_shape_aspect);
  WHERE
 wr1: SIZEOF ( SELF\derived_shape_aspect.
     deriving_relationships ) >1;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY geometric_representation_context
  SUBTYPE OF (representation_context);
  coordinate_space_dimension : dimension_count;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY geometric_representation_item
  SUPERTYPE OF (ONEOF(point,direction,vector,placement,
                cartesian_transformation_operator,curve,surface,
                edge_curve,face_surface,poly_loop,vertex_point,
                solid_model,boolean_result,sphere,
                right_circular_cone,right_circular_cylinder,torus,
                block,right_angular_wedge,half_space_solid,
                shell_based_surface_model,
                face_based_surface_model,edge_based_wireframe_model,
                geometric_set))
  SUBTYPE OF (representation_item);
  DERIVE
   dim : dimension_count := dimension_of(SELF);
  WHERE
 wr1: SIZEOF ( QUERY ( using_rep <* using_representations (
     SELF ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_REPRESENTATION_CONTEXT' IN TYPEOF ( using_rep.
     context_of_items ) ) ) ) =  0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY geometric_set
  SUPERTYPE OF (geometric_curve_set)
  SUBTYPE OF (geometric_representation_item);
  elements : SET[1:?] OF geometric_set_select;
 END_ENTITY;  -- 10303-42: geometric_model_schema
```

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```
 ENTITY geometric_tolerance;
  name : label;
  description : text;
  magnitude : measure_with_unit;
  toleranced_shape_aspect : shape_aspect;
  WHERE
 wr1: ( 'NUMBER' IN TYPEOF ( magnitude\ measure_with_unit.
     value_component ) ) AND ( magnitude\ measure_with_unit.
     value_component>=0.0 ) ;
END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY geometric_tolerance_relationship;
  name : label;
  description : text;
  relating_geometric_tolerance : geometric_tolerance;
  related_geometric_tolerance : geometric_tolerance;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY geometric_tolerance_with_datum_reference
  SUBTYPE OF (geometric_tolerance);
  datum_system : SET[1:?] OF datum_reference;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY geometric_tolerance_with_defined_unit
  SUBTYPE OF (geometric_tolerance);
  unit_size : measure_with_unit;
  WHERE
 wr1: ( 'NUMBER' IN TYPEOF ( unit_size\ measure_with_unit.
     value_component ) ) AND ( unit_size\ measure_with_unit.
     value_component>0.0 ) ;
END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY geometrical_tolerance_callout
  SUBTYPE OF (draughting_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY geometrically_bounded_2d_wireframe_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1:SELF.context_of_items\ geometric_representation_context.
     coordinate_space_dimension =  2;
 wr2: SIZEOF ( QUERY ( item <* SELF.items | NOT ( SIZEOF (
     TYPEOF ( item ) *['AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_CURVE_SET' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_2D' , 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']
```

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```
    ) =  1 ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( item <* SELF.items | SIZEOF ( TYPEOF
    ( item ) *['AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' ,
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM'] ) =  1 ) ) >=1;
 wr4: SIZEOF ( QUERY ( mi <* QUERY ( item <* SELF.items | (
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( item ) )
    ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
    'GEOMETRICALLY_BOUNDED_2D_WIREFRAME_REPRESENTATION' IN
    TYPEOF ( mi\ mapped_item.mapping_source.
    mapped_representation ) ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( gcs <* QUERY ( item <* SELF.items | (
    'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
    item ) ) ) | NOT ( SIZEOF ( QUERY ( elem <* gcs\
    geometric_set.elements | NOT ( SIZEOF ( TYPEOF ( elem )
    *['AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE' ,
    'AUTOMOTIVE_DESIGN.'+ 'CIRCLE' , 'AUTOMOTIVE_DESIGN.'+
    'COMPOSITE_CURVE' , 'AUTOMOTIVE_DESIGN.'+ 'ELLIPSE' ,
    'AUTOMOTIVE_DESIGN.'+ 'OFFSET_CURVE_2D' ,
    'AUTOMOTIVE_DESIGN.'+ 'POINT' , 'AUTOMOTIVE_DESIGN.'+
    'POLYLINE' , 'AUTOMOTIVE_DESIGN.'+ 'TRIMMED_CURVE'] ) =  1
    ) ) ) =  0 ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( gcs <* QUERY ( item <* SELF.items | (
    'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
    item ) ) ) | NOT ( SIZEOF ( QUERY ( crv <* QUERY ( elem
    <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
    'CURVE' IN TYPEOF ( elem ) ) ) | NOT (
    valid_basis_curve_in_2d_wireframe ( crv ) ) ) ) =  0 ) ) )
    =  0;
 wr7: SIZEOF ( QUERY ( gcs <* QUERY ( item <* SELF.items | (
    'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
    item ) ) ) | NOT ( SIZEOF ( QUERY ( pnt <* QUERY ( elem
    <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
    'POINT' IN TYPEOF ( elem ) ) ) | NOT ( SIZEOF ( TYPEOF
    ( pnt ) *['AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' ,
    'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_CURVE'] ) =  1 ) ) ) =  0 )
    ) ) =  0;
 wr8: SIZEOF ( QUERY ( gcs <* QUERY ( item <* SELF.items | (
    'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
    item ) ) ) | NOT ( SIZEOF ( QUERY ( pl <* QUERY ( elem
    <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
    'POLYLINE' IN TYPEOF ( elem ) ) ) | NOT ( SIZEOF ( pl\
    polyline.points ) >2 ) ) ) =  0 ) ) ) =  0;
END_ENTITY;  -- 10303-503: aic_geometrically_bounded_2d_wireframe


 ENTITY geometrically_bounded_surface_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' ,
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
```

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 wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
     ) ) >0;
 wr3: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRICALLY_BOUNDED_SURFACE_SHAPE_REPRESENTATION' IN
     TYPEOF ( mi\ mapped_item.mapping_source.
     mapped_representation ) ) AND ( SIZEOF ( QUERY ( mr_it
     <* mi\ mapped_item.mapping_source.mapped_representation.
     items | ( 'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' IN TYPEOF
     ( mr_it ) ) ) ) >0 ) ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( gs <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' IN TYPEOF ( it ) )
     | NOT ( SIZEOF ( QUERY ( pnt <* QUERY ( gsel <* gs\
     geometric_set.elements | 'AUTOMOTIVE_DESIGN.'+ 'POINT' IN
     TYPEOF ( gsel ) ) | NOT ( gbsf_check_point ( pnt ) ) )
     =  0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( gs <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' IN TYPEOF ( it ) )
     | NOT ( SIZEOF ( QUERY ( cv <* QUERY ( gsel <* gs\
     geometric_set.elements | 'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN
     TYPEOF ( gsel ) ) | NOT ( gbsf_check_curve ( cv ) ) ) )
     =  0 ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( gs <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' IN TYPEOF ( it ) )
     | NOT ( SIZEOF ( QUERY ( sf <* QUERY ( gsel <* gs\
     geometric_set.elements | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE'
     IN TYPEOF ( gsel ) ) | NOT ( gbsf_check_surface ( sf ) )
     ) ) =  0 ) ) ) =  0;
 wr7: SIZEOF ( QUERY ( gs <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_SET' IN TYPEOF ( it ) )
     | SIZEOF ( QUERY ( gsel <* gs\ geometric_set.elements |
     'AUTOMOTIVE_DESIGN.'+ 'SURFACE' IN TYPEOF ( gsel ) ) ) >0
     ) ) >0;
END_ENTITY;  -- 10303-507: aic_geometrically_bounded_surface


 ENTITY geometrically_bounded_wireframe_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
     TYPEOF ( it ) *['AUTOMOTIVE_DESIGN.'+
     'GEOMETRIC_CURVE_SET' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D' , 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']
     ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF ( TYPEOF (
     it ) *['AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM'] ) =  1 ) ) >=1;
 wr3: SIZEOF ( QUERY ( gcs <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
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      it ) ) ) | NOT ( SIZEOF ( QUERY ( crv <* QUERY ( elem
      <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
      'CURVE' IN TYPEOF ( elem ) ) ) | NOT (
      valid_geometrically_bounded_wf_curve ( crv ) ) ) ) =  0 ) )
      ) =  0;
  wr4: SIZEOF ( QUERY ( gcs <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
      it ) ) ) | NOT ( SIZEOF ( QUERY ( pnts <* QUERY ( elem
      <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
      'POINT' IN TYPEOF ( elem ) ) ) | NOT (
      valid_geometrically_bounded_wf_point ( pnts ) ) ) ) =  0 )
      ) ) =  0;
  wr5: SIZEOF ( QUERY ( gcs <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
      it ) ) ) | NOT ( SIZEOF ( QUERY ( cnc <* QUERY ( elem
      <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
      'CONIC' IN TYPEOF ( elem ) ) ) | NOT (
      'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT_3D' IN TYPEOF (
      cnc\ conic.position ) ) ) ) =  0 ) ) ) =  0;
  wr6: SIZEOF ( QUERY ( gcs <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_CURVE_SET' IN TYPEOF (
      it ) ) ) | NOT ( SIZEOF ( QUERY ( pline <* QUERY ( elem
      <* gcs\ geometric_set.elements | ( 'AUTOMOTIVE_DESIGN.'+
      'POLYLINE' IN TYPEOF ( elem ) ) ) | NOT ( SIZEOF (
      pline\ polyline.points ) >2 ) ) ) =  0 ) ) ) =  0;
  wr7: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items | (
      'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) )
      | NOT ( 'AUTOMOTIVE_DESIGN.' +
      'GEOMETRICALLY_BOUNDED_WIREFRAME_SHAPE_REPRESENTATION' IN
      TYPEOF ( mi\ mapped_item.mapping_source.
      mapped_representation ) ) ) ) =  0;
END_ENTITY;  -- 10303-510: aic_geometrically_bounded_wireframe


 ENTITY global_uncertainty_assigned_context
  SUBTYPE OF (representation_context);
  uncertainty : SET[1:?] OF uncertainty_measure_with_unit;
 END_ENTITY; -- 10303-43: representation_schema


 ENTITY global_unit_assigned_context
  SUBTYPE OF (representation_context);
  units : SET[1:?] OF unit;
 END_ENTITY;  -- 10303-41: measure_schema


 ENTITY group;
  name : label;
  description : OPTIONAL text;
  DERIVE
   id : identifier := get_id_value(SELF);
```

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  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: group_schema


 ENTITY group_assignment
  ABSTRACT SUPERTYPE;
  assigned_group : group;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY group_relationship;
  name : label;
  description : OPTIONAL text;
  relating_group : group;
  related_group : group;
 END_ENTITY;  -- 10303-41: group_schema


 ENTITY half_space_solid
  SUBTYPE OF (geometric_representation_item);
  base_surface : surface;
  agreement_flag : BOOLEAN;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY hardness_representation
  SUBTYPE OF (representation);
  WHERE
 wr1: ( {2<=SIZEOF ( SELF.items ) <=4} ) AND ( SIZEOF ( QUERY
     ( i <* items | ( 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTIVE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND
     ( i.name IN  [ 'measuring method' , 'measuring position' ]
     ) ) ) + SIZEOF ( QUERY ( i <* items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'VALUE_RANGE']* TYPEOF ( i ) ) =  1
     ) AND ( i.name IN  ['depth' , 'hardness'] ) ) ) =
     SIZEOF ( SELF.items ) ) ;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | i.name =
     'measuring method' ) ) =  1;
 wr3: SIZEOF ( QUERY ( i <* SELF.items | i.name =  'hardness'
     ) ) =  1;
 wr4: SIZEOF ( QUERY ( i <* SELF.items | i.name =
     'measuring position' ) ) <=1;
 wr5: SIZEOF ( QUERY ( i <* SELF.items | i.name =  'depth' )
```

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     ) <=1;
 wr6: ( SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) ) =  1 ) AND ( SIZEOF ( QUERY (
     pdr <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.' +
     'USED_REPRESENTATION' ) | SIZEOF ( QUERY ( gpa <* USEDIN
     ( pdr.definition , 'AUTOMOTIVE_DESIGN.' +
     'GENERAL_PROPERTY_ASSOCIATION.' + 'DERIVED_DEFINITION' ) |
     ( 'AUTOMOTIVE_DESIGN.' + 'GENERAL_PROPERTY' IN TYPEOF (
     gpa.base_definition ) ) AND ( gpa.base_definition.name
     =  'surface_condition' ) ) ) =  1 ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY hidden_element_over_riding_styled_item
  SUBTYPE OF (context_dependent_over_riding_styled_item);
  WHERE
 wr1: SIZEOF ( SELF.style_context ) =  1;
 wr2:'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_VIEW' IN TYPEOF (
     SELF.style_context[1] ) ;
 wr3:'AUTOMOTIVE_DESIGN.' + 'CAMERA_IMAGE' IN TYPEOF (
     SELF.item ) ;
 wr4:'AUTOMOTIVE_DESIGN.' + 'CAMERA_MODEL_D3_WITH_HLHSR' IN
     TYPEOF ( SELF.item\ mapped_item.mapping_source.
     mapping_origin ) ;
 wr5: SIZEOF ( QUERY ( rep <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.REPRESENTATION.ITEMS' ) |
     'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_VIEW' IN TYPEOF (
     rep ) ) ) >0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY hole_bottom
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN  ['through' , 'flat' ,
     'flat with taper' , 'flat with radius' , 'spherical' ,
     'conical'];
 wr3: NOT ( SELF.description IN  ['through' , 'flat'] ) OR (
     SIZEOF (
     get_shape_aspect_property_definition_representations ( SELF
     ) ) =  0 ) ;
 wr4: NOT ( SELF.description IN  [ 'flat with radius' ,
     'flat with taper' , 'spherical' , 'conical'] ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1 ) ;
```

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wr5: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  2 ) ) ) =  1 ) ;
wr6: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {1<=SIZEOF ( pdr.
    used_representation.items ) <=2} ) ) =  1 ) ;
wr7: NOT ( SELF.description IN  [ 'flat with radius' ,
    'spherical'] ) OR ( SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  1 ) ) ) =  1 ) ;
wr8: ( SELF.description<> 'flat with radius' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'corner radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1 ) ;
wr9: ( SELF.description<>'spherical' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1 ) ;
wr10: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'tip radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) <=1
    ) ) ) =  1 ) ;
wr11: ( SELF.description<>'conical' ) OR ( SIZEOF ( QUERY (
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      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'tip angle' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
      ) =  1 ) ) ) =  1 ) ;
  wr12: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'final diameter'
      ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr13: ( SELF.description<> 'flat with taper' ) OR ( SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'taper diameter'
      ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
      ) =  1 ) ) ) =  1 ) ;
  wr14: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
      'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
      ( sar.description =  'hole bottom usage' ) AND ( sar.
      related_shape_aspect.description =
      'bottom condition occurrence' ) ) ) =  1;
  wr15: ( SELF.description =  'through' ) OR ( SIZEOF ( QUERY
      ( sar <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATING_SHAPE_ASPECT' ) |
      ( 'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP'
      IN TYPEOF ( sar ) ) AND ( sar.name IN  [
      'hole depth start' , 'hole depth end' ] ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY hole_in_panel
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
      sa.name =  'hole profile' ) AND ( sa.description =
```

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```
     'closed profile occurrence' ) AND ( SIZEOF ( QUERY ( sar
     <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.description =
     'profile usage' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'CIRCULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'NGON_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'RECTANGULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'CLOSED_PATH_PROFILE']* TYPEOF ( sar.
     relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =  1;
 wr2: SIZEOF ( get_property_definition_representations ( SELF )
     ) =  SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | SIZEOF
     ( pdr.used_representation.items ) =  1 ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY homokinetic_pair
  SUBTYPE OF (universal_pair);
  WHERE
 wr1: NOT EXISTS ( SELF.input_skew_angle ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY hyperbola
  SUBTYPE OF (conic);
  semi_axis : positive_length_measure;
  semi_imag_axis : positive_length_measure;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY id_attribute;
  attribute_value : identifier;
  identified_item : id_attribute_select;
 END_ENTITY;  -- 10303-41: basic_attribute_schema


 ENTITY identification_assignment
  ABSTRACT SUPERTYPE;
  assigned_id : identifier;
  role : identification_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY identification_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: management_resources_schema
```

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```
 ENTITY inclusion_product_concept_feature
  SUBTYPE OF (conditional_concept_feature);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'PACKAGE_PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( SELF ) ) ;
 wr2: SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.' +
     'RELATING_PRODUCT_CONCEPT_FEATURE' ) | 'AUTOMOTIVE_DESIGN.'
     + 'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF
     ( cfr ) ) ) + SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.' +
     'RELATED_PRODUCT_CONCEPT_FEATURE' ) | 'AUTOMOTIVE_DESIGN.'
     + 'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF
     ( cfr ) ) ) =  0;
 wr3:SELF.condition.conditional_operator.name =
     'implication';
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY index_expression
  SUBTYPE OF (string_expression,binary_generic_expression);
  DERIVE
   operand : generic_expression :=
             SELF\binary_generic_expression.operands[1];
   index : generic_expression :=
             SELF\binary_generic_expression.operands[2];
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     operand ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'NUMERIC_EXPRESSION' IN TYPEOF ( index ) ) ;
 wr2:is_int_expr ( index ) ;
END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY initial_state;
  applies_to_mechanism : mechanism;
  pair_values : SET[1:?] OF pair_value;
  WHERE
 wr1: SIZEOF ( QUERY ( joint <* applies_to_mechanism.
     structure_definition.joints | SIZEOF ( QUERY ( init_val
     <* pair_values | init_val.applies_to_pair.joint:=:joint )
     ) <>1 ) ) =  0;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY instanced_feature
  SUBTYPE OF (shape_aspect,feature_definition);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF (
     SELF.of_shape.definition ) ;
 wr2:SELF.product_definitional;
```

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```
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
     IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'maximum feature limit' ) ) )
     =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY int_literal
  SUBTYPE OF (literal_number);
  SELF\literal_number.the_value : INTEGER;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY int_numeric_variable
  SUBTYPE OF (numeric_variable);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY int_value_function
  SUBTYPE OF (value_function);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY interpolated_configuration_sequence;
  interpolation : SET[1:?] OF configuration_interpolation;
 END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY intersection_curve
  SUBTYPE OF (surface_curve);
  WHERE
 wr1: SIZEOF ( SELF\surface_curve.associated_geometry ) =  2;
 wr2:associated_surface ( SELF\surface_curve.
     associated_geometry[1] ) <>associated_surface (
     SELF\surface_curve.associated_geometry[2] ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY interval_expression
  SUBTYPE OF (boolean_expression,multiple_arity_generic_expression);
  DERIVE
   interval_low : generic_expression :=
         SELF\multiple_arity_generic_expression.operands[1];
   interval_item : generic_expression :=
         SELF\multiple_arity_generic_expression.operands[2];
   interval_high : generic_expression :=
         SELF\multiple_arity_generic_expression.operands[3];
  WHERE
```

