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Framework for specifying performance in buildings

Cadre de travail pour la spécification de la performance dans les bâtiments

Reference number
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 3, *Functional/user requirements and performance in building construction*.

This first edition of ISO 19208 cancels and replaces ISO 6240:1980, ISO 6241:1984, ISO 7162:1992, ISO 9699:1994 and ISO/PAS 22539:2007, which have been technically revised.

Introduction

The performance concept has historically been used to address fitness for intended use of attributes of a building as a whole or a part thereof. Each characteristic is assessed in terms of whether or not it meets assumed performance.

Over the last decade, this concept has been expanded to be used to address the beneficial or adverse impact of choices made regarding building materials, construction methods and resources, operating energy, water services and sanitary systems on economic conditions, the environment, a society or the quality of life, i.e. the contribution which a building makes to sustainable development. This document provides the necessary framework and principles to describe the performance of a building or a part thereof either in terms of fitness of purpose or beneficial and adverse impacts and to provide the means of evaluation for solutions for all these applications.

This document is intended to assist anyone concerned with specifying performance of attributes and aspects of a building or a part thereof. Those include regulators, specifiers and suppliers, as well as international and national standards committee members.

Specifying performance of a building ranges from fundamental to specific. This document is intended primarily to assist those who are involved in specifying performance in buildings by stating general principles. It includes tables aimed at identifying the main factors to be considered in their elaboration.

a) User requirements and societal expectations,

b) possible uses of the buildings and their spaces,

c) building subsystems of which the product is a part, and

d) agents, of any nature and origin, which are relevant to the performance of a building and related entities in use, and affecting factors.

Documents that specify performance may take various forms or features, such as regulations, specifications, or product standards. Annex B gives an example of application of the principles embodied in this document.

Framework for specifying performance in buildings

1 Scope

This document provides the framework for specifying the performance of a building as a whole or a part thereof in order to satisfy specified user requirements and societal expectations.

This document covers buildings as constructed and inbuilt fixed components. It does not cover

a) the use of the land for buildings,

b) the design and operation of the environment within which buildings are located, and

c) moveable contents within buildings.

NOTE 1 Guidance on the application of certain clauses is provided in Annex A.

NOTE 2 A part of a building includes subsystems, spaces, elements, assemblies, components, products and materials.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6707-1, *Building and civil engineering — Vocabulary — Part 1: General terms*

ISO 6707-2, *Building and civil engineering — Vocabulary — Part 2: Contract terms*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
agent
whatever acts on the building or parts of a building

3.2
assembly
set of related *components* (3.6) attached to each other

[SOURCE: ISO 6707-1:2014, 5.5.5]

3.3
attribute
characteristic (3.4) assessed in terms of whether it does or does not meet a given performance

EXAMPLE Go or no go.

[SOURCE: ISO 6707-1:2014, 9.1.5, modified]

3.4
characteristic
property (3.15) that distinguishes the totality of specific items under consideration

[SOURCE: ISO 6707-1:2014, 9.1.4, modified]

3.5
competent person
person who has demonstrated his ability to apply knowledge and skills to make a determination regarding the performance of building attributes in relation to the required performance

[SOURCE: ISO 9000:2015, 3.1.6, modified]

3.6
component
product (3.14) manufactured as a distinct unit to serve a specific function or functions

[SOURCE: ISO 6707-1:2014, 6.1.3]

3.7
impact
change that may be beneficial or adverse

3.8
indicator
quantitative or qualitative measure of impacts

3.9
performance
ability to fulfil required functions under intended use conditions, behaviour when in use or impact on economic conditions, the environment, society or quality of life

[SOURCE: ISO 6707-1:2014, 9.1.1]

3.10
performance description
performance (3.9) demanded or expected to be fulfilled by an attribute

3.11
performance parameters
group of variables used to quantitatively describe performance of attributes or group of indicators used to evaluate the performance of attributes

3.12
performance specification
document that establishes the required performance and the means for evaluating performance in terms of such statement for one or more attributes or aspects

3.13
performance statement
performance (3.9) demanded or expected to be fulfilled in response to user requirements

[SOURCE: ISO 6707-1:2014, 9.1.16, modified]

3.14
product
item manufactured or processed for incorporation in buildings

[SOURCE: ISO 6707-1:2014, 6.1.2]

3.15
property
inherent or acquired feature of an item

[SOURCE: ISO 6707-1:2014, 9.1.3]

3.16
requirement
expression in the content of a document conveying criteria to be fulfilled if compliance with the document is to be claimed and from which no deviation is permitted

[SOURCE: ISO/IEC directives — Part 2]

3.17
scale
extent of an impact

Note 1 to entry: Examples of scale include the user; neighbourhood, regional, national or global.