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```
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'EXPRESSION' IN TYPEOF (
     interval_low ) ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'EXPRESSION'
     IN TYPEOF ( interval_item ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'EXPRESSION' IN TYPEOF (
     interval_high ) ) ;
 wr2: ( ( 'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF
     ( SELF.interval_low ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'STRING_EXPRESSION' IN TYPEOF ( SELF.interval_high ) )
     AND ( 'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN
     TYPEOF ( SELF.interval_item ) ) ) OR ( (
     'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     SELF.interval_low ) ) AND ( 'AUTOMOTIVE_DESIGN.'+
     'NUMERIC_EXPRESSION' IN TYPEOF ( SELF.interval_item ) )
     AND ( 'AUTOMOTIVE_DESIGN.'+ 'NUMERIC_EXPRESSION' IN
     TYPEOF ( SELF.interval_high ) ) ) ;
END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY invisibility;
  invisible_items : SET[1:?] OF invisible_item;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY item_defined_transformation;
  name : label;
  description : OPTIONAL text;
  transform_item_1 : representation_item;
  transform_item_2 : representation_item;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY joggle
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {5<=SIZEOF ( pdr.
     used_representation.items ) <=10} ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN
     ['orientation' , 'base radius 1' , 'base radius 2' ,
     'direction angle 1' , 'direction angle 2' , 'height' ,
     'slope angle 1' , 'slope angle 2' , 'top radius 1' ,
     'top radius 2' ] ) ) ) >0 ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( pdr <*
```

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```
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'direction angle 1' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'PLANE_ANGLE_MEASURE_WITH_UNIT']*
    TYPEOF ( i ) ) =  2 ) ) ) =  1 ) ) ) =  1;
wr4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =
    'direction angle 2' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'PLANE_ANGLE_MEASURE_WITH_UNIT']*
    TYPEOF ( i ) ) =  2 ) ) ) =  1 ) ) ) =  1;
wr5: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'height' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'slope angle 1' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
    ) =  1 ) ) ) =  1;
wr7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'slope angle 2' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
    ) =  1 ) ) ) =  1;
wr8: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'defining path' ) AND ( sa.description =
    'path feature component occurrence' ) AND ( SIZEOF (
```

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```
    QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
    ( sar.relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description =  'linear' ) ) ) =  1 )
    ) ) =  1;
wr9: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.name =  'termination' ) AND ( sa.description =
    'joggle termination occurrence' ) AND ( SIZEOF ( QUERY (
    sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
    'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.name =
    'joggle termination usage' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'JOGGLE_TERMINATION' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
wr10: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'base radius 1' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr11: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'base radius 2' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr12: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'top radius 1' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr13: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
```

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```
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'top radius 2' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY joggle_termination
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN  [ 'value termination' ,
     'face termination' ];
 wr3: ( SELF.description =  'value termination' ) XOR ( SIZEOF
     ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  0 ) ;
 wr4: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  2 ) ) ) =  1 ) ;
 wr5: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'depth' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1 ) ;
 wr6: ( SELF.description<> 'value termination' ) OR ( SIZEOF (
     QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'angle' ) AND (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
     ) =  1 ) ) ) =  1 ) ;
```

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```
 wr7: SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
     ( sar.name =  'joggle termination usage' ) AND (
     'AUTOMOTIVE_DESIGN.' + 'JOGGLE' IN TYPEOF ( sar.
     related_shape_aspect.of_shape.definition ) ) AND ( sar.
     related_shape_aspect.of_shape.definition\
     characterized_object.name =  'termination' ) AND ( sar.
     related_shape_aspect.of_shape.definition\
     characterized_object.description =
     'joggle termination occurrence' ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY kinematic_analysis_consistency;
  control : kinematic_control;
  result : kinematic_analysis_result;
  WHERE
 wr1:control.controlled_mechanism:=:result.analysed_mechanism;
END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY kinematic_analysis_result;
  analysed_mechanism : mechanism;
  contained_kinematic_results : SET[1:?] OF kinematic_result;
  WHERE
 wr1: ( SIZEOF ( QUERY ( result <* contained_kinematic_results
     | 'AUTOMOTIVE_DESIGN.'+ 'RESULTING_PATH' IN TYPEOF (
     result ) ) ) >0 ) XOR ( SIZEOF ( QUERY ( result <*
     contained_kinematic_results | ( ( 'AUTOMOTIVE_DESIGN.' +
     'INTERPOLATED_CONFIGURATION_SEQUENCE' IN TYPEOF ( result
     ) ) AND ( SIZEOF ( QUERY ( sequence <* result\
     interpolated_configuration_sequence.interpolation | (
     sequence.interpolation<>undefined ) ) ) >0 ) ) ) ) =  0 )
     ;
END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY kinematic_control;
  controlled_mechanism : mechanism;
  contained_kinematic_programs : SET[1:?] OF kinematic_analysis_definition;
 END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY kinematic_frame_background_representation
  SUBTYPE OF (representation);
  SELF\representation.items : SET[1:?] OF kinematic_frame_background;
  SELF\representation.context_of_items : geometric_representation_context;
  WHERE
 wr1:SELF\representation.context_of_items\
```

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```
     geometric_representation_context.
     coordinate_space_dimension =  3;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_frame_background_representation_association
  SUBTYPE OF (representation_relationship_with_transformation);
  SELF\representation_relationship_with_transformation
              .transformation_operator
  : kinematic_frame_based_transformation;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_LINK_REPRESENTATION' IN
     TYPEOF ( SELF\representation_relationship.rep_1 ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_FRAME_BACKGROUND_REPRESENTATION' IN TYPEOF (
     SELF\representation_relationship.rep_2 ) ;
 wr3:SELF\representation_relationship_with_transformation.
     transformation_operator\
     kinematic_frame_based_transformation.transformator IN
     SELF\representation_relationship.rep_1.items;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_frame_based_transformation
  SUBTYPE OF (geometric_representation_item,
                    functionally_defined_transformation);
  transformator : rigid_placement;
  WHERE
 wr1:SELF\geometric_representation_item.dim =  3;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_ground_representation
  SUBTYPE OF (representation);
  INVERSE
   property : kinematic_property_representation_relation
          FOR used_representation;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_CONTEXT'
     IN TYPEOF ( SELF\representation.context_of_items ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_joint;
  first_link : kinematic_link;
  second_link : kinematic_link;
  INVERSE
   structure : kinematic_structure FOR joints;
  WHERE
 wr1:first_link:<>:second_link;
END_ENTITY;  -- 10303-105: kinematic_structure_schema
```

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```
 ENTITY kinematic_link;
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.KINEMATIC_JOINT.FIRST_LINK' ) + USEDIN (
     SELF , 'AUTOMOTIVE_DESIGN.KINEMATIC_JOINT.SECOND_LINK' ) )
     >0;
 wr2:unique_link_usage ( SELF ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_link_representation
  SUBTYPE OF (representation);
  SELF\representation.context_of_items : geometric_representation_context;
  DERIVE
   link_frame : geometric_representation_context := SELF\representation.
                context_of_items;
  INVERSE
   link_representation_relation : kinematic_link_representation_relation
                    FOR geometric_aspects;
  WHERE
 wr1: SIZEOF ( QUERY ( item <* SELF\representation.items |
     NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'RIGID_PLACEMENT' IN
     TYPEOF ( item ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'CARTESIAN_TRANSFORMATION_OPERATOR_3D' IN TYPEOF ( item )
     ) ) ) ) =  0;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_link_representation_association
  SUBTYPE OF (representation_relationship);
  SELF\representation_relationship.rep_1 : kinematic_link_representation;
  WHERE
 wr1:SELF\representation_relationship.
     rep_2.context_of_items:=:SELF\representation_relationship.
     rep_1\representation.context_of_items;
 wr2: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_GROUND_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.'+
     'KINEMATIC_LINK_REPRESENTATION']* TYPEOF (
     SELF\representation_relationship.rep_2 ) ) =  0;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_link_representation_relation;
  topological_aspects : kinematic_link;
  geometric_aspects : kinematic_link_representation;
  UNIQUE
   ur1 : topological_aspects;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema
```

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```
 ENTITY kinematic_pair
  SUBTYPE OF (item_defined_transformation);
  joint : kinematic_joint;
  DERIVE
   pair_placement_in_first_link_context : rigid_placement := SELF\
                                          item_defined_transformation.
                                          transform_item_1;
   pair_placement_in_second_link_context : rigid_placement := SELF\
                                           item_defined_transformation.
                                           transform_item_2;
  UNIQUE
   ur1 : joint;
  WHERE
 wr1:coordinated_pair_link_representation ( joint.first_link ,
     pair_placement_in_first_link_context ) ;
 wr2:coordinated_pair_link_representation ( joint.second_link ,
     pair_placement_in_second_link_context ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_path
  SUBTYPE OF (representation_item);
 END_ENTITY;  -- 10303-105: kinematic_motion_representation_schema


 ENTITY kinematic_property_definition
  SUBTYPE OF (property_definition);
  ground_definition : characterized_definition;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_property_representation_relation
  SUBTYPE OF (property_definition_representation);
  UNIQUE
   ur1 : SELF\property_definition_representation.definition;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_PROPERTY_DEFINITION' IN
     TYPEOF ( SELF\property_definition_representation.
     definition ) ;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_GROUND_REPRESENTATION' IN
     TYPEOF ( SELF\property_definition_representation.
     used_representation ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY kinematic_structure;
  joints : SET[1:?] OF kinematic_joint;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY known_source
```

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```
  SUBTYPE OF (external_source,pre_defined_item);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY language
  SUBTYPE OF (group);
  WHERE
 wr1: ( SIZEOF ( QUERY ( ca <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'CLASSIFICATION_ASSIGNMENT.' +
     'ASSIGNED_CLASS' ) | 'AUTOMOTIVE_DESIGN.' +
     'LANGUAGE_ASSIGNMENT' IN TYPEOF ( ca ) ) ) >0 ) OR (
     SIZEOF ( QUERY ( aca <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' +
     'ATTRIBUTE_CLASSIFICATION_ASSIGNMENT.' + 'ASSIGNED_CLASS' )
     | 'AUTOMOTIVE_DESIGN.' + 'ATTRIBUTE_LANGUAGE_ASSIGNMENT'
     IN TYPEOF ( aca ) ) ) >0 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY language_assignment
  SUBTYPE OF (classification_assignment);
  items : SET[1:?] OF language_item;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'LANGUAGE' IN TYPEOF (
     SELF.assigned_class ) ;
 wr2:SELF.role.name =  'language';
 wr3: SIZEOF ( SELF.items ) =  SIZEOF ( QUERY ( i <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION' IN
     TYPEOF ( i ) ) AND ( i\ representation.name =
     'document content' ) ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY leader_curve
  SUBTYPE OF (annotation_curve_occurrence);
  WHERE
 wr1: SIZEOF ( QUERY ( ldc <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_CALLOUT.'+ 'CONTENTS' )
     | 'AUTOMOTIVE_DESIGN.' + 'LEADER_DIRECTED_CALLOUT' IN
     TYPEOF ( ldc ) ) ) >=1;
END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY leader_directed_callout
  SUBTYPE OF (draughting_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( l_1 <* SELF\draughting_callout.
     contents | 'AUTOMOTIVE_DESIGN.'+ 'LEADER_CURVE' IN (
     TYPEOF ( l_1 ) ) ) ) >=1;
 wr2: SIZEOF ( SELF\draughting_callout.contents ) >=2;
END_ENTITY;  -- 10303-101: draughting_element_schema
```

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```
 ENTITY leader_directed_dimension
  SUBTYPE OF (leader_directed_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( con <* SELF.contents |
     'AUTOMOTIVE_DESIGN.'+ 'LEADER_CURVE' IN TYPEOF ( con ) )
     ) =  1;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY leader_terminator
  SUBTYPE OF (terminator_symbol);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'LEADER_CURVE' IN TYPEOF (
     SELF\terminator_symbol.annotated_curve ) ;
END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY length_function
  SUBTYPE OF (numeric_expression,unary_generic_expression);
  SELF\unary_generic_expression.operand : string_expression;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY length_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'LENGTH_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY length_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  1.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY light_source
```

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```
  SUPERTYPE OF (ONEOF(light_source_ambient,light_source_directional,
                light_source_positional,light_source_spot))
  SUBTYPE OF (geometric_representation_item);
  light_colour : colour;
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'STYLED_ITEM.'+ 'ITEM' ) ) =  0;
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY light_source_ambient
  SUBTYPE OF (light_source);
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY light_source_directional
  SUBTYPE OF (light_source);
  orientation : direction;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY light_source_positional
  SUBTYPE OF (light_source);
  position : cartesian_point;
  constant_attenuation : REAL;
  distance_attenuation : REAL;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY light_source_spot
  SUBTYPE OF (light_source);
  position : cartesian_point;
  orientation : direction;
  concentration_exponent : REAL;
  constant_attenuation : REAL;
  distance_attenuation : REAL;
  spread_angle : positive_plane_angle_measure;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY like_expression
  SUBTYPE OF (comparison_expression);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     SELF\comparison_expression.operands[1] ) ) AND (
     'AUTOMOTIVE_DESIGN.'+ 'STRING_EXPRESSION' IN TYPEOF (
     SELF\comparison_expression.operands[2] ) ) ;
END_ENTITY;  -- 13584-20: expressions_schema
```

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```
 ENTITY limits_and_fits;
  form_variance : label;
  zone_variance : label;
  grade : label;
  source : text;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY line
  SUBTYPE OF (curve);
  pnt : cartesian_point;
  dir : vector;
  WHERE
 wr1:dir.dim =  pnt.dim;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY line_profile_tolerance
  SUBTYPE OF (geometric_tolerance);
  WHERE
 wr1: ( NOT ( ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_TOLERANCE_WITH_DATUM_REFERENCE' ) IN TYPEOF (
     SELF ) ) ) OR ( SIZEOF (
     SELF\geometric_tolerance_with_datum_reference.datum_system
     ) <=3 ) ;
 wr2: SIZEOF ( QUERY ( sar <* USEDIN (
     SELF\geometric_tolerance.toleranced_shape_aspect ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.'+
     'RELATING_SHAPE_ASPECT' ) | ( sar.name IN  [
     'affected plane association' ,
     'resulting intersection curve association' ] ) ) ) =  1;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY linear_dimension
  SUBTYPE OF (dimension_curve_directed_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY literal_number
  ABSTRACT SUPERTYPE OF (ONEOF(int_literal,real_literal))
  SUBTYPE OF (simple_numeric_expression,generic_literal);
  the_value : NUMBER;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY local_time;
  hour_component : hour_in_day;
  minute_component : OPTIONAL minute_in_hour;
  second_component : OPTIONAL second_in_minute;
```

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```
  zone : coordinated_universal_time_offset;
  WHERE
 wr1:valid_time ( SELF ) ;
END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY location_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( SELF.items ) =  1;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'
     + 'POINT' IN TYPEOF ( i ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY locator
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {2<=SIZEOF ( pdr.
     used_representation.items ) <=5} ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'diameter' ) AND
     ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'tip radius' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) <=1;
 wr4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'tip angle' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
```

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```
     'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
     ) =  1 ) ) ) =  1;
 wr5: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'base radius' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY log10_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY log2_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY log_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY loop
  SUPERTYPE OF (ONEOF(vertex_loop,edge_loop,poly_loop))
  SUBTYPE OF (topological_representation_item);
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY lot_effectivity
  SUBTYPE OF (effectivity);
  effectivity_lot_id : identifier;
  effectivity_lot_size : measure_with_unit;
 END_ENTITY;  -- 10303-41: effectivity_schema


 ENTITY luminous_intensity_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'LUMINOUS_INTENSITY_UNIT' IN TYPEOF
     ( SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema
```

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```
 ENTITY luminous_intensity_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     1.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY make_from_usage_option
  SUBTYPE OF (product_definition_usage);
  ranking : INTEGER;
  ranking_rationale : text;
  quantity : measure_with_unit;
  WHERE
 wr1: ( NOT ( 'NUMBER' IN TYPEOF ( quantity.value_component
     ) ) ) OR ( quantity.value_component>0 ) ;
END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY manifold_solid_brep
  SUBTYPE OF (solid_model);
  outer : closed_shell;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY manifold_surface_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' ,
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
     ) ) >0;
 wr3: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( ( 'AUTOMOTIVE_DESIGN.'+
     'MANIFOLD_SURFACE_SHAPE_REPRESENTATION' IN TYPEOF (
     mi\mapped_item.mapping_source.mapped_representation ) )
     AND ( SIZEOF ( QUERY ( mr_it <* mi\ mapped_item.
     mapping_source.mapped_representation.items | (
```

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```
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( mr_it ) ) ) ) >0 ) ) ) ) =  0;
wr4: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( sh <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'OPEN_SHELL' , 'AUTOMOTIVE_DESIGN.'+
    'ORIENTED_CLOSED_SHELL' , 'AUTOMOTIVE_DESIGN.'+
    'CLOSED_SHELL']* TYPEOF ( sh ) ) =  1 ) ) ) =  0 ) ) ) =
    0;
wr5: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    'AUTOMOTIVE_DESIGN.'+ 'FACE_SURFACE' IN TYPEOF ( fa ) ) )
    ) =  0 ) ) ) =  0 ) ) ) =  0;
wr6: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( msf_surface_check ( fa\ face_surface.face_geometry
    ) ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr7: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( bnds <* fa.bounds | NOT (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' ,
    'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP']* TYPEOF ( bnds.bound
    ) ) =  1 ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr8: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <*
    fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF
    ( bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( 'AUTOMOTIVE_DESIGN.'+
    'EDGE_CURVE' IN TYPEOF ( oe.edge_element ) ) ) ) =  0 )
    ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr9: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
```