3.18
space
area or volume bounded actually or theoretically

[SOURCE: ISO 6707-1:2014, 4.1.1]

3.19
specification
document that prescribes the performance requirements to be fulfilled

[SOURCE: ISO/IEC Guide 2]

3.20
societal expectations
what society deems as acceptable

Note 1 to entry: Societal expectations provide motives for actions taken.

3.21
standard
document, established by consensus and approved by an appropriate body, that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context

Note 1 to entry: Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

[SOURCE: ISO/IEC Guide 2, 3.2]

3.22
subsystem
part of a building, including space, fulfilling one or several of the functions needed to meet the user requirements and/or societal expectations

3.23
sustainable development
development that meets the needs of the present without compromising the ability of future generations to meet their own needs

[SOURCE: ISO 15392:2008, 3.21]

3.24
suitable
capable of fulfilling or having fulfilled the intended function or fit for its intended purpose

3.25
user
organization, person, animal or object for which a building is designed

[SOURCE: ISO 6707-1:2014, 8.1]

3.26
user requirement
statement of need to be fulfilled

[SOURCE: ISO 6707-1:2014, 9.1.2]

Note 1 to entry: User requirements can be driven by societal expectations.

4 Framework

4.1 General considerations

The objectives of this document relate to behaviour in use and typically relate to health, safety, convenience, comfort and protection of property. They may also relate to contributions to sustainable development.

Performance may be categorized into the following four types:

a) reaction to agents;

b) influence on human activities;

c) impact on society;

d) change in performance over time.

The performance of a building as a whole may vary from its parts. The performance of a part of a building, such as a subsystem, element or component may also influence the performance of a building as a whole. The relationship between a part of a building and the whole of the building depends upon its intended or designed role.

There are forward and backward linkages between the building as a whole and its parts, such as subsystems, spaces, elements, assemblies, components, products and materials, as illustrated in Figure 1. Accordingly, an objective and associated performance of a part of a building need not be identical to the objective and performance specified for the building as a whole. For example, if the object of the building as a whole is to minimize operational energy usage, the objectives for walls and floors may relate to thermal performance.

On the other hand, a part of a building may have multi-faceted objectives derived from the multi-faceted performance of the building as a whole. For example, a wall might be required to satisfy thermal, tightness and structural performance requirements.

Performance specified for a component should be project specific and not generic as the context within which the component is used needs to be considered.

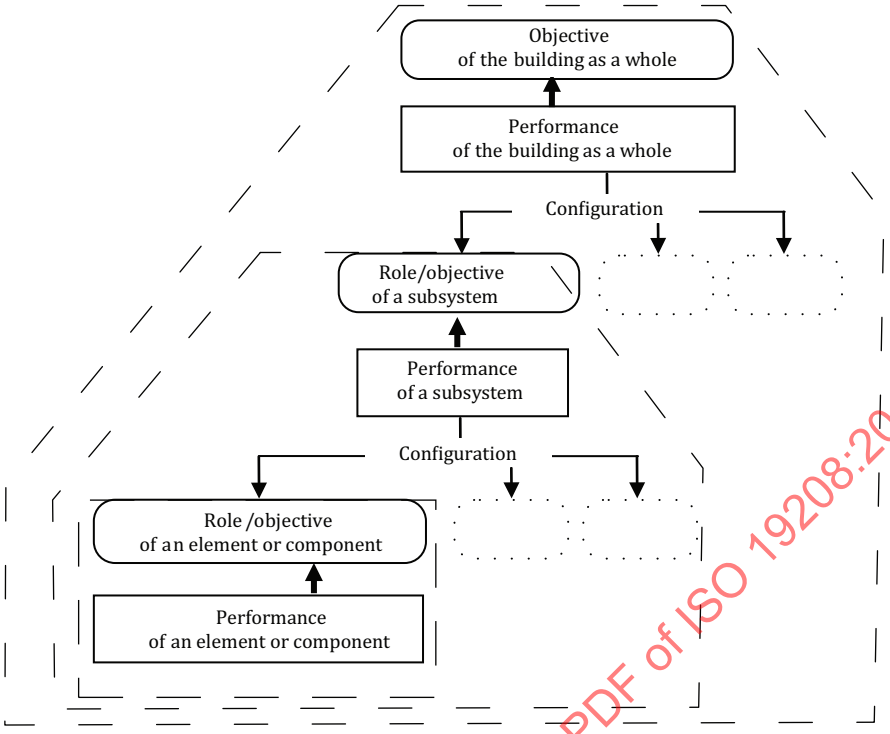

Figure 1 — Hierarchical structure of the performance of a whole building and its parts

4.2 Model for specifying performance

4.2.1 Four level model

The four level model shown in Figure 2 shall apply for specifying performance of a building as a whole or as a part. However, the contents of its description and its nature will differ depending on which attribute is under consideration.

4.2.2 Structure of the multiple layer model

4.2.2.1 Objective

Objectives of a building as a whole are directly related to user requirements or societal expectations. Table 1 lists the commonly encountered subject matter of objectives. The common drivers for objectives associated with contributions to sustainability are indicated in Table 2.