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```
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <*
    fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF
    ( bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe_cv <*
    QUERY ( oe <* elp_fbnds\ path.edge_list |
    'AUTOMOTIVE_DESIGN.'+ 'EDGE_CURVE' IN TYPEOF (
    oe.edge_element ) ) | NOT ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE' ,
    'AUTOMOTIVE_DESIGN.'+ 'CONIC' , 'AUTOMOTIVE_DESIGN.'+
    'CURVE_REPLICA' , 'AUTOMOTIVE_DESIGN.'+ 'LINE' ,
    'AUTOMOTIVE_DESIGN.'+ 'OFFSET_CURVE_3D' ,
    'AUTOMOTIVE_DESIGN.'+ 'PCURVE' , 'AUTOMOTIVE_DESIGN.'+
    'POLYLINE' , 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_CURVE']*
    TYPEOF ( oe_cv.edge_element\ edge_curve.edge_geometry )
    ) =  1 ) ) ) =  0 ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) )
    =  0;
wr10: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <*
    fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF
    ( bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( msf_curve_check ( oe.
    edge_element\ edge_curve.edge_geometry ) ) ) =  0 ) ) )
    =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr11: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <*
    fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF
    ( bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'VERTEX_POINT' IN TYPEOF ( oe.edge_element.edge_start )
    ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT' IN TYPEOF (
    oe.edge_element.edge_end ) ) ) ) =  0 ) ) ) =  0 ) ) )
    =  0 ) ) ) =  0 ) ) ) =  0;
wr12: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
    shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
    QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
    ) OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <*
    fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF
    ( bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( ( SIZEOF (
```

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```
     ['AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' ,
     'AUTOMOTIVE_DESIGN.'+ 'DEGENERATE_PCURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_CURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_SURFACE']* TYPEOF ( oe.
     edge_element.edge_start\ vertex_point.vertex_geometry ) )
     =  1 ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'CARTESIAN_POINT' , 'AUTOMOTIVE_DESIGN.'+
     'DEGENERATE_PCURVE' , 'AUTOMOTIVE_DESIGN.'+
     'POINT_ON_CURVE' , 'AUTOMOTIVE_DESIGN.'+
     'POINT_ON_SURFACE']* TYPEOF ( oe.edge_element.edge_end\
     vertex_point.vertex_geometry ) ) =  1 ) ) ) ) =  0 ) ) )
     =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
 wr13: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
     TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
     shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
     QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
     ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
     ) OR ( SIZEOF ( QUERY ( vlp_fbnds <* QUERY ( bnds <*
     fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP' IN
     TYPEOF ( bnds.bound ) ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
     'VERTEX_POINT' IN TYPEOF ( vlp_fbnds\ vertex_loop.
     loop_vertex ) ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =
     0;
 wr14: SIZEOF ( QUERY ( sbsm <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'SHELL_BASED_SURFACE_MODEL' IN
     TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* sbsm\
     shell_based_surface_model.sbsm_boundary | NOT ( SIZEOF (
     QUERY ( fa <* cfs\ connected_face_set.cfs_faces | NOT (
     ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa )
     ) OR ( SIZEOF ( QUERY ( vlp_fbnds <* QUERY ( bnds <*
     fa.bounds | 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP' IN
     TYPEOF ( bnds.bound ) ) | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' ,
     'AUTOMOTIVE_DESIGN.'+ 'DEGENERATE_PCURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_CURVE' ,
     'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_SURFACE']* TYPEOF (
     vlp_fbnds\ vertex_loop.loop_vertex\ vertex_point.
     vertex_geometry ) ) =  1 ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0
     ) ) ) =  0;
END_ENTITY;  -- 10303-509: aic_manifold_surface


 ENTITY mapped_item
  SUBTYPE OF (representation_item);
  mapping_source : representation_map;
  mapping_target : representation_item;
  WHERE
 wr1:acyclic_mapped_representation ( using_representations (
     SELF ) , [SELF] ) ;
END_ENTITY;  -- 10303-43: representation_schema
```

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```
 ENTITY mass_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'MASS_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY mass_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  1.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY material_designation;
  name : label;
  definitions : SET[1:?] OF characterized_definition;
 END_ENTITY;  -- 10303-45: material_property_definition_schema


 ENTITY material_designation_characterization;
  name : label;
  description : text;
  designation : material_designation;
  property : characterized_material_property;
 END_ENTITY;  -- 10303-45: material_property_definition_schema


 ENTITY material_property
  SUBTYPE OF (property_definition);
  UNIQUE
   ur1 : SELF\property_definition.name,SELF\property_definition.definition;
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'CHARACTERIZED_OBJECT' IN TYPEOF
     ( SELF\property_definition.definition ) ) OR ( SIZEOF (
     bag_to_set ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.'+ 'DEFINITION' ) ) -
     QUERY ( temp <* bag_to_set ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' +
     'PROPERTY_DEFINITION_REPRESENTATION.'+ 'DEFINITION' ) ) | (
     'AUTOMOTIVE_DESIGN.' + 'MATERIAL_PROPERTY_REPRESENTATION'
```

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     IN TYPEOF ( temp ) ) ) ) =  0 ) ;
END_ENTITY;  -- 10303-45: material_property_definition_schema


 ENTITY material_property_representation
  SUBTYPE OF (property_definition_representation);
  dependent_environment : data_environment;
 END_ENTITY;  -- 10303-45: material_property_representation_schema


 ENTITY maximum_function
  SUBTYPE OF (multiple_arity_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY measure_qualification;
  name : label;
  description : text;
  qualified_measure : measure_with_unit;
  qualifiers : SET[1:?] OF value_qualifier;
  WHERE
 wr1: SIZEOF ( QUERY ( temp <* qualifiers |
     'AUTOMOTIVE_DESIGN.'+ 'PRECISION_QUALIFIER' IN TYPEOF (
     temp ) ) ) <2;
END_ENTITY;  -- 10303-45: qualified_measure_schema


 ENTITY measure_representation_item
  SUBTYPE OF (representation_item,measure_with_unit);
 END_ENTITY;  -- 10303-45: qualified_measure_schema


 ENTITY measure_with_unit
  SUPERTYPE OF (ONEOF(length_measure_with_unit,
                mass_measure_with_unit,
                time_measure_with_unit,
                electric_current_measure_with_unit,
                thermodynamic_temperature_measure_with_unit,
                celsius_temperature_measure_with_unit,
                amount_of_substance_measure_with_unit,
                luminous_intensity_measure_with_unit,
                plane_angle_measure_with_unit,
                solid_angle_measure_with_unit,
                area_measure_with_unit,
                volume_measure_with_unit,
                ratio_measure_with_unit));
  value_component : measure_value;
  unit_component : unit;
  WHERE
 wr1:valid_units ( SELF ) ;
```

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END_ENTITY;  -- 10303-41: measure_schema


 ENTITY mechanical_design_geometric_presentation_area
  SUBTYPE OF (presentation_area);
  WHERE
 wr1: SIZEOF ( QUERY ( it1 <* SELF.items | NOT ( (
     'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' IN TYPEOF ( it1 )
     ) OR ( ( 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF (
     it1 ) ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW'
     IN TYPEOF ( it1\mapped_item.mapping_source.
     mapped_representation ) ) ) ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( pv <* QUERY ( mi1 <* QUERY ( it1 <*
     SELF.items | 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN
     TYPEOF ( it1 ) ) | 'AUTOMOTIVE_DESIGN.'+
     'PRESENTATION_VIEW' IN TYPEOF ( mi1\mapped_item.
     mapping_source.mapped_representation ) ) | NOT ( SIZEOF
     ( QUERY ( it2 <* pv\ mapped_item.mapping_source.
     mapped_representation\ representation.items | NOT ( (
     'AUTOMOTIVE_DESIGN.'+ 'AXIS2_PLACEMENT' IN TYPEOF ( it2 )
     ) OR ( ( 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF (
     it2 ) ) AND NOT ( 'AUTOMOTIVE_DESIGN.' +
     'CAMERA_IMAGE_3D_WITH_SCALE' IN TYPEOF ( it2 ) ) ) AND
     NOT ( 'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_VIEW' IN
     TYPEOF ( it2\mapped_item.mapping_source.
     mapped_representation ) ) ) OR ( ( 'AUTOMOTIVE_DESIGN.' +
     'CAMERA_IMAGE_3D_WITH_SCALE' IN TYPEOF ( it2 ) ) AND
     NOT ( ( 'AUTOMOTIVE_DESIGN.' +
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION'
     IN TYPEOF ( it2\mapped_item.mapping_source.
     mapped_representation ) ) ) ) ) =  0 ) ) ) =  0;
 wr3: ( SIZEOF ( QUERY ( ps <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+ 'UNIT' ) | ( (
     ps.size\ planar_extent.size_in_x<=0 ) OR ( ps.size\
     planar_extent.size_in_y<=0 ) ) ) ) =  0 ) AND ( SIZEOF (
     QUERY ( ais <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'AREA_IN_SET.'+ 'AREA' ) | ( SIZEOF ( QUERY ( ps <*
     USEDIN ( ais , 'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+
     'UNIT' ) | ( ( ps.size\ planar_extent.size_in_x<=0 ) OR
     ( ps.size\ planar_extent.size_in_y<=0 ) ) ) ) >0 ) ) ) =
     0 ) );
 wr4: ( SIZEOF ( QUERY ( ps <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+ 'UNIT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'AXIS2_PLACEMENT_2D' IN TYPEOF (
     ps.size.placement ) ) ) ) =  1 ) AND ( SIZEOF ( QUERY
     ( ps <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PRESENTATION_SIZE.'+ 'UNIT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'AXIS2_PLACEMENT_3D' IN TYPEOF ( ps.size.placement ) )
     ) ) =  0 ) OR ( ( SIZEOF ( QUERY ( ais <* USEDIN ( SELF
     , 'AUTOMOTIVE_DESIGN.' + 'AREA_IN_SET.'+ 'AREA' ) | (
     SIZEOF ( QUERY ( ps <* USEDIN ( ais ,
     'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+ 'UNIT' ) | (
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     'AUTOMOTIVE_DESIGN.' + 'AXIS2_PLACEMENT_2D' IN TYPEOF (
     ps.size.placement ) ) ) ) =  1 ) ) ) =  1 ) AND (
     SIZEOF ( QUERY ( ais <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'AREA_IN_SET.'+ 'AREA' ) | ( SIZEOF
     ( QUERY ( ps <* USEDIN ( ais , 'AUTOMOTIVE_DESIGN.' +
     'PRESENTATION_SIZE.'+ 'UNIT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'AXIS2_PLACEMENT_3D' IN TYPEOF ( ps.size.placement ) )
     ) ) =  0 ) ) ) =  1 ) ) ;
END_ENTITY;  -- 10303-517: aic_mechanical_design_geometric_presentation


 ENTITY mechanical_design_geometric_presentation_representation
  SUBTYPE OF (representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' ,
     'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'AXIS2_PLACEMENT' , 'AUTOMOTIVE_DESIGN.'+
     'CAMERA_MODEL_D3']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items | (
     'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) )
     | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION' , 'AUTOMOTIVE_DESIGN.' +
     'MECHANICAL_DESIGN_GEOMETRIC_PRESENTATION_REPRESENTATION']*
     TYPEOF ( mi\mapped_item.mapping_source.
     mapped_representation ) ) =  1 ) ) ) =  0;
 wr3: SIZEOF ( QUERY ( smi <* QUERY ( si <* QUERY ( it <*
     SELF.items | ( 'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN
     TYPEOF ( it ) ) ) | ( 'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM'
     IN TYPEOF ( si\ styled_item.item ) ) ) | NOT ( (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_REPRESENTATION' IN TYPEOF (
     smi\ styled_item.item\ mapped_item.mapping_source.
     mapped_representation ) ) ) ) ) =  0;
 wr4: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
     NOT ( SIZEOF ( QUERY ( pss <* psa.styles | NOT (
     SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'POINT_STYLE' ,
     'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' , 'AUTOMOTIVE_DESIGN.'+
     'SURFACE_STYLE_USAGE']* TYPEOF ( pss ) ) =  1 ) ) ) =  0 )
     ) ) =  0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
     'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
     NOT ( SIZEOF ( QUERY ( psbc <* QUERY ( psa <* si\
     styled_item.styles | 'AUTOMOTIVE_DESIGN.' +
     'PRESENTATION_STYLE_BY_CONTEXT' IN TYPEOF ( psa ) ) |
     NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.'+
     'REPRESENTATION']* TYPEOF ( psbc\
     presentation_style_by_context.style_context ) ) =  1 ) ) )
     =  0 ) ) ) =  0;
 wr6: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
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```
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ps <* QUERY ( pss <* psa.styles
    | 'AUTOMOTIVE_DESIGN.'+ 'POINT_STYLE' IN TYPEOF ( pss ) )
    | NOT ( ( 'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE'
    IN TYPEOF ( ps\ point_style.marker_size ) ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' ,
    'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_PRE_DEFINED_COLOUR']*
    TYPEOF ( ps\ point_style.marker_colour ) ) =  1 ) ) ) )
    =  0 ) ) ) =  0 ) ) ) =  0;
wr7: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( cs <* QUERY ( pss <* psa.styles
    | 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF ( pss ) )
    | NOT ( ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB',
    'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_PRE_DEFINED_COLOUR']*
    TYPEOF ( cs\ curve_style.curve_colour ) ) =  1 ) AND (
    'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE' IN
    TYPEOF ( cs\ curve_style.curve_width ) ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT' ,
    'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( cs\
    curve_style.curve_font ) ) =  1 ) ) ) ) =  0 ) ) ) =  0 )
    ) ) =  0;
wr8: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_SIDE_STYLE' IN TYPEOF ( ssu\
    surface_style_usage.style ) ) ) ) =  0 ) ) ) =  0 ) ) ) =
    0;
wr9: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( sses <* ssu\
    surface_style_usage.style\ surface_side_style.styles |
    NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_PARAMETER_LINE' , 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_CONTROL_GRID' , 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_SILHOUETTE' , 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_SEGMENTATION_CURVE' , 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_FILL_AREA' , 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_BOUNDARY']* TYPEOF ( sses ) ) =  1 ) ) ) =
    0 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr10: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
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    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( sspl <*
    QUERY ( sses <* ssu\ surface_style_usage.style\
    surface_side_style.styles | 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_PARAMETER_LINE' IN TYPEOF ( sses ) ) |
    NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF (
    sspl\ surface_style_parameter_line.
    style_of_parameter_lines ) ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' , 'AUTOMOTIVE_DESIGN.'
    + 'DRAUGHTING_PRE_DEFINED_COLOUR']* TYPEOF ( sspl\
    surface_style_parameter_line.style_of_parameter_lines\
    curve_style.curve_colour ) ) =  1 ) AND (
    'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE' IN
    TYPEOF ( sspl\
    surface_style_parameter_line.style_of_parameter_lines\
    curve_style.curve_width ) ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT' ,
    'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( sspl\
    surface_style_parameter_line.style_of_parameter_lines\
    curve_style.curve_font ) ) =  1 ) ) ) ) =  0 ) ) ) =  0 )
    ) ) =  0 ) ) ) =  0;
wr11: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( sscg <*
    QUERY ( sses <* ssu\ surface_style_usage.style\
    surface_side_style.styles | 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_CONTROL_GRID' IN TYPEOF ( sses ) ) | NOT
    ( ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF ( sscg\
    surface_style_control_grid.style_of_control_grid ) ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' ,
    'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_PRE_DEFINED_COLOUR']*
    TYPEOF ( sscg\ surface_style_control_grid.
    style_of_control_grid\ curve_style.curve_colour ) ) =  1 )
    AND ( 'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE' IN
    TYPEOF ( sscg\ surface_style_control_grid.
    style_of_control_grid\ curve_style.curve_width ) ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT' ,
    'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( sscg\
    surface_style_control_grid.style_of_control_grid\
    curve_style.curve_font ) ) =  1 ) ) ) ) =  0 ) ) ) =  0 )
    ) ) =  0 ) ) ) =  0;
wr12: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
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    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( sssh <*
    QUERY ( sses <* ssu\ surface_style_usage.style\
    surface_side_style.styles | 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_SILHOUETTE' IN TYPEOF ( sses ) ) | NOT (
    ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF ( sssh\
    surface_style_silhouette.style_of_silhouette ) ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' ,
    'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_PRE_DEFINED_COLOUR']*
    TYPEOF ( sssh\ surface_style_silhouette.
    style_of_silhouette\ curve_style.curve_colour ) ) =  1 )
    AND ( 'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE' IN
    TYPEOF ( sssh\ surface_style_silhouette.
    style_of_silhouette\ curve_style.curve_width ) ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT' ,
    'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( sssh\
    surface_style_silhouette.style_of_silhouette\ curve_style.
    curve_font ) ) =  1 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0 ) )
    ) =  0;
wr13: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( sssc <*
    QUERY ( sses <* ssu\ surface_style_usage.style\
    surface_side_style.styles | 'AUTOMOTIVE_DESIGN.' +
    'SURFACE_STYLE_SEGMENTATION_CURVE' IN TYPEOF ( sses ) ) |
    NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF (
    sssc\ surface_style_segmentation_curve.
    style_of_segmentation_curve ) ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' , 'AUTOMOTIVE_DESIGN.'
    + 'DRAUGHTING_PRE_DEFINED_COLOUR']* TYPEOF ( sssc\
    surface_style_segmentation_curve.
    style_of_segmentation_curve\ curve_style.curve_colour ) )
    =  1 ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'POSITIVE_LENGTH_MEASURE' IN TYPEOF ( sssc\
    surface_style_segmentation_curve.
    style_of_segmentation_curve\ curve_style.curve_width ) )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT'
    , 'AUTOMOTIVE_DESIGN.' +
    'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( sssc\
    surface_style_segmentation_curve.
    style_of_segmentation_curve\ curve_style.curve_font ) ) =
    1 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr14: SIZEOF ( QUERY ( si <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'STYLED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( SIZEOF ( QUERY ( psa <* si\ styled_item.styles |
    NOT ( SIZEOF ( QUERY ( ssu <* QUERY ( pss <* psa.
    styles | 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN
    TYPEOF ( pss ) ) | NOT ( SIZEOF ( QUERY ( ssbd <*
    QUERY ( sses <* ssu\ surface_style_usage.style\
```

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```
      surface_side_style.styles | 'AUTOMOTIVE_DESIGN.' +
      'SURFACE_STYLE_BOUNDARY' IN TYPEOF ( sses ) ) | NOT ( (
      'AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE' IN TYPEOF ( ssbd\
      surface_style_boundary.style_of_boundary ) ) AND ( SIZEOF
      ( ['AUTOMOTIVE_DESIGN.'+ 'COLOUR_RGB' ,
      'AUTOMOTIVE_DESIGN.' + 'DRAUGHTING_PRE_DEFINED_COLOUR']*
      TYPEOF ( ssbd\surface_style_boundary.style_of_boundary\
      curve_style.curve_colour ) ) =  1 ) AND (
      'AUTOMOTIVE_DESIGN.' + 'POSITIVE_LENGTH_MEASURE' IN
      TYPEOF ( ssbd\ surface_style_boundary.style_of_boundary\
      curve_style.curve_width ) ) AND ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.'+ 'CURVE_STYLE_FONT' ,
      'AUTOMOTIVE_DESIGN.' +
      'DRAUGHTING_PRE_DEFINED_CURVE_FONT']* TYPEOF ( ssbd\
      surface_style_boundary.style_of_boundary\ curve_style.
      curve_font ) ) =  1 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0 ) )
      ) =  0;
END_ENTITY;  -- 10303-517: aic_mechanical_design_geometric_presentation


 ENTITY mechanism;
  structure_definition : kinematic_structure;
  base : kinematic_link;
  containing_property : kinematic_property_definition;
  WHERE
 wr1: SIZEOF ( QUERY ( joint <* structure_definition.joints |
      ( base:=:joint.first_link ) OR ( base:=:joint.
      second_link ) ) ) >0;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY mechanism_base_placement
  SUBTYPE OF (representation_relationship_with_transformation);
  base_of_mechanism : mechanism;
  SELF\representation_relationship_with_transformation
            .transformation_operator
  : cartesian_transformation_operator_3d;
  DERIVE
   SELF\representation_relationship.rep_2 :
                     kinematic_link_representation :=
                     representation_of_link(
                             base_of_mechanism.base);
  UNIQUE
   ur1 : base_of_mechanism;
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_GROUND_REPRESENTATION'
      IN TYPEOF ( SELF\representation_relationship.rep_1 ) )
      OR ( 'AUTOMOTIVE_DESIGN.'+ 'KINEMATIC_LINK_REPRESENTATION'
      IN TYPEOF ( SELF\representation_relationship.rep_1 ) ) ;
 wr2:suitably_based_mechanism ( SELF , base_of_mechanism ) ;
 wr3: SELF\representation_relationship_with_transformation.
      transformation_operator IN
```

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```
    SELF\representation_relationship.rep_1.items;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY minimum_function
  SUBTYPE OF (multiple_arity_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY minus_expression
  SUBTYPE OF (binary_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY minus_function
  SUBTYPE OF (unary_function_call);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY mod_expression
  SUBTYPE OF (binary_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY modified_geometric_tolerance
  SUBTYPE OF (geometric_tolerance);
  modifier : limit_condition;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY modified_pattern
  SUBTYPE OF (replicate_feature);
  WHERE
 wr1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( sar.description =
     'base pattern' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'CIRCULAR_PATTERN' , 'AUTOMOTIVE_DESIGN.' +
     'RECTANGULAR_PATTERN']* TYPEOF ( sar.
     related_shape_aspect.of_shape.definition ) ) =  1 ) ) )
     =  1 ) ) ) =  1;
 wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( SIZEOF ( QUERY ( sar1 <*
     USEDIN ( sar.related_shape_aspect , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     sar.related_shape_aspect:<>:sar1.related_shape_aspect )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
```

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```
     'PATTERN_OFFSET_MEMBERSHIP' , 'AUTOMOTIVE_DESIGN.' +
     'PATTERN_OMIT_MEMBERSHIP']* TYPEOF ( sar1 ) ) =  1 ) ) )
     =  1 ) ) ) >=1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY moments_of_inertia_representation
  SUBTYPE OF (representation);
  WHERE
 wr1: ( SIZEOF ( SELF.items ) =  1 ) AND ( SIZEOF ( QUERY (
     i <* SELF.items | ( 'AUTOMOTIVE_DESIGN.' +
     'COMPOUND_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     i.name =  'moments of inertia matrix' ) ) ) =  1 ) ;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | (
     'AUTOMOTIVE_DESIGN.' + 'COMPOUND_REPRESENTATION_ITEM' IN
     TYPEOF ( i ) ) AND ( SIZEOF ( i\
     compound_representation_item.item_element ) =  3 ) AND (
     'AUTOMOTIVE_DESIGN.' + 'LIST_REPRESENTATION_ITEM' IN
     TYPEOF ( i\ compound_representation_item.item_element ) )
     AND value_range_aggregate_rep_item ( i\
     compound_representation_item.item_element ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY motion_link_relationship
  SUPERTYPE OF (resulting_path)
  SUBTYPE OF (representation_relationship);
  SELF\representation_relationship.rep_1 : founded_kinematic_path;
  SELF\representation_relationship.rep_2 : kinematic_link_representation;
  related_frame : rigid_placement;
  DERIVE
   motion : founded_kinematic_path :=
                 SELF\representation_relationship.rep_1;
   frame_link : kinematic_link_representation := SELF\
                representation_relationship.rep_2;
  WHERE
 wr1:related_frame IN frame_link\ representation.items;
END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY mult_expression
  SUBTYPE OF (multiple_arity_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY multi_language_attribute_assignment
  SUBTYPE OF (attribute_value_assignment);
  items : SET[1:?] OF multi_language_attribute_item;
  DERIVE
   language : label := get_multi_language(SELF);
  WHERE
```

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```
 wr1:SELF\attribute_value_assignment.role.name =
     'alternate language' ;
 wr2: ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ATTRIBUTE_LANGUAGE_ASSIGNMENT.ITEMS' ) )
     =  1 ) AND ( SIZEOF ( QUERY ( ala <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ATTRIBUTE_LANGUAGE_ASSIGNMENT.' +
     'ITEMS' ) | ala.attribute_name =  'attribute_value' ) ) =
     1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY multiple_arity_boolean_expression
  ABSTRACT SUPERTYPE OF (ONEOF(and_expression,or_expression))
  SUBTYPE OF (boolean_expression,multiple_arity_generic_expression);
  SELF\multiple_arity_generic_expression.operands : LIST[2:?] OF
                                                   boolean_expression;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY multiple_arity_function_call
  ABSTRACT SUPERTYPE OF (ONEOF(maximum_function,minimum_function))
  SUBTYPE OF (multiple_arity_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY multiple_arity_generic_expression
  ABSTRACT SUPERTYPE
  SUBTYPE OF (generic_expression);
  operands : LIST[2:?] OF generic_expression;
 END_ENTITY;  -- 13584-20: generic_expressions_schema


 ENTITY multiple_arity_numeric_expression
  ABSTRACT SUPERTYPE OF (ONEOF(plus_expression,mult_expression,
                         multiple_arity_function_call))
  SUBTYPE OF (numeric_expression,multiple_arity_generic_expression);
  SELF\multiple_arity_generic_expression.operands : LIST[2:?] OF
                                                   numeric_expression;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY name_assignment
  ABSTRACT SUPERTYPE;
  assigned_name : label;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema
```

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```
ENTITY name_attribute;
 attribute_value : label;
 named_item : name_attribute_select;
END_ENTITY;  -- 10303-41: basic_attribute_schema


ENTITY named_unit
 SUPERTYPE OF (ONEOF(si_unit,conversion_based_unit,context_dependent_unit)
               ANDOR ONEOF(length_unit,mass_unit,time_unit,
               electric_current_unit,thermodynamic_temperature_unit,
               amount_of_substance_unit,luminous_intensity_unit,
               plane_angle_unit,solid_angle_unit,area_unit,volume_unit,
               ratio_unit));
 dimensions : dimensional_exponents;
END_ENTITY;  -- 10303-41: measure_schema


ENTITY named_unit_variable
 SUBTYPE OF (named_unit,variable_semantics);
 INVERSE
  associated_variable_environment : environment FOR semantics;
END_ENTITY;  -- 10303-214: automotive_design


ENTITY next_assembly_usage_occurrence
 SUBTYPE OF (assembly_component_usage);
END_ENTITY;  -- 10303-44: product_structure_schema


ENTITY ngon_closed_profile
 SUBTYPE OF (shape_aspect);
 WHERE
wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
    TYPEOF ( SELF\shape.definition ) ;
wr2: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
wr3: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {3<=SIZEOF ( pdr.
    used_representation.items ) <=4} ) ) =  1;
wr4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | NOT ( i.name IN
```

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    ['orientation' , 'number of sides' ,
    'circumscibed diameter' , 'diameter across flats' ,
    'corner radius' ] ) ) ) =  0 ) ) ) =  1;
 wr5: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
    'orientation' ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'number of sides'
    ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1;
 wr7: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name IN  [
    'circumscribed diameter' , 'diameter across flats' ] ) AND
    ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1;
 wr8: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'corner radius' )
    ) ) <=1 ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'corner radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'corner radius' ) ) ) ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY non_manifold_surface_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( it <* SELF.items | NOT ( SIZEOF (
```

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    ['AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' ,
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'+
    'AXIS2_PLACEMENT_3D']* TYPEOF ( it ) ) =  1 ) ) ) =  0;
wr2: SIZEOF ( QUERY ( it <* SELF.items | SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' ,
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM']* TYPEOF ( it ) ) =  1
    ) ) >0;
wr3: SIZEOF ( QUERY ( mi <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'MAPPED_ITEM' IN TYPEOF ( it ) ) |
    NOT ( ( 'AUTOMOTIVE_DESIGN.' +
    'NON_MANIFOLD_SURFACE_SHAPE_REPRESENTATION' IN TYPEOF (
    mi\ mapped_item.mapping_source.mapped_representation ) )
    AND ( SIZEOF ( QUERY ( mr_it <* mi\ mapped_item.
    mapping_source.mapped_representation.items | (
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( mr_it ) ) ) ) >0 ) ) ) ) =  0;
wr4: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'FACE_SURFACE' ,
    'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_FACE']* TYPEOF ( fa ) ) =
    1 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr5: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( f_sf <* QUERY ( fa <* cfs.cfs_faces | (
    'AUTOMOTIVE_DESIGN.'+ 'FACE_SURFACE' IN TYPEOF ( fa ) ) )
    | NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN
    TYPEOF ( f_sf ) ) OR ( nmsf_surface_check ( f_sf\
    face_surface.face_geometry ) ) ) ) ) =  0 ) ) ) =  0 ) ) )
    =  0;
wr6: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( o_fa <* QUERY ( fa <* cfs.cfs_faces | (
    'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_FACE' IN TYPEOF ( fa ) )
    ) | NOT ( ( 'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN
    TYPEOF ( o_fa\ oriented_face.face_element ) ) OR (
    nmsf_surface_check ( o_fa\ oriented_face.face_element\
    face_surface.face_geometry ) ) ) ) ) =  0 ) ) ) =  0 ) ) )
    =  0;
wr7: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( bnds <* fa.bounds | NOT (
```

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    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' ,
    'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP']* TYPEOF ( bnds.bound
    ) ) =  1 ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr8: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( 'AUTOMOTIVE_DESIGN.'+
    'EDGE_CURVE' IN TYPEOF ( oe.edge_element ) ) ) =  0 )
    ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr9: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe_cv <* QUERY
    ( oe <* elp_fbnds\ path.edge_list | 'AUTOMOTIVE_DESIGN.'+
    'EDGE_CURVE' IN TYPEOF ( oe.edge_element ) ) | NOT (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.'+ 'B_SPLINE_CURVE' ,
    'AUTOMOTIVE_DESIGN.'+ 'CONIC' , 'AUTOMOTIVE_DESIGN.'+
    'CURVE_REPLICA' , 'AUTOMOTIVE_DESIGN.'+ 'LINE' ,
    'AUTOMOTIVE_DESIGN.'+ 'OFFSET_CURVE_3D' ,
    'AUTOMOTIVE_DESIGN.'+ 'PCURVE' , 'AUTOMOTIVE_DESIGN.'+
    'POLYLINE' , 'AUTOMOTIVE_DESIGN.'+ 'SURFACE_CURVE']*
    TYPEOF ( oe_cv.edge_element\ edge_curve.edge_geometry )
    ) =  1 ) ) ) =  0 ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) )
    =  0;
wr10: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( nmsf_curve_check ( oe.
    edge_element\ edge_curve.edge_geometry ) ) ) =  0 ) ) )
    =  0 ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr11: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
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```
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( ( 'AUTOMOTIVE_DESIGN.'+
    'VERTEX_POINT' IN TYPEOF ( oe.edge_element.edge_start )
    ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_POINT' IN TYPEOF (
    oe.edge_element.edge_end ) ) ) ) =  0 ) ) ) =  0 ) ) )
    ) =  0 ) ) ) =  0 ) ) ) =  0;
wr12: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( elp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'EDGE_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( QUERY ( oe <*
    elp_fbnds\ path.edge_list | NOT ( ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.'+ 'CARTESIAN_POINT' ,
    'AUTOMOTIVE_DESIGN.'+ 'DEGENERATE_PCURVE' ,
    'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_CURVE' ,
    'AUTOMOTIVE_DESIGN.'+ 'POINT_ON_SURFACE']* TYPEOF ( oe.
    edge_element.edge_start\ vertex_point.vertex_geometry ) )
    =  1 ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
    'CARTESIAN_POINT' , 'AUTOMOTIVE_DESIGN.'+
    'DEGENERATE_PCURVE' , 'AUTOMOTIVE_DESIGN.'+
    'POINT_ON_CURVE' , 'AUTOMOTIVE_DESIGN.'+
    'POINT_ON_SURFACE']* TYPEOF ( oe.edge_element.edge_end\
    vertex_point.vertex_geometry ) ) =  1 ) ) ) ) =  0 ) ) )
    =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
wr13: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( vlp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( 'AUTOMOTIVE_DESIGN.'+
    'VERTEX_POINT' IN TYPEOF ( vlp_fbnds\ vertex_loop.
    loop_vertex ) ) ) ) =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =
    0;
wr14: SIZEOF ( QUERY ( fbsm <* QUERY ( it <* SELF.items |
    'AUTOMOTIVE_DESIGN.'+ 'FACE_BASED_SURFACE_MODEL' IN
    TYPEOF ( it ) ) | NOT ( SIZEOF ( QUERY ( cfs <* fbsm\
    face_based_surface_model.fbsm_faces | NOT ( SIZEOF (
    QUERY ( fa <* cfs.cfs_faces | NOT ( (
    'AUTOMOTIVE_DESIGN.'+ 'ADVANCED_FACE' IN TYPEOF ( fa ) )
    OR ( SIZEOF ( QUERY ( vlp_fbnds <* QUERY ( bnds <* fa.
    bounds | 'AUTOMOTIVE_DESIGN.'+ 'VERTEX_LOOP' IN TYPEOF (
    bnds.bound ) ) | NOT ( SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
```

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```
     'CARTESIAN_POINT' , 'AUTOMOTIVE_DESIGN.'+
     'DEGENERATE_PCURVE' , 'AUTOMOTIVE_DESIGN.'+
     'POINT_ON_CURVE' , 'AUTOMOTIVE_DESIGN.'+
     'POINT_ON_SURFACE']* TYPEOF ( vlp_fbnds\ vertex_loop.
     loop_vertex\ vertex_point.vertex_geometry ) ) =  1 ) ) )
     =  0 ) ) ) ) =  0 ) ) ) =  0 ) ) ) =  0;
END_ENTITY;  -- 10303-508: aic_non_manifold_surface


 ENTITY not_expression
  SUBTYPE OF (unary_boolean_expression);
  SELF\unary_generic_expression.operand : boolean_expression;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY numeric_expression
  ABSTRACT SUPERTYPE OF (ONEOF(simple_numeric_expression,
                unary_numeric_expression,binary_numeric_expression,
                multiple_arity_numeric_expression,length_function,
                value_function))
  SUBTYPE OF (expression);
  DERIVE
   is_int : BOOLEAN := is_int_expr(SELF);
   sql_mappable : BOOLEAN := is_sql_mappable(SELF);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY numeric_variable
  SUPERTYPE OF (ONEOF(int_numeric_variable,real_numeric_variable))
  SUBTYPE OF (simple_numeric_expression,variable);
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'INT_NUMERIC_VARIABLE' IN TYPEOF
     ( SELF ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'REAL_NUMERIC_VARIABLE' IN TYPEOF ( SELF ) ) ;
END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY object_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: basic_attribute_schema


 ENTITY odd_function
  SUBTYPE OF (unary_boolean_expression);
  SELF\unary_generic_expression.operand : numeric_expression;
  WHERE
 wr1:is_int_expr (SELF\unary_generic_expression.operand) ;
END_ENTITY;  -- 13584-20: expressions_schema
```

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```
 ENTITY offset_curve_2d
  SUBTYPE OF (curve);
  basis_curve : curve;
  distance : length_measure;
  self_intersect : LOGICAL;
  WHERE
 wr1:basis_curve.dim =  2;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY offset_curve_3d
  SUBTYPE OF (curve);
  basis_curve : curve;
  distance : length_measure;
  self_intersect : LOGICAL;
  ref_direction : direction;
  WHERE
 wr1: ( basis_curve.dim =  3 ) AND ( ref_direction.dim =  3 )
     ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY offset_surface
  SUBTYPE OF (surface);
  basis_surface : surface;
  distance : length_measure;
  self_intersect : LOGICAL;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY one_direction_repeat_factor
  SUBTYPE OF (geometric_representation_item);
  repeat_factor : vector;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY open_path_profile
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
```

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```
      used_representation.items ) =  1 ) ) ) =  1;
  wr4: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
      'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
      'orientation' ) ) ) =  1 ) ) ) =  1;
  wr5: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PATH_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) =  1;
  wr6: ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) <=1 ) AND (
      SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) =  SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'profile limit' ) ) ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY open_shell
  SUBTYPE OF (connected_face_set);
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY or_expression
  SUBTYPE OF (multiple_arity_boolean_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY ordinate_dimension
  SUBTYPE OF (projection_directed_callout);
 END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY organization;
  id : OPTIONAL identifier;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: person_organization_schema
```

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```
 ENTITY organization_assignment
  ABSTRACT SUPERTYPE;
  assigned_organization : organization;
  role : organization_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY organization_relationship;
  name : label;
  description : OPTIONAL text;
  relating_organization : organization;
  related_organization : organization;
 END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY organization_role;
  name : label;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY organizational_address
  SUBTYPE OF (address);
  organizations : SET[1:?] OF organization;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY organizational_project;
  name : label;
  description : OPTIONAL text;
  responsible_organizations : SET[1:?] OF organization;
  DERIVE
   id : identifier := get_id_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
    'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY organizational_project_assignment
  ABSTRACT SUPERTYPE;
  assigned_organizational_project : organizational_project;
  role : organizational_project_role;
 END_ENTITY;  -- 10303-41: management_resources_schema
```

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```
 ENTITY organizational_project_relationship;
  name : label;
  description : OPTIONAL text;
  relating_organizational_project : organizational_project;
  related_organizational_project : organizational_project;
 END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY organizational_project_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY oriented_closed_shell
  SUBTYPE OF (closed_shell);
  closed_shell_element : closed_shell;
  orientation : BOOLEAN;
  DERIVE
   SELF\connected_face_set.cfs_faces : SET[1:?] OF face :=
                       conditional_reverse(
                                          SELF.orientation,SELF.
                                          closed_shell_element.cfs_faces);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_CLOSED_SHELL' IN
     TYPEOF ( SELF.closed_shell_element ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY oriented_edge
  SUBTYPE OF (edge);
  edge_element : edge;
  orientation : BOOLEAN;
  DERIVE
   SELF\edge.edge_start : vertex :=
             boolean_choose(SELF.orientation,SELF.
             edge_element.edge_start,SELF.edge_element.edge_end);
   SELF\edge.edge_end : vertex :=
             boolean_choose(SELF.orientation,SELF.
             edge_element.edge_end,SELF.edge_element.edge_start);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_EDGE' IN TYPEOF (
    SELF.edge_element ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY oriented_face
  SUBTYPE OF (face);
  face_element : face;
  orientation : BOOLEAN;
  DERIVE
```