Objectives of parts of a building may be determined by the intended use or the way they are related to other parts or the building as a whole.

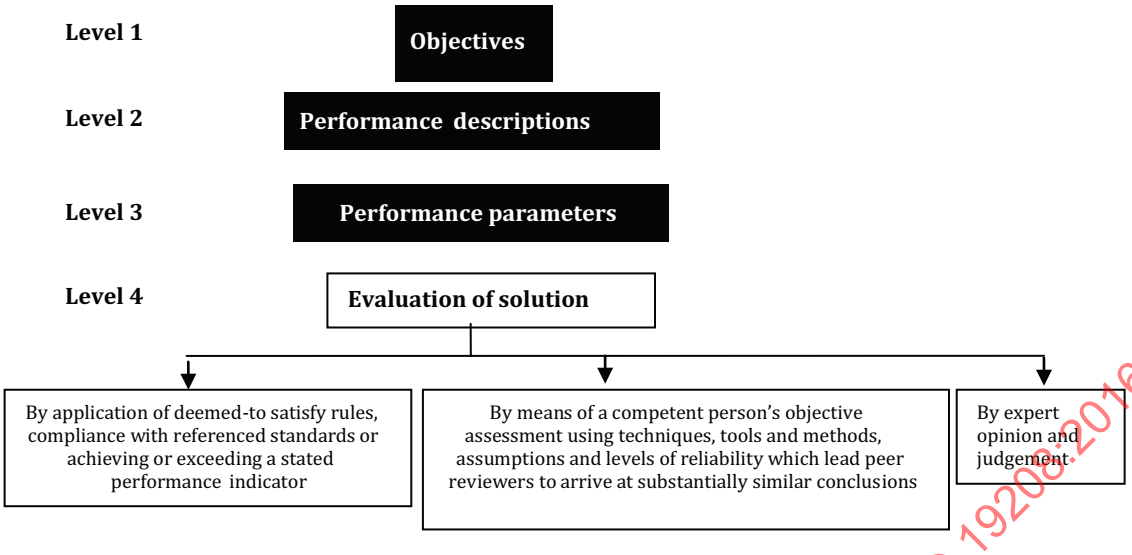

Figure 2 — Four level model for the specification of performance

NOTE The four level model is based on the approach adopted in the ISO 15928 series and ISO/PAS 22539.

Table 1 — Examples of subject matter of objectives

Category	Subject matter of objectives
1 Stability	Mechanical resistance to static and dynamic actions, both individually and in combination. Resistance to impacts, intentional and unintentional abuse, accidental actions. Cyclic (fatigue) effects.
2 Fire safety	Risks of outbreak of fire and of spread of fire. Physiological effects of smoke and heat. Alarm time (detection and alarm systems). Evacuation time (escape routes). Survival time (fire compartmentation).
3 Safety in use	Safety in respect of aggressive agents (protection against explosions, burning, sharp points and edges, moving mechanisms, electrocution, radioactivity, inhalation or contact with poisonous substances, infection). Safety during movements and circulation (limitation of floor slipperiness, unobstructed passage, guard rails, etc.). Security against human or animal intrusion.
4 Tightness	Water tightness (rain, ground water, drinking water, waste water, etc.). Air and gas tightness. Snow and dust tightness.
5 Hygrothermal	Control of air temperature, thermal radiation, air velocity and relative humidity (limitation of variation in time and in space, response of controls). Control of condensation.
6 Air purity	Ventilation. Control of odours.

Table 1 *(continued)*

Category	Subject matter of objectives
7 Acoustical	Control of external and internal noise (continuous and intermittent). Intelligibility of sound. Reverberation time.
8 Visual	Natural and artificial lighting (required illuminance, freedom from glare, luminance contrast and stability). Sunlight (insolation). Possibility of darkness. Aspect of spaces and surfaces (colour, texture, regularity, flatness, verticality, horizontality, perpendicularity, etc.). Visual contact, internally and with the external world (links and barriers for privacy, freedom from optical distortion).
9 Tactile	Surface properties, roughness, dryness, warmth, suppleness. Freedom from discharges of static electricity.
10 Dynamic	Limitation of whole body accelerations and vibrations (transient and continuous). Pedestrian comfort in windy areas. Ease of movement (slope of ramps, pitch of staircases). Manoeuvrability (operation of doors, windows, controls on equipment, etc.).
11 Hygiene	Facilities for human body care and cleaning. Water supply. Cleanability. Evacuation of waste water, waste materials and smoke. Limitation of emission of contaminants.
12 Suitability of spaces for specific uses	Number, size, configuration, subdivision, and interrelation of spaces. Service and equipment. Furnishability, flexibility.
13 Durability	Retention of performance over required service life subject to regular maintenance. Adaptability for changed usage.
14 Economic	Capital, running and maintenance costs. Maintainability Demolition costs.
15 Accessibility	Access for disabled persons, equity.
16 Contributions to sustainable development	Usage of resources, such as energy and water. Choice of building materials. Choice of construction methods and resources. Waste disposal. Resilience.
NOTE User requirements can be driven by societal expectations.	