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```
   SELF\face.bounds : SET[1:?] OF face_bound :=
              conditional_reverse(SELF.
                      orientation,SELF.face_element.bounds);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_FACE' IN TYPEOF (
     SELF.face_element ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY oriented_open_shell
  SUBTYPE OF (open_shell);
  open_shell_element : open_shell;
  orientation : BOOLEAN;
  DERIVE
   SELF\connected_face_set.cfs_faces : SET[1:?] OF face :=
                           conditional_reverse(
                           SELF.orientation,SELF.open_shell_element
                            .cfs_faces);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_OPEN_SHELL' IN
     TYPEOF ( SELF.open_shell_element ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY oriented_path
  SUBTYPE OF (path);
  path_element : path;
  orientation : BOOLEAN;
  DERIVE
   SELF\path.edge_list : LIST[1:?] OF UNIQUE oriented_edge :=
                         conditional_reverse(SELF.orientation,
                          SELF.path_element.edge_list);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.'+ 'ORIENTED_PATH' IN TYPEOF (
     SELF.path_element ) ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY oriented_surface
  SUBTYPE OF (surface);
  orientation : BOOLEAN;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY outer_boundary_curve
  SUBTYPE OF (boundary_curve);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY over_riding_styled_item
```

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```
  SUBTYPE OF (styled_item);
  over_ridden_style : styled_item;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY package_product_concept_feature
  SUBTYPE OF (product_concept_feature);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' +
     'CONDITIONAL_CONCEPT_FEATURE' IN TYPEOF ( SELF ) ) ;
 wr2: SIZEOF ( QUERY ( cfr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONCEPT_FEATURE_RELATIONSHIP.' +
     'RELATING_PRODUCT_CONCEPT_FEATURE' ) | (
     'AUTOMOTIVE_DESIGN.' +
     'CONCEPT_FEATURE_RELATIONSHIP_WITH_CONDITION' IN TYPEOF (
     cfr ) ) AND ( SIZEOF ( QUERY ( ipcf <* USEDIN ( cfr ,
     'AUTOMOTIVE_DESIGN.CONDITIONAL_CONCEPT_FEATURE.' +
     'CONDITION' ) | 'AUTOMOTIVE_DESIGN.' +
     'INCLUSION_PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( ipcf ) )
     ) =  1 ) ) ) >0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pair_actuator;
  actuated_pair : kinematic_pair;
  name : label;
  UNIQUE
   ur1 : actuated_pair;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY pair_value;
  applies_to_pair : kinematic_pair;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY parabola
  SUBTYPE OF (conic);
  focal_dist : length_measure;
  WHERE
 wr1:focal_dist<>0.0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY parallel_offset
  SUBTYPE OF (derived_shape_aspect);
  offset : measure_with_unit;
  WHERE
 wr1: SIZEOF ( SELF\derived_shape_aspect.
     deriving_relationships ) =  1;
```

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```
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY parallelism_tolerance
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) <3;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY parametric_representation_context
  SUBTYPE OF (representation_context);
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY partial_circular_profile
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) = 1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  3 ) ) ) =  1;
 wr4: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN
     ['orientation' , 'sweep angle' , 'radius'] ) ) ) =  0 ) ) )
     = 1;
 wr5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
     'orientation' ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
```

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```
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'radius' ) AND (
      SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1;
  wr7: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'sweep angle' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
      ) =  1 ) ) ) =  1;
  wr8: ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) <=1 ) AND (
      SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) =  SIZEOF (
      QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name = 'profile limit' ) ) ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY path
  SUPERTYPE OF (ONEOF(edge_loop,oriented_path))
  SUBTYPE OF (topological_representation_item);
  edge_list : LIST[1:?] OF UNIQUE oriented_edge;
  WHERE
 wr1:path_head_to_tail ( SELF ) ;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY path_feature_component
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
      TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN  [ 'partial circular' ,
      'complete circular' , 'linear' , 'complex'];
 wr3: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
```

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```
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
wr4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
    'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
    'orientation' ) ) ) =  1 ) ) ) =  1;
wr5: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  3 ) ) ) =  1 ) ;
wr6: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name = 'radius' ) AND (
    SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) =  1 ) ;
wr7: ( SELF.description<> 'partial circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'sweep angle' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'PLANE_ANGLE_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) )
    ) =  1 ) ) ) =  1 ) ;
wr8: ( SELF.description<> 'complete circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( pdr.
    used_representation.items ) =  2 ) ) ) =  1 ) ;
wr9: ( SELF.description<> 'complete circular' ) OR ( SIZEOF (
    QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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```
      used_representation.items | ( i.name =  'radius' ) AND (
      SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr10: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY (
      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( pdr.
      used_representation.items ) =  2 ) ) ) =  1 ) ;
  wr11: ( SELF.description<>'linear' ) OR ( SIZEOF ( QUERY (
      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'distance' ) AND
      ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr12: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'PATH_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
      used_representation ) ) AND ( pdr.name =  'sweep path' )
      ) ) =  1 ) AND ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PATH_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.name
      =  'sweep path' ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'path curve' )
      AND ( 'AUTOMOTIVE_DESIGN.' + 'CURVE' IN TYPEOF ( i ) ) )
      ) =  1 ) ) ) =  1 ) ;
  wr13: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( pdr.
      used_representation.items ) =  1 ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY path_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
  wr1: SIZEOF ( SELF.items ) =  1;
  wr2: SIZEOF ( QUERY ( i <* SELF.items | ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.' + 'BOUNDED_CURVE' ,
      'AUTOMOTIVE_DESIGN.' + 'EDGE_CURVE' , 'AUTOMOTIVE_DESIGN.'
      + 'PATH']* TYPEOF ( i ) ) =  1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design
```

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```
ENTITY pattern_offset_membership
 SUBTYPE OF (feature_component_relationship);
 WHERE
wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' ,
    'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN']* TYPEOF (
    SELF.relating_shape_aspect.of_shape.definition ) ) =  1;
wr2: SIZEOF ( QUERY ( sar <* USEDIN (
    SELF.related_shape_aspect ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( 'AUTOMOTIVE_DESIGN.' + 'MODIFIED_PATTERN' IN TYPEOF (
    sar.relating_shape_aspect.of_shape.definition ) ) AND (
    sar.description =  'modified pattern' ) ) ) >=1;
wr3: SIZEOF ( get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) ) =  1;
wr4: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( pdr.used_representation.items ) =  2 ) ) ) =  1
    ) ;
wr5: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'index number' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1
    ) ;
wr6: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'offset' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'PLANE_ANGLE_MEASURE_WITH_UNIT']*
    TYPEOF ( i ) ) =  2 ) ) ) =  1 ) ) ) =  1 ) ;
wr7: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( pdr.used_representation.items ) =  3 ) ) ) =  1
```

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```
    ) ;
 wr8: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'row index' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1
    ) ;
 wr9: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'column index' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1
    ) ;
 wr10: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'offset distance' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
    'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
    ( i ) ) =  2 ) ) ) =  1 ) ) ) =  1 ) ;
 wr11: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
    TYPEOF ( pdr.used_representation ) ) AND ( pdr.
    used_representation.name =  'offset direction' ) ) ) =  1
    ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pattern_omit_membership
  SUBTYPE OF (feature_component_relationship);
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' ,
    'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN']* TYPEOF (
    SELF.relating_shape_aspect.of_shape.definition ) ) =  1;
 wr2: SIZEOF ( QUERY ( sar <* USEDIN (
```

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```
    SELF.related_shape_aspect ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATED_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( 'AUTOMOTIVE_DESIGN.' + 'MODIFIED_PATTERN' IN TYPEOF (
    sar.relating_shape_aspect.of_shape.definition ) ) AND (
    sar.description =  'modified pattern' ) ) ) >=1;
wr3: SIZEOF ( get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) ) =  1;
wr4: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( pdr.used_representation.items ) =  1 ) ) ) =  1
    ) ;
wr5: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'index number' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) =  1 ) ) ) =  1
    ) ;
wr6: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( pdr.used_representation.items ) =  2 ) ) ) =  1
    ) ;
wr7: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'row index' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
    'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
    measure_with_unit.value_component ) ) ) =  1 ) ) ) =  1
    ) ;
wr8: NOT ( 'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_PATTERN' IN
    TYPEOF ( SELF.relating_shape_aspect.of_shape.definition
    ) ) OR ( SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations (
    SELF.related_shape_aspect.of_shape.definition ) | (
    SIZEOF ( QUERY ( i <* pdr.used_representation.items | (
    i.name =  'column index' ) AND ( 'AUTOMOTIVE_DESIGN.' +
```

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```
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
     measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1
     ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pcurve
  SUBTYPE OF (curve);
  basis_surface : surface;
  reference_to_curve : definitional_representation;
  WHERE
 wr1: SIZEOF ( reference_to_curve\ representation.items ) =
     1;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'CURVE' IN TYPEOF (
     reference_to_curve\ representation.items[1] ) ;
 wr3:reference_to_curve\ representation.
     items[1]\geometric_representation_item.dim =  2;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY perpendicular_to
  SUBTYPE OF (derived_shape_aspect);
  WHERE
 wr1: SIZEOF ( SELF\derived_shape_aspect.
     deriving_relationships ) =  1;
END_ENTITY;  -- 10303-47: shape_aspect_definition_schema


 ENTITY perpendicularity_tolerance
  SUBTYPE OF (geometric_tolerance_with_datum_reference);
  WHERE
 wr1: SIZEOF ( SELF\geometric_tolerance_with_datum_reference.
     datum_system ) <=3;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY person;
  id : identifier;
  last_name : OPTIONAL label;
  first_name : OPTIONAL label;
  middle_names : OPTIONAL LIST[1:?] OF label;
  prefix_titles : OPTIONAL LIST[1:?] OF label;
  suffix_titles : OPTIONAL LIST[1:?] OF label;
  WHERE
 wr1: EXISTS ( last_name ) OR EXISTS ( first_name ) ;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY person_and_organization;
```

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```
  the_person : person;
  the_organization : organization;
  DERIVE
   name : label := get_name_value(SELF);
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY person_and_organization_address
  SUBTYPE OF (organizational_address,personal_address);
  WHERE
 wr1: SIZEOF ( SELF\personal_address.people ) =  1;
 wr2: SIZEOF ( SELF\organizational_address.organizations ) =
     1;
 wr3: SIZEOF ( QUERY ( pao <* USEDIN ( SELF.people[1] ,
     'AUTOMOTIVE_DESIGN.PERSON_AND_ORGANIZATION.THE_PERSON' ) |
     pao.the_organization:=:SELF\organizational_address.
     organizations[1] ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY person_and_organization_assignment
  ABSTRACT SUPERTYPE;
  assigned_person_and_organization : person_and_organization;
  role : person_and_organization_role;
 END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY person_and_organization_role;
  name : label;
  DERIVE
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY personal_address
  SUBTYPE OF (address);
  people : SET[1:?] OF person;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: person_organization_schema


 ENTITY physically_modelled_product_definition
```

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```
  SUBTYPE OF (product_definition_with_associated_documents);
  WHERE
 wr1:SELF.frame_of_reference\ application_context_element.name
     =  'physical model occurrence' ;
 wr2: ( SIZEOF ( documentation_ids ) =  1 ) AND ( SIZEOF (
     QUERY ( d <* documentation_ids | ( SIZEOF ( QUERY ( drt
     <* d.representation_types | ( drt.name =  'physical' ) ) )
     =  1 ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY placed_datum_target_feature
  SUBTYPE OF (datum_target);
  WHERE
 wr1:SELF.description IN  ['point' , 'line' , 'rectangle' ,
     'circle'];
 wr2: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'orientation' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
     ) ) ) =  1 ) ) ) =  1;
 wr4: ( SELF.description<>'point' ) OR ( SIZEOF ( QUERY ( pdr
     <* get_shape_aspect_property_definition_representations (
     SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  1 ) ) ) =  1 ) ;
 wr5: ( SELF.description<>'circle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  2 ) ) ) =  1 ) ;
 wr6: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  3 ) ) ) =  1 ) ;
 wr7: ( SELF.description<>'circle' ) OR ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
```

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      used_representation.items | ( i.name =  'target diameter'
      ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr8: ( SELF.description<>'line' ) OR ( SIZEOF ( QUERY ( pdr
      <* get_shape_aspect_property_definition_representations (
      SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'target length' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr9: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY (
      pdr <* get_shape_aspect_property_definition_representations
      ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'target length' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
  wr10: ( SELF.description<>'rectangle' ) OR ( SIZEOF ( QUERY
      ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( i.name =  'target width' )
      AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
      'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
      'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
      1 ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY placed_feature
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF (
      SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'SHAPE_REPRESENTATION' IN
      TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'feature definition placement'
      ) AND ( SIZEOF ( QUERY ( i <* pdr.used_representation.
      items | ( 'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM' IN TYPEOF
      ( i ) ) AND ( SIZEOF ( QUERY ( pdr1 <* USEDIN ( i\
```

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      mapped_item.mapping_source.mapped_representation ,
      'AUTOMOTIVE_DESIGN.' + 'PROPERTY_DEFINITION_REPRESENTATION.'
      + 'USED_REPRESENTATION') |
      ( 'AUTOMOTIVE_DESIGN.' + 'FEATURE_DEFINITION' IN
      TYPEOF ( pdr1.definition\ property_definition.definition
      ) ) ) ) =  1 ) ) ) =  1 ) ) ) =  1;
  wr3: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'maximum feature limit' ) ) )
      =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY placement
  SUPERTYPE OF (ONEOF(axis1_placement,
                      axis2_placement_2d,
                      axis2_placement_3d))
  SUBTYPE OF (geometric_representation_item);
  location : cartesian_point;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY planar_box
  SUBTYPE OF (planar_extent);
  placement : axis2_placement;
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY planar_curve_pair
  SUBTYPE OF (kinematic_pair);
  curve_1 : curve;
  curve_2 : curve;
  orientation : BOOLEAN;
  WHERE
 wr1:frame_associated_to_background ( SELF\kinematic_pair.
      pair_placement_in_first_link_context , curve_1 ) ;
 wr2:frame_associated_to_background ( SELF\kinematic_pair.
      pair_placement_in_second_link_context , curve_2 ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY planar_curve_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : planar_curve_pair;
  range_on_curve_1 : trimmed_curve;
  range_on_curve_2 : trimmed_curve;
  WHERE
 wr1:SELF\simple_pair_range.applies_to_pair\ planar_curve_pair.
      curve_1:=:range_on_curve_1.basis_curve;
```

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```
 wr2:SELF\simple_pair_range.applies_to_pair\ planar_curve_pair.
     curve_2:=:range_on_curve_2.basis_curve;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY planar_extent
  SUBTYPE OF (geometric_representation_item);
  size_in_x : length_measure;
  size_in_y : length_measure;
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY planar_pair
  SUBTYPE OF (kinematic_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY planar_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : planar_pair;
  lower_limit_actual_rotation : rotational_range_measure;
  upper_limit_actual_rotation : rotational_range_measure;
  lower_limit_actual_translation_x : translational_range_measure;
  upper_limit_actual_translation_x : translational_range_measure;
  lower_limit_actual_translation_y : translational_range_measure;
  upper_limit_actual_translation_y : translational_range_measure;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_rotation ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_actual_rotation
     ) ) ) XOR (
     lower_limit_actual_rotation<upper_limit_actual_rotation ) ;
 wr2: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_translation_x ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     upper_limit_actual_translation_x ) ) ) XOR (
     lower_limit_actual_translation_x<upper_limit_actual_translation_x
     ) ;
 wr3: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_translation_y ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     upper_limit_actual_translation_y ) ) ) XOR (
     lower_limit_actual_translation_y<upper_limit_actual_translation_y
     ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY planar_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : planar_pair;
  actual_rotation : plane_angle_measure;
```

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```
  actual_translation_x : length_measure;
  actual_translation_y : length_measure;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY planar_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( SELF.items ) =  1;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | 'AUTOMOTIVE_DESIGN.'
     + 'PLANE' IN TYPEOF ( i ) ) ) =  1;
 wr3:SELF.name IN  [ 'profile limit' , 'maximum feature limit'
     ];
 wr4: ( SELF.name<> 'maximum feature limit' ) OR ( SIZEOF (
     QUERY ( pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PROPERTY_DEFINITION_REPRESENTATION.'
     +'USED_REPRESENTATION') |
     SIZEOF ( QUERY ( sa <* get_shape_aspects ( pdr.
     definition\ property_definition.definition ) | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'INSTANCED_FEATURE',
     'AUTOMOTIVE_DESIGN.' + 'PLACED_FEATURE']* TYPEOF ( sa ) )
     =  1 ) ) =  1 ) ) =  1 ) ;
 wr5: ( SELF.name<> 'profile limit' ) OR ( SIZEOF ( QUERY (
     pdr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PROPERTY_DEFINITION_REPRESENTATION.'
     +'USED_REPRESENTATION') |
     SIZEOF ( QUERY ( sa <* get_shape_aspects ( pdr.
     definition\ property_definition.definition ) | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'OPEN_PATH_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'PARTIAL_CIRCULAR_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'ROUNDED_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'SQUARE_U_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'
     + 'VEE_PROFILE']* TYPEOF ( sa ) ) =  1 ) ) =  1 ) ) =  1 )
     ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY plane
  SUBTYPE OF (elementary_surface);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY plane_angle_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'PLANE_ANGLE_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema
```

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```
 ENTITY plane_angle_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY plus_expression
  SUBTYPE OF (multiple_arity_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY plus_minus_tolerance;
  range : tolerance_method_definition;
  toleranced_dimension : dimensional_characteristic;
  UNIQUE
   ur1 : toleranced_dimension;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY pocket
  SUBTYPE OF (feature_definition);
  WHERE
 wr1:SELF.description IN  [ 'open rectangular' ,
     'closed rectangular' , 'complex'];
 wr2: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
     sa <* get_shape_aspects ( SELF ) | ( sa.description =
     'boundary occurrence' ) AND ( SIZEOF ( QUERY ( sar <*
     USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.description =
     'profile usage' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'CIRCULAR_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'NGON_CLOSED_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'CLOSED_PATH_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'PARTIAL_CIRCULAR_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
     'ROUNDED_U_PROFILE' , 'AUTOMOTIVE_DESIGN.' + 'VEE_PROFILE'
     , 'AUTOMOTIVE_DESIGN.' + 'TEE_PROFILE' ,
     'AUTOMOTIVE_DESIGN.' + 'OPEN_PATH_PROFILE']* TYPEOF ( sar.
     relating_shape_aspect ) ) =  1 ) ) ) =  1 ) ) ) =  1 ) ;
 wr3: ( SELF.description<> 'closed rectangular' ) OR ( SIZEOF
```

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```
    ( QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description =  'closed boundary occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.description =  'profile usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'RECTANGULAR_CLOSED_PROFILE' IN
    TYPEOF ( sar.relating_shape_aspect ) ) ) ) =  1 ) ) ) =
    1 ) ;
wr4: ( SELF.description<> 'open rectangular' ) OR ( SIZEOF (
    QUERY ( sa <* get_shape_aspects ( SELF ) | ( sa.
    description =  'open boundary occurrence' ) AND ( SIZEOF
    ( QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) ) (
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
    TYPEOF ( sar ) ) AND ( sar.description =
    'profile usage' ) AND ( 'AUTOMOTIVE_DESIGN.' +
    'SQUARE_U_PROFILE' IN TYPEOF ( sar.relating_shape_aspect
    ) ) ) ) =  1 ) ) ) =  1 ) ;
wr5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'pocket depth occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.name =  'pocket depth' ) AND ( sar.description =
    'path feature component usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
    ( sar.relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description =  'linear' ) ) ) =  1 )
    ) ) =  1;
wr6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description = 'bottom condition occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'pocket bottom usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'POCKET_BOTTOM' IN TYPEOF ( sar.
    relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
wr7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'change in boundary occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'taper usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
    relating_shape_aspect ) ) AND ( sar.
    relating_shape_aspect.description IN  [ 'angle taper' ,
    'directed taper' ] ) ) ) =  1 ) ) ) <=1;
```

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 wr8: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {1<=SIZEOF ( pdr.
     used_representation.items ) <=2} ) ) ) =  0;
 wr9: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN
     ['orientation' , 'fillet radius 1' ] ) ) ) >0 ) ) ) =  0;
 wr10: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'base radius' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pocket_bottom
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
     TYPEOF ( SELF.of_shape.definition ) ;
 wr2:SELF.description IN ['planar' , 'complex' , 'through'];
 wr3: NOT ( SELF.description IN  ['planar' , 'complex'] ) OR (
     SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) <=1 ) AND ( SIZEOF ( QUERY (
     pdr <* get_shape_aspect_property_definition_representations
     ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  1 ) AND ( SIZEOF ( QUERY
     ( i <* pdr.used_representation.items | ( i.name =
     'radius' ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) <=1 ) ;
 wr4: NOT ( SELF.description IN  ['planar' , 'complex'] ) OR (
     SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
     ) | ( 'AUTOMOTIVE_DESIGN.' +
```

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```
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.name IN  [ 'pocket depth' , 'pocket depth end' ] ) )
    ) =  1 ) ;
wr5: ( SELF.description<>'complex' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FACE_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) AND ( SIZEOF ( QUERY
    ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' + 'FACE_SHAPE_REPRESENTATION'
    IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
    used_representation.name =  'floor' ) ) ) =  1 ) ;
wr6: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) AND ( SIZEOF ( QUERY
    ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'LOCATION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) AND ( pdr.used_representation.
    name =  'floor location' ) ) ) =  1 ) ;
wr7: ( SELF.description<>'planar' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1 ) AND ( SIZEOF ( QUERY
    ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'DIRECTION_SHAPE_REPRESENTATION' IN TYPEOF ( pdr.
    used_representation ) ) AND ( pdr.used_representation.
    name =  'floor normal' ) ) ) =  1 ) ;
wr8: ( SELF.description<>'through' ) OR ( SIZEOF ( QUERY (
    pdr <* get_shape_aspect_property_definition_representations
    ( SELF ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  0 ) ;
wr9: ( SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) ) )
    =  1 ) AND ( SIZEOF ( QUERY ( sar <* USEDIN ( SELF ,
    'AUTOMOTIVE_DESIGN.SHAPE_ASPECT_RELATIONSHIP.RELATING_SHAPE_ASPECT'
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'pocket bottom usage' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'POCKET' IN TYPEOF ( sar.
    related_shape_aspect.of_shape.definition ) ) AND ( sar.
    related_shape_aspect.of_shape.definition\
```

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     characterized_object.description =
     'bottom condition occurrence' ) ) ) =  1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY point
  SUPERTYPE OF (ONEOF(cartesian_point,point_on_curve,point_on_surface,
                point_replica,degenerate_pcurve))
  SUBTYPE OF (geometric_representation_item);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY point_on_curve
  SUBTYPE OF (point);
  basis_curve : curve;
  point_parameter : parameter_value;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY point_on_planar_curve_pair
  SUBTYPE OF (kinematic_pair);
  pair_curve : curve;
  orientation : BOOLEAN;
  WHERE
 wr1:frame_associated_to_background ( SELF\kinematic_pair.
     pair_placement_in_first_link_context , pair_curve ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_on_planar_curve_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : point_on_planar_curve_pair;
  range_on_pair_curve : trimmed_curve;
  lower_limit_yaw : rotational_range_measure;
  upper_limit_yaw : rotational_range_measure;
  lower_limit_pitch : rotational_range_measure;
  upper_limit_pitch : rotational_range_measure;
  lower_limit_roll : rotational_range_measure;
  upper_limit_roll : rotational_range_measure;
  WHERE
 wr1:SELF\simple_pair_range.applies_to_pair\
     point_on_planar_curve_pair.
     pair_curve:=:range_on_pair_curve.basis_curve;
 wr2: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_yaw ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_yaw ) ) ) XOR (
     lower_limit_yaw<upper_limit_yaw ) ;
 wr3: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_pitch ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_pitch ) ) ) XOR
     ( lower_limit_pitch<upper_limit_pitch ) ;
```

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 wr4: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_roll ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_roll ) ) ) XOR
     ( lower_limit_roll<upper_limit_roll ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_on_planar_curve_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : point_on_planar_curve_pair;
  actual_point_on_curve : point_on_curve;
  input_orientation : spatial_rotation;
  DERIVE
   actual_orientation : ypr_rotation := convert_spatial_to_ypr_rotation
       (SELF\pair_value.applies_to_pair,input_orientation);
  WHERE
 wr1:SELF\pair_value.applies_to_pair\
     point_on_planar_curve_pair.
     pair_curve:=:actual_point_on_curve.basis_curve;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_on_surface
  SUBTYPE OF (point);
  basis_surface : surface;
  point_parameter_u : parameter_value;
  point_parameter_v : parameter_value;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY point_on_surface_pair
  SUBTYPE OF (kinematic_pair);
  pair_surface : surface;
  WHERE
 wr1:frame_associated_to_background ( SELF\kinematic_pair.
     pair_placement_in_first_link_context , pair_surface ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_on_surface_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : point_on_surface_pair;
  range_on_pair_surface : rectangular_trimmed_surface;
  lower_limit_yaw : rotational_range_measure;
  upper_limit_yaw : rotational_range_measure;
  lower_limit_pitch : rotational_range_measure;
  upper_limit_pitch : rotational_range_measure;
  lower_limit_roll : rotational_range_measure;
  upper_limit_roll : rotational_range_measure;
  WHERE
 wr1:SELF\simple_pair_range.applies_to_pair\
```

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```
     point_on_surface_pair.
     pair_surface:=:range_on_pair_surface.basis_surface;
 wr2: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_yaw ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_yaw ) ) ) XOR (
     lower_limit_yaw<upper_limit_yaw ) ;
 wr3: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_pitch ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_pitch ) ) ) XOR
     ( lower_limit_pitch<upper_limit_pitch ) ;
 wr4: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_roll ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_roll ) ) ) XOR
     ( lower_limit_roll<upper_limit_roll ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_on_surface_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : point_on_surface_pair;
  actual_point_on_surface : point_on_surface;
  input_orientation : spatial_rotation;
  DERIVE
   actual_orientation : ypr_rotation := convert_spatial_to_ypr_rotation
       (SELF\pair_value.applies_to_pair.input_orientation);
  WHERE
 wr1:SELF\pair_value.applies_to_pair\ point_on_surface_pair.
     pair_surface:=:actual_point_on_surface.basis_surface;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY point_placement_shape_representation
  SUBTYPE OF (shape_representation);
  WHERE
 wr1: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'COMPOUND_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.'
     + 'AXIS2_PLACEMENT_3D']* TYPEOF ( i ) ) <>1 ) ) =  0;
 wr2: SIZEOF ( QUERY ( i <* SELF.items | SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'COMPOUND_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'MAPPED_ITEM']* TYPEOF ( i ) ) =  1
     ) ) >0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY point_replica
  SUBTYPE OF (point);
  parent_pt : point;
  transformation : cartesian_transformation_operator;
  WHERE
 wr1:transformation.dim =  parent_pt.dim;
```

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```
 wr2:acyclic_point_replica ( SELF , parent_pt ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY point_style;
  name : label;
  marker : marker_select;
  marker_size : size_select;
  marker_colour : colour;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY poly_loop
  SUBTYPE OF (loop,geometric_representation_item);
  polygon : LIST[3:?] OF UNIQUE cartesian_point;
 END_ENTITY;  -- 10303-42: topology_schema


 ENTITY polyline
  SUBTYPE OF (bounded_curve);
  points : LIST[2:?] OF cartesian_point;
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY position_tolerance
  SUBTYPE OF (geometric_tolerance);
  WHERE
 wr1: ( NOT ( 'AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_TOLERANCE_WITH_DATUM_REFERENCE' IN TYPEOF (
     SELF ) ) ) OR ( SIZEOF (
     SELF\geometric_tolerance_with_datum_reference.datum_system
     ) <=3 ) ;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY power_expression
  SUBTYPE OF (binary_numeric_expression);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY pre_defined_colour
  SUBTYPE OF (pre_defined_item,colour);
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY pre_defined_curve_font
  SUBTYPE OF (pre_defined_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema
```

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```
 ENTITY pre_defined_dimension_symbol
  SUBTYPE OF (pre_defined_symbol);
  WHERE
 wr1:SELF.name IN  [ 'arc length' , 'conical taper' ,
     'counterbore' , 'countersink' , 'depth' , 'diameter' ,
     'plus minus' , 'radius' , 'slope' , 'spherical diameter' ,
     'spherical radius' , 'square'];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pre_defined_geometrical_tolerance_symbol
  SUBTYPE OF (pre_defined_symbol);
  WHERE
 wr1:SELF.name IN  ['angularity' , 'basic dimension' ,
     'blanked datum reference' , 'circular runout' ,
     'circularity' , 'concentricity' , 'cylindricity' ,
     'datum target identification' , 'diameter' ,
     'filled datum reference' , 'flatness' ,
     'least material condition' , 'maximum material condition' ,
     'parallelism' , 'perpendicularity' , 'position' ,
     'profile of a line' , 'profile of a surface' ,
     'projected tolerance zone' , 'regardless of feature size' ,
     'straightness' , 'symmetry' , 'total runout' ];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pre_defined_item;
  name : label;
 END_ENTITY;  -- 10303-41: external_reference_schema


 ENTITY pre_defined_marker
  SUBTYPE OF (pre_defined_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY pre_defined_point_marker_symbol
  SUBTYPE OF (pre_defined_marker,pre_defined_symbol);
  WHERE
 wr1:SELF.name IN  ['asterisk' , 'circle' , 'dot' , 'plus' ,
    'square' , 'triangle' , 'x'];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pre_defined_presentation_style
  SUBTYPE OF (pre_defined_item);
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY pre_defined_surface_condition_symbol
```

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```
  SUBTYPE OF (pre_defined_symbol);
  WHERE
 wr1:SELF.name IN  ['000' , '010' , '020' , '030' , '040' ,
     '050' , '060' , '070' , '001' , '011' , '021' , '031' ,
     '041' , '051' , '061' , '071' , '100' , '110' , '120' ,
     '130' , '140' , '150' , '160' , '170' , '101' , '111' ,
     '121' , '131' , '141' , '151' , '161' , '171' , '200' ,
     '210' , '220' , '230' , '240' , '250' , '260' , '270' ,
     '201' , '211' , '221' , '231' , '241' , '251' , '261' ,
     '271'];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pre_defined_symbol
  SUBTYPE OF (pre_defined_item);
 END_ENTITY;  -- 10303-46: presentation_definition_schema


 ENTITY pre_defined_terminator_symbol
  SUBTYPE OF (pre_defined_symbol);
  WHERE
 wr1:SELF.name IN  [ 'blanked arrow' , 'blanked box' ,
     'blanked dot' , 'dimension origin' , 'filled arrow' ,
     'filled box' , 'filled dot' , 'integral symbol' ,
     'open arrow' , 'slash' , 'unfilled arrow' ];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY pre_defined_text_font
  SUBTYPE OF (pre_defined_item);
 END_ENTITY;  -- 10303-46: presentation_resource_schema


 ENTITY precision_qualifier;
  precision_value: INTEGER;
 END_ENTITY;  -- 10303-45: qualified_measure_schema


 ENTITY presentation_area
  SUBTYPE OF (presentation_representation);
  WHERE
 wr1: ( ( SIZEOF ( QUERY ( ais <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'AREA_IN_SET.'+ 'AREA' ) | SIZEOF (
     USEDIN ( ais , 'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+
     'UNIT' ) ) =  1 ) ) >0 ) OR ( SIZEOF ( USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PRESENTATION_SIZE.'+ 'UNIT' ) ) =
     1 ) ) ;
END_ENTITY;  -- 10303-46: presentation_organization_schema
```

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```
 ENTITY presentation_layer_assignment;
  name : label;
  description : text;
  assigned_items : SET[1:?] OF layered_item;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presentation_representation
  SUBTYPE OF (representation);
  WHERE
 wr1:SELF\representation.context_of_items\
     geometric_representation_context.
     coordinate_space_dimension =  2;
 wr2:'AUTOMOTIVE_DESIGN.'+ 'GEOMETRIC_REPRESENTATION_CONTEXT'
     IN TYPEOF ( SELF\representation.context_of_items ) ;
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presentation_set;
  INVERSE
   areas : SET[1:?] OF area_in_set FOR in_set;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presentation_size;
  unit : presentation_size_assignment_select;
  size : planar_box;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'PRESENTATION_REPRESENTATION'
     IN TYPEOF ( SELF.unit ) ) AND item_in_context (
     SELF.size , SELF.unit\ representation.context_of_items ) )
     OR ( ( 'AUTOMOTIVE_DESIGN.'+ 'AREA_IN_SET' IN TYPEOF (
     SELF.unit ) ) AND ( SIZEOF ( QUERY ( ais <* SELF.unit\
     area_in_set.in_set.areas | NOT item_in_context (
     SELF.size , ais.area\ representation.context_of_items ) )
     ) =  0 ) ) );
END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presentation_style_assignment;
  styles : SET[1:?] OF presentation_style_select;
  WHERE
 wr1: SIZEOF ( QUERY ( style1 <* SELF.styles | NOT ( SIZEOF
     ( QUERY ( style2 <* ( SELF.styles-style1 ) | NOT ( (
     TYPEOF ( style1 ) <> TYPEOF ( style2 ) ) OR ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'SURFACE_STYLE_USAGE' ,
     'AUTOMOTIVE_DESIGN.' + 'EXTERNALLY_DEFINED_STYLE']* TYPEOF
     ( style1 ) ) =  1 ) ) ) ) =  0 ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( style1 <* SELF.styles |
     'AUTOMOTIVE_DESIGN.'+ 'SURFACE_STYLE_USAGE' IN TYPEOF (
     style1 ) ) ) <=2;
```

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```
END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY presentation_style_by_context
  SUBTYPE OF (presentation_style_assignment);
  style_context : style_context_select;
 END_ENTITY;  -- 10303-46: presentation_appearance_schema


 ENTITY presentation_view
  SUBTYPE OF (presentation_representation);
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presented_item
  ABSTRACT SUPERTYPE;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY presented_item_representation;
  presentation : presentation_representation_select;
  item : presented_item;
 END_ENTITY;  -- 10303-46: presentation_organization_schema


 ENTITY prismatic_pair
  SUBTYPE OF (kinematic_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY prismatic_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : prismatic_pair;
  lower_limit_actual_translation : translational_range_measure;
  upper_limit_actual_translation : translational_range_measure;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_translation ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     upper_limit_actual_translation ) ) ) XOR (
     lower_limit_actual_translation<upper_limit_actual_translation
     ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY prismatic_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : prismatic_pair;
  actual_translation : length_measure;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema
```

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```
 ENTITY process_operation
  SUBTYPE OF (action_method);
  WHERE
 wr1: SIZEOF ( QUERY ( amr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ACTION_METHOD_RELATIONSHIP.' +
     'RELATING_METHOD' ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
     'PROCESS_OPERATION' IN TYPEOF ( amr.related_method ) )
     OR ( SELF:=:amr.related_method ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( amr <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.ACTION_METHOD_RELATIONSHIP.' +
     'RELATED_METHOD' ) | NOT ( 'AUTOMOTIVE_DESIGN.' +
     'PROCESS_OPERATION' IN TYPEOF ( amr.relating_method ) )
     OR ( SELF:=:amr.relating_method ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY process_plan
  SUBTYPE OF (action);
  WHERE
 wr1: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_RELATIONSHIP.' +
     'RELATED_ACTION' ) | SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar.relating_action ) )
     <>1 ) ) =  0;
 wr2: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_RELATIONSHIP.' +
     'RELATING_ACTION' ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar.related_action ) )
     =  1 ) OR ( ( ar.name = 'process operation occurrence' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'PROCESS_OPERATION' IN
     TYPEOF ( ar.related_action.chosen_method ) ) ) ) ) =
     SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATING_ACTION' ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY process_product_association;
  name : label;
  description : text;
  defined_product : characterized_product_definition;
  process : product_definition_process;
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY process_property_association;
  name : label;
  description : text;
  process : property_process;
  property_or_shape : property_or_shape_select;
```

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```
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY product;
  id : identifier;
  name : label;
  description : OPTIONAL text;
  frame_of_reference : SET[1:?] OF product_context;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_category;
  name : label;
  description : OPTIONAL text;
  DERIVE
   id : identifier := get_id_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_category_relationship;
  name : label;
  description : OPTIONAL text;
  category : product_category;
  sub_category : product_category;
  WHERE
 wr1:acyclic_product_category_relationship ( SELF ,
     [SELF.sub_category] ) ;
END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_class
  SUBTYPE OF (product_concept,characterized_object);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_concept;
  id : identifier;
  name : label;
  description : OPTIONAL text;
  market_context : product_concept_context;
  UNIQUE
   ur1 : id;
 END_ENTITY;  -- 10303-44: product_concept_schema


 ENTITY product_concept_context
  SUBTYPE OF (application_context_element);
```

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```
  market_segment_type : label;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY product_concept_feature;
  id : identifier;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-44: product_concept_schema


 ENTITY product_concept_feature_association;
  name : label;
  description : OPTIONAL text;
  concept : product_concept;
  feature : product_concept_feature;
 END_ENTITY;  -- 10303-44: product_concept_schema


 ENTITY product_concept_feature_category
  SUBTYPE OF (group);
  WHERE
 wr1: SIZEOF ( QUERY ( aga <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.GROUP_ASSIGNMENT' + 'ASSIGNED_GROUP' )
     | ( 'AUTOMOTIVE_DESIGN.' + 'APPLIED_GROUP_ASSIGNMENT' IN
     TYPEOF ( aga ) ) AND ( ( aga.role.name<>
     'specification category member' ) OR ( SIZEOF ( QUERY (
     i <* aga.items | ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_CONCEPT_FEATURE' IN TYPEOF ( i ) ) AND NOT (
     'AUTOMOTIVE_DESIGN.' + 'CONDITIONAL_CONCEPT_FEATURE' IN
     TYPEOF ( i ) ) ) ) <> SIZEOF ( aga.items ) ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_concept_feature_category_usage
  SUBTYPE OF (group_assignment);
  items : SET[1:?] OF category_usage_item;
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'PRODUCT_CONCEPT_FEATURE_CATEGORY'
     IN TYPEOF ( SELF.assigned_group ) ;
 wr2:SELF.role.name IN  [ 'mandatory category usage' ,
   'optional category usage' ];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_concept_relationship;
  name : label;
  description : OPTIONAL text;
  relating_product_concept : product_concept;
  related_product_concept : product_concept;
```

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```
 END_ENTITY;  -- 10303-44: product_concept_schema


 ENTITY product_context
  SUBTYPE OF (application_context_element);
  discipline_type : label;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY product_definition;
  id : identifier;
  description : OPTIONAL text;
  formation : product_definition_formation;
  frame_of_reference : product_definition_context;
  DERIVE
   name : label := get_name_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_definition_context
  SUBTYPE OF (application_context_element);
  life_cycle_stage : label;
 END_ENTITY;  -- 10303-41: application_context_schema