Table 2 — Common drivers for objectives associated with contributions to sustainability

Subject matter of objective	Areas of concern
Usage of resources, such as energy and water	Greenhouse gas emissions Use of renewable and non-renewable resources Consumption of fresh water Life cycle costs
Choice of building materials	Use of renewable and non-renewable resources and release of emissions because of materials and energy flows. Economics Potential to generate business and employment opportunities for targeted groups. Formation of waste hazards
Choice of construction methods and resources	Health and safety during construction Potential to generate business and employment opportunities for targeted groups.
Waste disposal	Recycling Hazardous waste
Resilience	"Bounce back" from disaster The capacity to restore not only buildings but also social systems following exposure to hazards.
NOTE An attribute is a characteristic assessed in terms of whether it does or does not meet a given performance.	

4.2.2.2 Performance description

Performance descriptions establish qualitative requirements for an attribute. The different types of performance need to be expressed as follows:

a) The reaction to agents should be described in terms of behaviour as the result of external agent or the consequence of such behaviour to fulfil objectives (see Table 3).

b) The influence on human activities should be described in terms of the effects on human existence or activities and their consequences (see Table 4).

c) The impact on society should be described in terms of the effects on society and their results which may relate to one or more stages of the cycle of a building.

d) Changes in performance over time which typically relate to the durability, fatigue and creep of materials, should be described in terms of the cause of change and the consequences of the change (see Table 5), as well as design life and maintenance schedules, as relevant.

Table 3 — Examples of agents, behaviours and consequences or states

Agents		Examples of origin	Consequences or states (ISO description[a])
1	**Mechanical agents**		
1.1	Gravity	Snow loads, dead loads	Structural failure; loss of function and appearance (ISO 2103, ISO 2633, ISO 9194, ISO 4355)
1.2	Forces and imposed or restrained deformations	Subsidence, land slide	Structural failure; loss of function and appearance
1.3	Kinetic energy	External impacts, Earthquake	Structural failure; loss of function and appearance (ISO 3010, ISO 4354, ISO 21650)
1.4	Vibrations and noises	Traffic and machinery vibrations	Structural failure; loss of function and appearance Disturbance to human activity (ISO 9996)
2	**Electro-magnetic agents**		
2.1	Radiation	Solar radiation	Heating of the building fabric Degradation of materials
2.2	Electricity	Lightning	Stray currents; surges
2.3	Magnetism		Magnetic fields
3	**Thermal agents**	Heat, frost, thermal shock	Structural failure; loss of function and appearance
4	**Chemical agents**		
4.1	Water and solvents	Air humidity	Degradation of materials
4.2	Oxidizing agents	Oxygen, ozone	Degradation of materials
4.3	Reducing agents	Sulfides	Degradation of materials
4.4	Acid	Sulfuric acid	Degradation of materials
4.5	Bases		Degradation of materials
4.6	Salts	Sulfates	Degradation of materials
4.7	Chemically neutral	Neutral dust	Explosion
5	Biological agents		
5.1	Vegetable and microbial	Bacteria, seeds	Contamination of the indoor environment
5.2	Animal	Insects, termites	Degradation of materials of biological origin

[a] ISO has standardized the descriptions of some mechanical agents for structural design.

Table 4 — Examples of factors affecting human behaviour and consequences/states

Human behaviour	Factors affecting human behaviour	Consequences/states
1. Physical abilities		
1.1 Walking	Differences in level	Tripping, Falling
1.2 Balance	Slippery slope	Falling
1.3 Handling		
1.3.1 Gripping	Failure to grip	Falling
1.3.2 Grasping	Failure to grasp	Falling
1.3.3 Manipulation	Improper operating	Malfunctioning
1.4 Strength and endurance		
1.4.1 Strength	Self-closing device on manual door required to resist wind forces	Difficulty in closing/opening
1.4.2 Endurance	Long sloping path without resting-places	Difficulty in reaching the destination
1.5 Lifting	Heavy vertically sliding sash window	Hard to open
1.6 Reaching	Window furniture positioned without easy reach	Hard to operate
1.7 Speech	Where only one-way communication is required	Hard to communicate audible information
2. Sensory abilities		
2.1 Sight	No alarming tactile walking surface indicators	Risk of injury
	Mistaking glazed areas for openings	Risk of injury
2.2 Hearing	Noisy environment	Difficulty in making communications
	Inability to hear alarm	Risk of failure to evacuate
2.3 Touch	Surface with some metal	Allergic reaction
2.4 Smell	Poor air quality	Irritation of nose
	Inability to smell something burning	Risk of failure to evacuate
3. Mental abilities		
3.1 Cognition	sign	Finding way
3.2 Intellect	sign	Misunderstanding
3.3 Interpretation	ambiguity	Misunderstanding
3.4 Learning	ambiguity	Misunderstanding
3.5 Memory	too complex	Finding way