 ENTITY product_definition_context_association;
  definition : product_definition;
  frame_of_reference : product_definition_context;
  role : product_definition_context_role;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_definition_context_role;
  name : label;
  description : OPTIONAL text;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_definition_effectivity
  SUBTYPE OF (effectivity);
  usage : product_definition_relationship;
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'EFFECTIVITY_ASSIGNMENT.'+ 'ASSIGNED_EFFECTIVITY' ) ) =  0;
END_ENTITY;  -- 10303-41: product_definition_schema
```

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```
ENTITY product_definition_formation;
 id : identifier;
 description : OPTIONAL text;
 of_product : product;
 UNIQUE
  ur1 : id,of_product;
END_ENTITY;  -- 10303-41: product_definition_schema


ENTITY product_definition_formation_relationship;
 id : identifier;
 name : label;
 description : OPTIONAL text;
 relating_product_definition_formation : product_definition_formation;
 related_product_definition_formation : product_definition_formation;
END_ENTITY;  -- 10303-41: product_definition_schema


ENTITY product_definition_formation_with_specified_source
 SUBTYPE OF (product_definition_formation);
 make_or_buy : source;
END_ENTITY;  -- 10303-41: product_definition_schema


ENTITY product_definition_occurrence_relationship;
 name : label;
 description : OPTIONAL text;
 occurrence : product_definition;
 occurrence_usage : assembly_component_usage;
 WHERE
wr1:occurrence_usage.
    relating_product_definition:<>:occurrence;
wr2:occurrence_usage.related_product_definition:<>:occurrence;
wr3:occurrence.formation:=:occurrence_usage.
    related_product_definition.formation;
END_ENTITY;  -- 10303-44: product_structure_schema


ENTITY product_definition_process
 SUBTYPE OF (action);
 identification : identifier;
 INVERSE
  product_definitions : SET[1:?] OF process_product_association
                FOR process;
END_ENTITY;  -- 10303-49: process_property_schema


ENTITY product_definition_relationship;
 id : identifier;
 name : label;
```

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```
  description : OPTIONAL text;
  relating_product_definition : product_definition;
  related_product_definition : product_definition;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_definition_resource
  SUBTYPE OF (action_resource,product_definition);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'REQUIREMENT_FOR_ACTION_RESOURCE.' + 'RESOURCES' ) ) >0;
 wr2:SELF.frame_of_reference.name IN  ['part_definition' ,
     'part occurrence' , 'physical occurrence' ];
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_definition_shape
  SUBTYPE OF (property_definition);
  UNIQUE
   ur1 : SELF\property_definition.definition;
  WHERE
 wr1: SIZEOF ( ['AUTOMOTIVE_DESIGN.'+
     'CHARACTERIZED_PRODUCT_DEFINITION' , 'AUTOMOTIVE_DESIGN.'+
     'CHARACTERIZED_OBJECT']* TYPEOF (
     SELF\property_definition.definition ) ) >0;
END_ENTITY;  -- 10303-41: product_property_definition_schema


 ENTITY product_definition_substitute;
  description : OPTIONAL text;
  context_relationship : product_definition_relationship;
  substitute_definition : product_definition;
  DERIVE
   name : label := get_name_value(SELF);
  WHERE
 wr1:context_relationship.
     related_product_definition:<>:substitute_definition;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_definition_usage
  SUPERTYPE OF (ONEOF(make_from_usage_option,assembly_component_usage))
  SUBTYPE OF (product_definition_relationship);
  UNIQUE
   ur1 : SELF\product_definition_relationship.id,SELF\
   product_definition_relationship.relating_product_definition,SELF\
   product_definition_relationship.related_product_definition;
  WHERE
 wr1:acyclic_product_definition_relationship ( SELF ,
```

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```
     [SELF\product_definition_relationship.
     related_product_definition] , 'AUTOMOTIVE_DESIGN.'+
     'PRODUCT_DEFINITION_USAGE' ) ;
END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY product_definition_with_associated_documents
  SUBTYPE OF (product_definition);
  documentation_ids : SET[1:?] OF document;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_identification
  SUBTYPE OF (configuration_item,characterized_object);
  WHERE
 wr1: SIZEOF ( QUERY ( cd <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.CONFIGURATION_DESIGN.CONFIGURATION' ) |
     ( 'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION_FORMATION' IN
     TYPEOF ( cd.design ) ) AND ( SIZEOF ( QUERY ( prpc <*
     USEDIN ( cd.design\ product_definition_formation.
     of_product ,
     'AUTOMOTIVE_DESIGN.PRODUCT_RELATED_PRODUCT_CATEGORY.PRODUCTS'
     ) | prpc.name IN  ['part' , 'raw material' , 'tool'] ) )
     >0 ) ) ) <=1;
 wr2:'AUTOMOTIVE_DESIGN.' + 'PRODUCT_CLASS' IN TYPEOF (
     SELF.item_concept ) ;
 wr3: NOT ( 'AUTOMOTIVE_DESIGN.' + 'CONFIGURABLE_ITEM' IN
     TYPEOF ( SELF ) ) OR ( 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_SPECIFICATION' IN TYPEOF ( SELF ) ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_process_plan
  SUBTYPE OF (product_definition_process);
  WHERE
 wr1: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_RELATIONSHIP.' +
     'RELATED_ACTION' ) | SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar.relating_action ) )
     <>1 ) ) =  0;
 wr2: SIZEOF ( QUERY ( ar <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_RELATIONSHIP.' +
     'RELATING_ACTION' ) | ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'PROCESS_PLAN' , 'AUTOMOTIVE_DESIGN.' +
     'PRODUCT_PROCESS_PLAN']* TYPEOF ( ar.related_action ) )
     =  1 ) OR ( ( ar.name =  'process operation occurrence' )
     AND ( 'AUTOMOTIVE_DESIGN.' + 'PROCESS_OPERATION' IN
     TYPEOF ( ar.related_action.chosen_method ) ) ) ) ) =
     SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATING_ACTION' ) ) ;
```

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```
 wr3: SIZEOF ( QUERY ( ppa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'PROCESS_PRODUCT_ASSOCIATION.' +
     'PROCESS' ) | ( ppa.name<> 'produced output' ) OR NOT (
     'AUTOMOTIVE_DESIGN.' + 'PRODUCT_DEFINITION' IN TYPEOF (
     ppa.defined_product ) ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY product_related_product_category
  SUBTYPE OF (product_category);
  products : SET[1:?] OF product;
 END_ENTITY;  -- 10303-41: product_definition_schema


 ENTITY product_specification
  SUBTYPE OF (product_identification,configurable_item);
 END_ENTITY;  -- 10303-214: automotive_design


 ENTITY projected_zone_definition
  SUBTYPE OF (tolerance_zone_definition);
  projection_end : shape_aspect;
  projected_length : measure_with_unit;
  WHERE
 wr1: ( 'NUMBER' IN TYPEOF ( projected_length\
     measure_with_unit.value_component ) ) AND (
     projected_length\ measure_with_unit.value_component>0.0 )
     ;
 wr2: ( derive_dimensional_exponents ( projected_length\
     measure_with_unit.unit_component ) =
     dimensional_exponents ( 1 , 0 , 0 , 0 , 0 , 0 , 0 ) ) ;
END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY projection_curve
  SUBTYPE OF (annotation_curve_occurrence);
 END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY projection_directed_callout
  SUBTYPE OF (draughting_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( p_1 <* SELF\draughting_callout.
     contents | 'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_CURVE' IN (
     TYPEOF ( p_1 ) ) ) ) =  1;
 wr2: SIZEOF ( SELF\draughting_callout.contents ) >=2;
END_ENTITY;  -- 10303-101: draughting_element_schema


 ENTITY promissory_usage_occurrence
```

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```
  SUBTYPE OF (assembly_component_usage);
 END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY property_definition;
  name : label;
  description : OPTIONAL text;
  definition : characterized_definition;
  DERIVE
   id : identifier := get_id_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_property_definition_schema


 ENTITY property_definition_relationship;
  name : label;
  description : text;
  relating_property_definition : property_definition;
  related_property_definition : property_definition;
 END_ENTITY;  -- 10303-45: material_property_definition_schema


 ENTITY property_definition_representation;
  definition : represented_definition;
  used_representation : representation;
  DERIVE
   description : text := get_description_value(SELF);
   name : label := get_name_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'NAME_ATTRIBUTE.'+ 'NAMED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-41: product_property_representation_schema


 ENTITY property_process
  SUBTYPE OF (action);
  identification : identifier;
  INVERSE
   properties : SET[1:?] OF process_property_association FOR process;
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY qualified_representation_item
  SUBTYPE OF (representation_item);
  qualifiers : SET[1:?] OF value_qualifier;
  WHERE
```

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```
 wr1: SIZEOF ( QUERY ( temp <* qualifiers |
     'AUTOMOTIVE_DESIGN.'+ 'PRECISION_QUALIFIER' IN TYPEOF (
     temp ) ) ) <2;
END_ENTITY;  -- 10303-45: qualified_measure_schema


 ENTITY quantified_assembly_component_usage
  SUBTYPE OF (assembly_component_usage);
  quantity : measure_with_unit;
  WHERE
 wr1: ( NOT ( 'NUMBER' IN TYPEOF ( quantity.value_component
     ) ) ) OR ( quantity.value_component>0 ) ;
END_ENTITY;  -- 10303-44: product_structure_schema


 ENTITY quasi_uniform_curve
  SUBTYPE OF (b_spline_curve);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY quasi_uniform_surface
  SUBTYPE OF (b_spline_surface);
 END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY rack_and_pinion_pair
  SUBTYPE OF (kinematic_pair);
  pinion_radius : length_measure;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rack_and_pinion_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : rack_and_pinion_pair;
  lower_limit_rack_displacement : translational_range_measure;
  upper_limit_rack_displacement : translational_range_measure;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_rack_displacement ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     upper_limit_rack_displacement ) ) ) XOR (
     lower_limit_rack_displacement<upper_limit_rack_displacement
     ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rack_and_pinion_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : rack_and_pinion_pair;
  actual_displacement : length_measure;
```

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```
  DERIVE
   actual_rotation : plane_angle_measure :=
                     convert_plane_angle_for_pair_from_radian
                     (SELF\pair_value.applies_to_pair,
                     (- actual_displacement / SELF\pair_value.
                     applies_to_pair\rack_and_pinion_pair.pinion_radius));
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY radius_dimension
  SUBTYPE OF (dimension_curve_directed_callout);
  WHERE
 wr1: SIZEOF ( QUERY ( con <* SELF.contents |
     'AUTOMOTIVE_DESIGN.'+ 'PROJECTION_CURVE' IN TYPEOF ( con
     ) ) ) <=1;
END_ENTITY;  -- 10303-506: aic_draughting_elements


 ENTITY ratio_measure_with_unit
  SUBTYPE OF (measure_with_unit);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.'+ 'RATIO_UNIT' IN TYPEOF (
     SELF\measure_with_unit.unit_component ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY ratio_unit
  SUBTYPE OF (named_unit);
  WHERE
 wr1: ( SELF\named_unit.dimensions.length_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.mass_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.time_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     electric_current_exponent =  0.0 ) AND ( SELF\named_unit.
     dimensions.thermodynamic_temperature_exponent =  0.0 )
     AND ( SELF\named_unit.dimensions.
     amount_of_substance_exponent =  0.0 ) AND (
     SELF\named_unit.dimensions.luminous_intensity_exponent =
     0.0 ) ;
END_ENTITY;  -- 10303-41: measure_schema


 ENTITY rational_b_spline_curve
  SUBTYPE OF (b_spline_curve);
  weights_data : LIST[2:?] OF REAL;
  DERIVE
   weights : ARRAY[0:upper_index_on_control_points] OF REAL :=
             list_to_array(
             weights_data,0,upper_index_on_control_points);
  WHERE
 wr1: SIZEOF ( weights_data ) =  SIZEOF ( SELF\b_spline_curve.
```

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```
    control_points_list ) ;
 wr2:curve_weights_positive ( SELF ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY rational_b_spline_surface
  SUBTYPE OF (b_spline_surface);
  weights_data : LIST[2:?] OF LIST[2:?] OF REAL;
  DERIVE
   weights : ARRAY[0:u_upper] OF ARRAY[0:v_upper] OF REAL :=
             make_array_of_array
             (weights_data,0,u_upper,0,v_upper);
  WHERE
 wr1: ( SIZEOF ( weights_data ) =  SIZEOF (
    SELF\b_spline_surface.control_points_list ) ) AND (
    SIZEOF ( weights_data[1] ) =  SIZEOF (
    SELF\b_spline_surface.control_points_list[1] ) ) ;
 wr2:surface_weights_positive ( SELF ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY real_literal
  SUBTYPE OF (literal_number);
  SELF\literal_number.the_value : REAL;
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY real_numeric_variable
  SUBTYPE OF (numeric_variable);
 END_ENTITY;  -- 13584-20: expressions_schema


 ENTITY rectangular_closed_profile
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
    TYPEOF ( SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND  {3<=SIZEOF ( pdr.
    used_representation.items ) <=4} ) ) =  1;
 wr4: SIZEOF ( QUERY ( pdr <*
    get_shape_aspect_property_definition_representations ( SELF
    ) | ( 'AUTOMOTIVE_DESIGN.' +
```

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```
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN
     ['orientation' , 'length' , 'width' , 'corner radius' ] ) )
     ) >0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
     'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
     'orientation' ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
     ( i ) ) =  2 ) AND ( i.name =  'width' ) ) ) =  1 ) ) )
     =  1;
 wr7: SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
     ( i ) ) =  2 ) AND ( i.name =  'length' ) ) ) =  1 ) ) )
     =  1;
 wr8: ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'corner radius' )
     ) ) =  1 ) ) ) <=1 ) AND ( SIZEOF ( QUERY ( pdr <*
     get_shape_aspect_property_definition_representations ( SELF
     ) | ( 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( SIZEOF (
     ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
     'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
     ( i ) ) =  2 ) ) ) =  1 ) ) ) <=1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY rectangular_composite_surface
```

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```
  SUBTYPE OF (bounded_surface);
  segments : LIST[1:?] OF LIST[1:?] OF surface_patch;
  DERIVE
   n_u : INTEGER := SIZEOF(segments);
   n_v : INTEGER := SIZEOF(segments[1]);
  WHERE
 wr1: SIZEOF ( QUERY ( s <* segments | n_v<> SIZEOF ( s ) ) )
     =  0;
 wr2:constraints_rectangular_composite_surface ( SELF ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY rectangular_pattern
  SUBTYPE OF (replicate_feature);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'row layout direction' ) ) )
     =  1;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' + 'DIRECTION_SHAPE_REPRESENTATION' IN
     TYPEOF ( pdr.used_representation ) ) AND ( pdr.
     used_representation.name =  'column layout direction' ) )
     ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( pdr.
     used_representation.items ) =  5 ) ) ) =  1;
 wr4: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'number of rows'
     ) AND ( 'AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
     measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1;
 wr5: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =
     'number of columnws' ) AND ( 'AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' IN TYPEOF ( i ) ) AND (
     'AUTOMOTIVE_DESIGN.' + 'COUNT_MEASURE' IN TYPEOF ( i\
```

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```
     measure_with_unit.value_component ) ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'row spacing' )
     AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1;
 wr7: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'column spacing'
     ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
     1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY rectangular_trimmed_surface
  SUBTYPE OF (bounded_surface);
  basis_surface : surface;
  u1 : parameter_value;
  u2 : parameter_value;
  v1 : parameter_value;
  v2 : parameter_value;
  usense : BOOLEAN;
  vsense : BOOLEAN;
  WHERE
 wr1:u1<>u2;
 wr2:v1<>v2;
 wr3: ( ( 'AUTOMOTIVE_DESIGN.'+ 'ELEMENTARY_SURFACE' IN TYPEOF
     ( basis_surface ) ) AND ( NOT ( 'AUTOMOTIVE_DESIGN.'+
     'PLANE' IN TYPEOF ( basis_surface ) ) ) OR (
     'AUTOMOTIVE_DESIGN.'+ 'SURFACE_OF_REVOLUTION' IN TYPEOF (
     basis_surface ) ) OR ( usense =  ( u2>u1 ) ) ;
 wr4: ( ( 'AUTOMOTIVE_DESIGN.'+ 'SPHERICAL_SURFACE' IN TYPEOF
     ( basis_surface ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'TOROIDAL_SURFACE' IN TYPEOF ( basis_surface ) ) ) OR (
     vsense =  ( v2>v1 ) ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY referenced_modified_datum
  SUBTYPE OF (datum_reference);
  modifier : limit_condition;
 END_ENTITY;  -- 10303-47: shape_aspect_definition_schema
```

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```
 ENTITY relative_event_occurrence
  SUBTYPE OF (event_occurrence);
  base_event : event_occurrence;
  offset : time_measure_with_unit;
 END_ENTITY;  -- 10303-41: date_time_schema


 ENTITY rep_item_group
  SUBTYPE OF (group,representation_item);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'PRESENTATION_LAYER_ASSIGNMENT.' + 'ASSIGNED_ITEMS' ) )>0;
 wr2: SIZEOF ( QUERY ( r <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'REPRESENTATION.' + 'ITEMS' ) | r.
     name =  'group representation' ) ) >0;
 wr3: SIZEOF ( QUERY ( ga <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'GROUP_ASSIGNMENT.' +
     'ASSIGNED_GROUP' ) | ga.role.name<> 'group membership' )
     ) =  0;
 wr4: SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
     'GEOMETRIC_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'TOPOLOGICAL_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
     'MAPPED_ITEM' , 'AUTOMOTIVE_DESIGN.' + 'STYLED_ITEM']*
     TYPEOF ( SELF ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY reparametrised_composite_curve_segment
  SUBTYPE OF (composite_curve_segment);
  param_length : parameter_value;
  WHERE
 wr1:param_length>0.0;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY replicate_feature
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) ) ) =  1;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | ( i.name =  'orientation' )
```

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```
     AND ( 'AUTOMOTIVE_DESIGN.' + 'PLACEMENT' IN TYPEOF ( i )
     ) ) ) =  1 ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
     'RELATING_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
     ( sar.name =  'pattern basis' ) AND (
     'AUTOMOTIVE_DESIGN.' + 'FEATURE_DEFINITION' IN TYPEOF (
     sar.related_shape_aspect.of_shape.definition ) ) ) ) =
     1 ) ) ) =  1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY representation;
  name : label;
  items : SET[1:?] OF representation_item;
  context_of_items : representation_context;
  DERIVE
   id : identifier := get_id_value(SELF);
   description : text := get_description_value(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ID_ATTRIBUTE.'+ 'IDENTIFIED_ITEM' ) ) <=1;
 wr2: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'DESCRIPTION_ATTRIBUTE.'+ 'DESCRIBED_ITEM' ) ) <=1;
END_ENTITY;  -- 10303-43: representation_schema


 ENTITY representation_context;
  context_identifier : identifier;
  context_type : text;
  INVERSE
   representations_in_context : SET[1:?] OF representation
            FOR context_of_items;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY representation_item;
  name : label;
  WHERE
 wr1: SIZEOF ( using_representations ( SELF ) ) >0;
END_ENTITY;  -- 10303-43: representation_schema


 ENTITY representation_map;
  mapping_origin : representation_item;
  mapped_representation : representation;
  INVERSE
   map_usage : SET[1:?] OF mapped_item FOR mapping_source;
  WHERE
```