Table 5 — Examples of changes in critical characteristics with changes in performance over time

Category performance area	Critical characteristics	Cause	Consequences of characteristics change
Stability	Intensity	Cyclic loading	Fatigue Failure
	Relation between the actions and the limits on the responses of the structure	Cyclic loading	Deflection Deformation
	Structural durability	Exposure duration (e.g. UV radiation)	Degradation
		Freeze–thaw cycles	Degradation
Weather tightness	Weather resistance	Wet–dry cycles	Corrosion
	Change of surface	Pollutant	Damage of surface
		Fungi and moulds	Degradation Failure

4.2.2.3 Performance parameters

Performance parameters establish quantitative requirements for an attribute. They may vary considerably depending upon the type and nature of the performance that is being specified. For example, parameters for

a) reactions to agents can be framed around the quantum of the agent, such as the total of loads at the limit state of the structural system for structural safety performance,

b) influence to human activities can be framed around the height difference level that is likely to trigger tripping for 95 % of average users,

c) impact on society can be framed around the level of simulated emission of CO_2 per year, and

d) changes in performance over time can be framed around the expected level of performance after 30 years in use, or years for the performance expected to deteriorate to 70 % level immediately after construction.

Performance parameters which relate to the contribution to sustainable development are frequently linked to indicators. Such indicators should be

a) objective, verifiable and reproducible, and

b) wherever possible, linked to predetermined benchmarks, reference levels or scales of value which are within levels acceptable to the user and meet the expectations of the community and society.

An indicator should be accompanied by an explanation that describes how to assign the value of the indicator.

NOTE Indicators can address economic, environmental and social impacts directly, or issues that have consequences on impacts. Such consequential indicators can be useful for the assessment of the impacts of buildings on sustainable development. In some cases, consequential indicators will address more than just a single aspect of sustainable development (see ISO 21929-1).

4.2.2.4 Evaluation of solution(s)

Evaluation of solutions sets up the framework for demonstration of compliance with performance requirements. Demonstration of compliance with performance requirements for the building as a whole or a part of a building is usually achieved by means of one or more of the following distinctly different approaches:

a) by application of deemed-to satisfy rules, compliance with referenced standards or achieving or exceeding a stated performance indicator which can be readily evaluated;

b) by appointing a competent person to demonstrate compliance through:

   1) application of well-established engineering principles, relevant international or national standards or suitable authoritative publications;

   2) interpretation of test results or experimental models based on assumptions, levels of reliability, data, practices, procedures and the like which would lead peer reviewers to arrive at substantially similar conclusions;

   3) application of a standard rating tool;

c) by obtaining expert opinion and judgement.

Tests should be representative of the conditions encountered in practice. For example, in the case of structural safety, tests should incorporate a realistic representation of materials, loading conditions, boundary conditions and construction practices. Testing for evaluating structural response should be full scale unless all scale effects can be appropriately estimated.

Service experience should comprise a sufficient number of representative examples, exposed to similar or more severe service conditions, together with adequate documentation.

In some cases, evaluation of performance of the upper level solutions can be obtained through the combination of the results of the lower level elements, including calculations. For example, evaluation of a whole building can be obtained through

a) experiments on a full scale building,

b) integration of performance of elements through calculation, etc. (experimental results of elements), and

c) logical reasoning of performance from materials or products, through elements to a whole building.

Rating tools and simulation software can be used to establish whether or not a solution achieves the performance required by an indicator. The rating tool and the simulation software should be identified where indicators are framed around such evaluation instruments.

A judgment or appraisal can permit the extent of compliance with requirements of performance statements to be assessed on the basis of experience of similar cases and conditions or compliance with well-established solutions.

Annex A
(informative)

Commentary

A.1 General

This annex includes background information on ISO 19208, guidance on its use and suggestions on good practice.

A.2 Commentary on Scope

The framework for ISO 19208 addresses the performance of a building as a whole or as a part, i.e. what ISO 6707-1 defines as "construction works that has the provision of shelter for its occupants or content as one of its main purposes, usually partially or totally enclosed and designed to stand permanently in one place". It considers the performance of everything that is constructed or results from construction operations in the context of a building. It does this from two distinctly different points of view, namely

a) the ability to fulfil required functions under intended use conditions or behaviour when in use, and

b) impact upon economic conditions, the environment, society or quality of life.

The drivers of performance can come from two sources, namely

a) user requirements which focus on needs to be fulfilled, and

b) societal expectations which motivate and inform choices that are exercised in specifying performance.

The document does not address attributes relating to land use, site selection, the functionality of a building (suitability or usefulness for a specific purpose or activity use) or the moveable contents within a building.

ISO 11863 specifies how to determine functional performance requirements (demand) for buildings and building-related facilities, and how to check the capability of buildings and facilities to meet identified requirements (supply). ISO 111863 accordingly establishes the high level performance brief for the design of a building. ISO 19208 establishes the performance of the constructed building.

ISO 9699 describes the content for a brief for building design and provides briefing checklists.

A.3 Commentary on the framework

A.3.1 Four level model for the specification of performance

The framework for performance shown in Figure 1, and as expanded upon in Figure A1, requires that in the first instance an objective be formulated for each attribute whose performance is to be specified, i.e. the aim, intention, purpose, goal or end of what is to be achieved in the performance specification. This enables the performance to be specified by means of performance descriptions and performance parameters for the building as a whole or a part thereof.

Tables A.1 to A.4 provide examples of the specification for a range of different types of attributes. The means by which the evaluation of performance is to be evaluated needs to be provided to complete the specification. For example, the evaluation of the operational energy can be specified as being in

accordance with ISO 23045 (see Table A.1) and the opportunities for the participation of local businesses and labour during construction in accordance with ISO 10845-7 (see Table A.4).

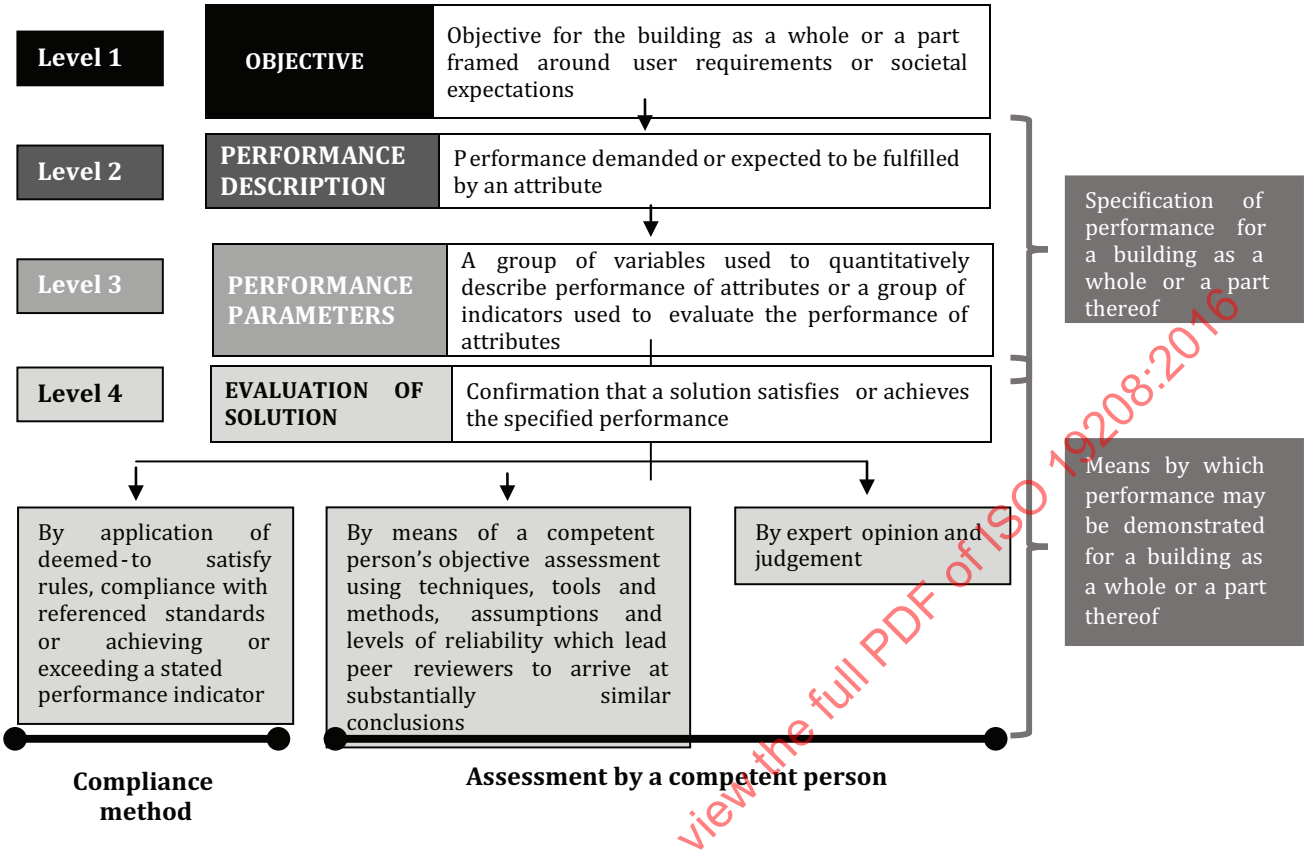

Figure A.1 — Framework within which performance is specified and solutions are tested for compliance with requirements