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```
 wr1:item_in_context ( SELF.mapping_origin ,
     SELF.mapped_representation.context_of_items ) ;
END_ENTITY;  -- 10303-43: representation_schema


 ENTITY representation_relationship;
  name : label;
  description : OPTIONAL text;
  rep_1 : representation;
  rep_2 : representation;
 END_ENTITY;  -- 10303-43: representation_schema


 ENTITY representation_relationship_with_transformation
  SUBTYPE OF (representation_relationship);
  transformation_operator : transformation;
  WHERE
 wr1:SELF\representation_relationship.
     rep_1.context_of_items:<>:SELF\representation_relationship.
     rep_2.context_of_items;
END_ENTITY;  -- 10303-43: representation_schema


 ENTITY requirement_for_action_resource
  SUBTYPE OF (action_resource_requirement);
  resources : SET[1:?] OF action_resource;
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY resource_property;
  name : label;
  description : text;
  resource : characterized_resource_definition;
 END_ENTITY;  -- 10303-49: process_property_schema


 ENTITY resource_property_representation;
  name : label;
  description : text;
  property : resource_property;
  representation : representation;
 END_ENTITY;  -- 10303-49: process_property_representation_schema


 ENTITY resource_requirement_type;
  name : label;
  description : text;
 END_ENTITY;  -- 10303-49: process_property_schema
```

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```
 ENTITY resulting_path
  SUBTYPE OF (motion_link_relationship);
  controlling_joints : SET[1:?] OF kinematic_joint;
 END_ENTITY;  -- 10303-105: kinematic_analysis_control_and_result_schema


 ENTITY retention
  SUBTYPE OF (action);
  WHERE
 wr1: SIZEOF ( QUERY ( aa <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'ACTION_ASSIGNMENT.' +
     'ASSIGNED_ACTION' ) | ( 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_ACTION_ASSIGNMENT' IN TYPEOF ( aa ) ) AND ( aa.
     role.name =  'retention' ) ) ) >=1;
 wr2: ( SIZEOF ( QUERY ( atia <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'APPLIED_TIME_INTERVAL_ASSIGNMENT.'
     + 'ITEMS' ) | ( atia.role.name =
     'minimum retention period' ) ) ) =  1 ) AND ( SIZEOF (
     QUERY ( atia <* USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_TIME_INTERVAL_ASSIGNMENT.' + 'ITEMS' ) | ( atia.
     role.name =  'maximum retention period' ) ) ) =  1 ) AND
     ( SIZEOF ( QUERY ( atia1 <* USEDIN ( SELF ,
     'AUTOMOTIVE_DESIGN.' + 'APPLIED_TIME_INTERVAL_ASSIGNMENT.'
     + 'ITEMS' ) | ( atia1.role.name =
     'minimum retention period' ) AND ( 'AUTOMOTIVE_DESIGN.' +
     'TIME_INTERVAL_WITH_BOUNDS' IN TYPEOF (
     atia1.assigned_time_interval ) ) AND ( EXISTS (
     atia1.assigned_time_interval\ time_interval_with_bounds.
     secondary_bound ) OR EXISTS (
     atia1.assigned_time_interval\ time_interval_with_bounds.
     duration ) ) AND ( SIZEOF ( QUERY ( atia2 <* USEDIN (
     SELF , 'AUTOMOTIVE_DESIGN.' +
     'APPLIED_TIME_INTERVAL_ASSIGNMENT.' + 'ITEMS' ) | (
     atia2.role.name = 'maximum retention period' ) AND (
     'AUTOMOTIVE_DESIGN.' + 'TIME_INTERVAL_WITH_BOUNDS' IN
     TYPEOF ( atia2.assigned_time_interval ) ) AND ( EXISTS (
     atia2.assigned_time_interval\ time_interval_with_bounds.
     secondary_bound ) OR EXISTS (
     atia2.assigned_time_interval\ time_interval_with_bounds.
     duration ) ) AND ( atia1.assigned_time_interval\
     time_interval_with_bounds.
     primary_bound:=:atia2.assigned_time_interval\
     time_interval_with_bounds.primary_bound ) ) ) =  1 ) ) )
     =  1 ) ;
 wr3: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATING_ACTION' ) ) + SIZEOF (
     USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ACTION_RELATIONSHIP.' + 'RELATED_ACTION' ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY revolute_pair
```

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```
  SUBTYPE OF (kinematic_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY revolute_pair_range
  SUBTYPE OF (simple_pair_range);
  SELF\simple_pair_range.applies_to_pair : revolute_pair;
  lower_limit_actual_rotation : rotational_range_measure;
  upper_limit_actual_rotation : rotational_range_measure;
  WHERE
 wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
     lower_limit_actual_rotation ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
     'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_actual_rotation
     ) ) ) XOR (
     lower_limit_actual_rotation<upper_limit_actual_rotation ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY revolute_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : revolute_pair;
  actual_rotation : plane_angle_measure;
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY revolved_face_solid
  SUBTYPE OF (swept_face_solid);
  axis : axis1_placement;
  angle : plane_angle_measure;
  DERIVE
   axis_line : line := dummy_gri || curve() ||
               line(axis.location, dummy_gri ||
               vector(axis.z,1.0));
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY rib
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND NOT ( {1<=SIZEOF ( pdr.
     used_representation.items ) <=3} ) ) ) =  0;
 wr2: SIZEOF ( QUERY ( pdr <*
     get_property_definition_representations ( SELF ) | (
     'AUTOMOTIVE_DESIGN.' +
     'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
     used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
     used_representation.items | NOT ( i.name IN
```

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```
    ['orientation' , 'fillet radius' , 'shoulder radius' ] ) )
    ) >0 ) ) ) =  0;
wr3: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'fillet radius' )
    AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr4: SIZEOF ( QUERY ( pdr <*
    get_property_definition_representations ( SELF ) | (
    'AUTOMOTIVE_DESIGN.' +
    'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
    used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
    used_representation.items | ( i.name =  'shoulder radius'
    ) AND ( SIZEOF ( ['AUTOMOTIVE_DESIGN.' +
    'MEASURE_REPRESENTATION_ITEM' , 'AUTOMOTIVE_DESIGN.' +
    'LENGTH_MEASURE_WITH_UNIT']* TYPEOF ( i ) ) =  2 ) ) ) =
    1 ) ) ) <=1;
wr5: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'swept shape occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.description =  'profile usage' ) AND ( SIZEOF (
    ['AUTOMOTIVE_DESIGN.' + 'PARTIAL_CIRCULAR_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'SQUARE_U_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'ROUNDED_U_PROFILE' ,
    'AUTOMOTIVE_DESIGN.' + 'TEE_PROFILE' , 'AUTOMOTIVE_DESIGN.'
    + 'VEE_PROFILE' , 'AUTOMOTIVE_DESIGN.' +
    'OPEN_PATH_PROFILE']* TYPEOF ( sar.relating_shape_aspect
    ) ) =  1 ) ) ) =  1 ) ) ) =  1;
wr6: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'course of travel occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'SHAPE_DEFINING_RELATIONSHIP' IN TYPEOF ( sar ) ) AND (
    sar.name =  'course of travel' ) AND (
    'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
    ( sar.relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
wr7: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
    sa.description =  'change in boundary occurrence' ) AND (
    SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
    'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
    'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
    'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
    ( sar.description =  'taper usage' ) AND (
```

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```
     'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
     relating_shape_aspect ) ) AND ( sar.
     relating_shape_aspect.description =  'directed taper' ) )
     ) =  1 ) ) ) <=1;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY right_angular_wedge
  SUBTYPE OF (geometric_representation_item);
  position : axis2_placement_3d;
  x : positive_length_measure;
  y : positive_length_measure;
  z : positive_length_measure;
  ltx : length_measure;
  WHERE
 wr1: ( ( 0.0<=ltx ) AND ( ltx<x ) ) ;
END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY right_circular_cone
  SUBTYPE OF (geometric_representation_item);
  position : axis1_placement;
  height : positive_length_measure;
  radius : length_measure;
  semi_angle : plane_angle_measure;
  WHERE
 wr1:radius>=0.0;
END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY right_circular_cylinder
  SUBTYPE OF (geometric_representation_item);
  position : axis1_placement;
  height : positive_length_measure;
  radius : positive_length_measure;
 END_ENTITY;  -- 10303-42: geometric_model_schema


 ENTITY role_association;
  role : object_role;
  item_with_role : role_select;
 END_ENTITY;  -- 10303-41: basic_attribute_schema


 ENTITY rolling_curve_pair
  SUBTYPE OF (planar_curve_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rolling_curve_pair_value
```

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```
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : rolling_curve_pair;
  actual_point_on_curve_1 : point_on_curve;
  WHERE
 wr1:SELF\pair_value.applies_to_pair\ planar_curve_pair.
     curve_1:=:actual_point_on_curve_1.basis_curve;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rolling_surface_pair
  SUBTYPE OF (surface_pair);
 END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rolling_surface_pair_value
  SUBTYPE OF (pair_value);
  SELF\pair_value.applies_to_pair : rolling_surface_pair;
  actual_point_on_surface : point_on_surface;
  actual_rotation : plane_angle_measure;
  WHERE
 wr1:SELF\pair_value.applies_to_pair\ surface_pair.
     surface_1:=:actual_point_on_surface.basis_surface;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY rotation_about_direction;
  direction_of_axis : direction;
  rotation_angle : plane_angle_measure;
  WHERE
 wr1: SIZEOF ( direction_of_axis.direction_ratios ) =  3;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


 ENTITY round_hole
  SUBTYPE OF (feature_definition);
  WHERE
 wr1: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     sa.description =  'diameter occurrence' ) AND ( SIZEOF (
     QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
     TYPEOF ( sar ) ) AND ( sar.name =  'diameter' ) AND (
     sar.description =  'profile usage' ) AND (
     'AUTOMOTIVE_DESIGN.' + 'CIRCULAR_CLOSED_PROFILE' IN
     TYPEOF ( sar.relating_shape_aspect ) ) ) ) =  1 ) ) ) =
     1;
 wr2: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
     sa.description =  'hole depth occurrence' ) AND ( SIZEOF
     ( QUERY ( sar <* USEDIN ( sa , 'AUTOMOTIVE_DESIGN.' +
     'SHAPE_ASPECT_RELATIONSHIP.' + 'RELATED_SHAPE_ASPECT' ) | (
     'AUTOMOTIVE_DESIGN.' + 'SHAPE_DEFINING_RELATIONSHIP' IN
```

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```
      TYPEOF ( sar ) ) AND ( sar.name =  'hole depth' ) AND (
      sar.description =  'path feature component usage' ) AND (
      'AUTOMOTIVE_DESIGN.' + 'PATH_FEATURE_COMPONENT' IN TYPEOF
      ( sar.relating_shape_aspect ) ) AND ( sar.
      relating_shape_aspect.description =  'linear' ) ) ) =  1 )
      ) ) =  1;
  wr3: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
      sa.description =  'bottom condition occurrence' ) AND (
      SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
      ( sar.description =  'hole bottom usage' ) AND (
      'AUTOMOTIVE_DESIGN.' + 'HOLE_BOTTOM' IN TYPEOF ( sar.
      relating_shape_aspect ) ) ) ) =  1 ) ) ) <=1;
  wr4: SIZEOF ( QUERY ( sa <* get_shape_aspects ( SELF ) | (
      sa.description =  'change in diameter occurrence' ) AND (
      SIZEOF ( QUERY ( sar <* USEDIN ( sa ,
      'AUTOMOTIVE_DESIGN.' + 'SHAPE_ASPECT_RELATIONSHIP.' +
      'RELATED_SHAPE_ASPECT' ) | ( 'AUTOMOTIVE_DESIGN.' +
      'FEATURE_COMPONENT_RELATIONSHIP' IN TYPEOF ( sar ) ) AND
      ( sar.description =  'taper usage' ) AND (
      'AUTOMOTIVE_DESIGN.' + 'TAPER' IN TYPEOF ( sar.
      relating_shape_aspect ) ) ) ) =  1 ) ) ) =  1;
  wr5: SIZEOF ( QUERY ( pdr <*
      get_property_definition_representations ( SELF ) | (
      'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( pdr.
      used_representation.items ) <>1 ) ) ) =  0;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY rounded_u_profile
  SUBTYPE OF (shape_aspect);
  WHERE
 wr1:'AUTOMOTIVE_DESIGN.' + 'FEATURE_COMPONENT_DEFINITION' IN
      TYPEOF ( SELF.of_shape.definition ) ;
 wr2: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) ) ) =  1;
 wr3: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( pdr.
      used_representation.items ) =  2 ) ) ) =  1;
 wr4: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
```

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```
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | NOT ( i.name IN  ['width' ,
      'orientation'] ) ) ) >0 ) ) ) =  0;
 wr5: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( 'AUTOMOTIVE_DESIGN.' +
      'PLACEMENT' IN TYPEOF ( i ) ) AND ( i.name =
      'orientation' ) ) ) =  1 ) ) ) =  1;
 wr6: SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' +
      'SHAPE_REPRESENTATION_WITH_PARAMETERS' IN TYPEOF ( pdr.
      used_representation ) ) AND ( SIZEOF ( QUERY ( i <* pdr.
      used_representation.items | ( SIZEOF (
      ['AUTOMOTIVE_DESIGN.' + 'MEASURE_REPRESENTATION_ITEM' ,
      'AUTOMOTIVE_DESIGN.' + 'LENGTH_MEASURE_WITH_UNIT']* TYPEOF
      ( i ) ) =  2 ) AND ( i.name =  'width' ) ) ) =  1 ) ) )
      =  1;
 wr7: ( SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) ) ) <=1 ) AND (
      SIZEOF ( QUERY ( pdr <*
      get_shape_aspect_property_definition_representations ( SELF
      ) | ( 'AUTOMOTIVE_DESIGN.' + 'PLANAR_SHAPE_REPRESENTATION'
      IN TYPEOF ( pdr.used_representation ) ) AND ( pdr.
      used_representation.name =  'profile limit' ) ) ) <=1 ) ;
END_ENTITY;  -- 10303-214: automotive_design


 ENTITY roundness_tolerance
  SUBTYPE OF (geometric_tolerance);
  WHERE
 wr1: NOT ( 'AUTOMOTIVE_DESIGN.' +
      'GEOMETRIC_TOLERANCE_WITH_DATUM_REFERENCE' IN TYPEOF (
      SELF ) ) ;
END_ENTITY;  -- 10303-519: aic_geometric_tolerances


 ENTITY runout_zone_definition
  SUBTYPE OF (tolerance_zone_definition);
  orientation : runout_zone_orientation;
 END_ENTITY;  -- 10303-47: shape_tolerance_schema


 ENTITY runout_zone_orientation;
  angle : measure_with_unit;
```

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```
END_ENTITY;  -- 10303-47: shape_tolerance_schema


ENTITY runout_zone_orientation_reference_direction
 SUBTYPE OF (runout_zone_orientation);
 orientation_defining_relationship : shape_aspect_relationship;
END_ENTITY;  -- 10303-47: shape_tolerance_schema


ENTITY screw_pair
 SUBTYPE OF (kinematic_pair);
 pitch : length_measure;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


ENTITY screw_pair_range
 SUBTYPE OF (simple_pair_range);
 SELF\simple_pair_range.applies_to_pair : screw_pair;
 lower_limit_actual_rotation : rotational_range_measure;
 upper_limit_actual_rotation : rotational_range_measure;
 WHERE
wr1: ( ( 'AUTOMOTIVE_DESIGN.'+ 'UNLIMITED_RANGE' IN TYPEOF (
    lower_limit_actual_rotation ) ) OR ( 'AUTOMOTIVE_DESIGN.'+
    'UNLIMITED_RANGE' IN TYPEOF ( upper_limit_actual_rotation
    ) ) ) XOR (
    lower_limit_actual_rotation<upper_limit_actual_rotation ) ;
END_ENTITY;  -- 10303-105: kinematic_structure_schema


ENTITY screw_pair_value
 SUBTYPE OF (pair_value);
 SELF\pair_value.applies_to_pair : screw_pair;
 actual_rotation : plane_angle_measure;
 DERIVE
  actual_translation : length_measure :=
            SELF\pair_value.applies_to_pair\
                screw_pair.pitch * plane_angle_for_pair_in_radian
              (SELF\
                pair_value.applies_to_pair,actual_rotation) / (2 * PI);
END_ENTITY;  -- 10303-105: kinematic_structure_schema


ENTITY seam_curve
 SUBTYPE OF (surface_curve);
 WHERE
wr1: SIZEOF ( SELF\surface_curve.associated_geometry ) =  2;
wr2:associated_surface ( SELF\surface_curve.
    associated_geometry[1] ) =  associated_surface (
    SELF\surface_curve.associated_geometry[2] ) ;
wr3:'AUTOMOTIVE_DESIGN.'+ 'PCURVE' IN TYPEOF (
```

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```
     SELF\surface_curve.associated_geometry[1] ) ;
 wr4:'AUTOMOTIVE_DESIGN.'+ 'PCURVE' IN TYPEOF (
     SELF\surface_curve.associated_geometry[2] ) ;
END_ENTITY;  -- 10303-42: geometry_schema


 ENTITY seam_edge
  SUBTYPE OF (oriented_edge);
  pcurve_reference : pcurve;
  WHERE
 wr1: ( 'AUTOMOTIVE_DESIGN.'+ 'EDGE_CURVE' IN TYPEOF (
     edge_element ) ) AND ( 'AUTOMOTIVE_DESIGN.'+ 'SEAM_CURVE'
     IN TYPEOF ( edge_element\ edge_curve.edge_geometry ) ) ;
 wr2:pcurve_reference IN edge_element\ edge_curve.
     edge_geometry\ surface_curve.associated_geometry;
END_ENTITY;  -- 10303-42: topology_schema


 ENTITY security_classification;
  name : label;
  purpose : text;
  security_level : security_classification_level;
 END_ENTITY;  -- 10303-41: security_classification_schema


 ENTITY security_classification_assignment
  ABSTRACT SUPERTYPE;
  assigned_security_classification : security_classification;
  DERIVE
   role : object_role := get_role(SELF);
  WHERE
 wr1: SIZEOF ( USEDIN ( SELF , 'AUTOMOTIVE_DESIGN.' +
     'ROLE_ASSOCIATION.'+ 'ITEM_WITH_ROLE' ) ) <=1;
END_ENTITY;  -- 10303-41: management_resources_schema


 ENTITY security_classification_level;
  name : label;
 END_ENTITY;  -- 10303-41: security_classification_schema


 ENTITY serial_numbered_effectivity
  SUBTYPE OF (effectivity);
  effectivity_start_id : identifier;
  effectivity_end_id : OPTIONAL identifier;
 END_ENTITY;  -- 10303-41: effectivity_schema


 ENTITY shape_aspect;
  name : label;
```

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