Table A.1 — Specifying operational energy (energy to meet user needs associated with the use of the building)

Description	Sample content
Objective	The operational energy performance of a building shall be acceptable to the users in terms of thermal comfort and functionality and inefficient energy use.
Performance description	The whole building and its parts shall, with an appropriate degree of reliability, provide suitable indoor climate conditions and fulfil the user needs on energy usage in the environment in which it is located over the specified design working life when subject to its intended use and expected normal climate, in terms of the probability of a) the occupants experiencing suitable levels of thermal comfort, b) the adequacy of internal illumination (lighting), c) the availability of sufficient amounts of domestic hot water, and d) the efficient operation of other built-in appliances.
Performance parameters	**Design working life of the building** The design working life of the building is . . . . .
	Geographic location The geographic location of the building is . . . . .

Table A.1 *(continued)*

Description	Sample content
	Built-in appliances The built-in appliances are . . . . .
	Indoor conditions The range of indoor temperature is . . . . . The range of indoor humidity is . . . . . . The specified level of ventilation is . . . . .
	User functional requirements The amount of hot water at a temperature of . . . . is . . . . . . The amount and level of lighting is . . . . . . The number and individual characteristics of the occupants of the building are . . . . .
	Energy used The energy used by the building shall not exceed . . . . . mega joules per annum.

Table A.2 — Specifying structural performance of a building and its parts

Description	Sample content
Objective	**Structural safety** The risk of collapse or other kind of severe damage resulting from structural failure, which may affect the life safety of the building occupants, or people in its vicinity, shall not exceed a level acceptable to the user. **Structural serviceability** The following characteristics of a building, for normal use and conditions, under all expected actions, shall be kept within levels acceptable to the user: a) functioning and appearance of the building and its components; b) functioning of the occupants and equipment in the building; c) comfort of the occupants; d) asset value of the building. **Structural durability** The structural safety and serviceability performance of the building shall be acceptable to the user over the specified design working life
Performance description	**Structural safety** The whole building and its parts shall, with an appropriate degree of reliability, maintain strength and stability under all actions likely to occur during the building's design working life. **Structural serviceability** The whole building and its parts shall, with an appropriate degree of reliability, perform within established parameters under all expected actions for normal use in terms of local damage, including cracking, deformation and vibration. **Structural durability** The whole building and its parts shall, with an appropriate degree of reliability, fulfil its intended safety and serviceability performance in the environment in which it is located over the specified design working life when subject to its intended use, taking into account the external and internal environmental agents (including those associated with microclimates that can arise in buildings), maintenance schedule and specified component design life and changes in form or properties.

Table A.2 *(continued)*

<table>
<tr><th>Description</th><th colspan="2">Sample content</th></tr>
<tr><td>Performance parameters</td><td colspan="2">Design working life
The design working life of the building is . . . .years in respect of the structural system and . . . . years for repairable or replaceable components and materials, such as claddings, roofing materials, exterior trims, and integrated components, such as windows and doors.
Wind load
The buildings shall suffer no more than insignificant damage when subjected to winds associated with a . . .year mean return period. Damage from winds associated with a. . . . year mean return period shall not prevent the building from fulfilling their intended purpose, except for the possible loss of roof covering material and cladding, nor shall such damage pose a threat to the occupants. The building shall not collapse if subjected to wind speeds substantially greater than the design values (e.g. in an intense thunderstorm).
Structural response
The sum of the effects of the destabilizing design loads combined with 0,7 times the effects of the stabilizing component of the self-weight load shall not exceed the design resistance of the relevant parts of the building and its foundations. The safety index as defined in ISO 2394 shall not be less ...., ... and .... in the case of ductile (gradual modes of failure) materials, brittle (sudden modes of failure) materials and connection details between components, respectively.
Representative actions and impacts applied to the building
<table>
<tr><th>Scope</th><th>Performance parameters for agents</th></tr>
<tr><td>Building as a whole</td><td>State parameters for wind and seismic actions and ground conditions and movements.</td></tr>
<tr><td>Roofing assembly</td><td>State parameters for permanent, imposed, wind and snow actions and hail impact.</td></tr>
<tr><td>Walls</td><td>State parameters for wind, permanent and imposed actions, soft body impact, sharp body impact, hail impact, door slamming and fittings.</td></tr>
<tr><td>Floors</td><td>State parameters for permanent and imposed actions and vibrations.</td></tr>
<tr><td colspan="2">Structural responses of the building to representative actions and impacts</td></tr>
<tr><td>Scope</td><td>Performance parameters for agents</td></tr>
<tr><td>Ground conditions and movements</td><td>State parameters for tilt and total settlement.</td></tr>
<tr><td>Roofing assembly</td><td>State parameters for deflection and cracking associated with direct and indirect actions and cracking and damage associated with hail impact.</td></tr>
<tr><td>Walls</td><td>State parameters for deflection and cracking associated with direct and indirect actions and ground movements, acceptance criteria for soft, hard body and door slamming impacts and damage associated with fittings.</td></tr>
<tr><td>Floors</td><td>State parameters for deflection and damage associated with direct and indirect actions.</td></tr>
</table></td></tr>
</table>

Table A.3 — Specifying reductions in the harmful emissions of paints in interior applications

Description	Sample content
Objective	Reduce the risk of harmful effects of volatile organic compound emissions on the health of building occupants
Performance description	Paint used in an internal application, and applied on site, as mixed and ready to use, inclusive of tints, shall have a total volatile organic compound content measured in grams per litre not exceeding a specified limit:
Performance parameters	The total volatile organic compound content of the paint measured in grams per litre shall not exceed walls and ceilings - interior gloss: . . . g/l;
	walls and ceilings-interior semi-gloss/low sheen: . . . g/l; walls and ceilings-interior flat washable: . . . g/l; trim-gloss, semi-gloss, satin, varnishes and wood stains: . . . g/l; timber and binding primers: . . . g/l; latex primer for galvanized iron and Zincalume®: . . . g/l; interior latex undercoat: . . . g/l; interior sealer (including general primers and concrete floor sealers): . . . g/l; one and two pack performance coatings for floors: . . . g/l; and any solvent-based coating whose purpose is not covered in above: . . . g/l
NOTE Zincalume® is an example of suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.	

Table A.4 — Specifying opportunities for the participation of local businesses and labour during construction

Description	Sample content
Objective	Provide business and employment opportunities to specified target groups during the construction of the building.
Performance description	Engage the target groups indirectly or directly in the execution of the works associated with the building.
Performance parameters	**Target area** The target area is . . . . . . **Target group** Targeted labour is . . . . . . Targeted enterprises are . . . . . . **Participation goal** The percentage of the expenditure on local enterprises and local labour or both in the construction of the works associated with the building in relation to the total expenditure is not less than . . . . . %

A.3.2 Evaluation of solutions

A.3.2.1 General

Evaluation sets up the framework for demonstration of compliance with performance statements. Table A.5 identifies the methods that are most suitable for confirming compliance, depending on the purpose of the performance statements.

The choice of a method for evaluating solutions depends on the level of accuracy appropriate to the relative importance and the order of priority of the performance statement.

Table A.5 — Means of evaluating solutions

Purpose of performance statements	Typical means for evaluation
To fulfil user requirements	By a) application of deemed-to satisfy rules or compliance with referenced standards, b) performing a rational design, c) performing a rational assessment, d) expert opinion and judgement, or e) any combination of a) to d)
To fulfil societal expectations	By a) achieving or exceeding a stated indicator, b) performing a rational design, c) application of a standard rating tool, d) performing a rational assessment, e) performing a simulation, f) expert opinion and judgement, or g) any combination of a) to f)

A.3.2.2 Rational design

Rational designs involve a process of reasoning and calculation which can be based on the application of a standard or other suitable document. It is therefore essential that the person performing such an assessment has the necessary education, training, experience and contextual knowledge to perform such designs.

The assumptions made and the level of reliability of rational designs should be such that a peer review of the design would arrive at a similar conclusion.

Greater consistency in solutions can be obtained by specifying the standards that are to form the bases for design.

A.3.2.3 Rational assessments

Rational assessments can involve a number of techniques including, as necessary, a process of reasoning, calculation and consideration of accepted analytical principles, based on a combination of deductions from available information, research and data, appropriate testing and service experience. It is therefore essential that the person performing such an assessment has the necessary education, training, experience and contextual knowledge to perform such assessments.

Tests should be representative of the conditions encountered in practice. For example, in the case of structural safety, tests should incorporate a realistic representation of materials, loading conditions,

boundary conditions and construction practices. Testing for evaluating structural response should be full scale unless all scale effects can be appropriately estimated.

Service experience should comprise a sufficient number of representative examples, exposed to similar or more severe service conditions, together with adequate documentation.

The assumptions made and the level of reliability of rational assessments should be such that a peer review of the design would arrive at a similar conclusion.

A.3.2.4 Rating tools and simulation software

Rating tools and simulation software can be used to establish whether or not a solution achieves the performance required by an indicator. The rating tool and the simulation software should be identified where indicators are framed around such evaluation instruments.

A.3.2.5 Expert opinion and judgment

A judgment or appraisal can permit the extent of compliance with requirements of performance statements to be assessed on the basis of experience of similar cases and conditions or comparison with well-established solutions.

NOTE Members of the World Federation of Technical Assessment Organisations establish by means of favourable technical assessments the fitness for use and quality of innovative products and systems that deviate from established standard specifications. (A technical assessment covers all procedures described in different countries by terms, such as agrément certificate, appraisal, avis technique, conformity appraisal, evaluation report, technical agreement, technical approval, technical assessment, type approval, etc.).