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Rubber and plastics hoses and hose assemblies — Vocabulary

Tuyaux et flexibles en caoutchouc et en plastiques — Vocabulaire

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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).

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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 218, *Rubber and plastics hoses and hose assemblies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 8330:2014), which has been technically revised.

The main changes are as follows:

- the structure of the document is now divided into subclauses as follows:
 - General [3.1](#);
 - Hose types [3.2](#);
 - Hose parts and components other than the reinforcement and end [3.3](#);
 - Hose reinforcement parts and components [3.4](#);
 - Hose end types [3.5](#);
 - Hose assembly terms [3.6](#);
 - Sizes and geometrical properties of hoses and hose assemblies [3.7](#);
 - Mechanical properties [3.8](#);
 - Hose production methods and tools [3.10](#);
 - Hose tests and operation conditions [3.11](#);

- Hose and hose assembly deformations and defects [3.12](#);
- the numbering and order of the terms has been revised;
- alphabetical index has been added;
- the following terms have been added:
 - barb;
 - burst;
 - cure (with vulcanization);
 - helix wire;
 - identification yarn;
 - OS&D hose;
 - rigid mandrel;
 - semi-rigid hose;
 - socketshell (to ferrule);
 - spiralled wire cord;
 - tracer yarn;
- the following terms have been removed:
 - body wire;
 - brand;
 - design pressure;
 - dogleg;
 - helical cord;
 - lay;
 - mandrel-made hose;
 - nominal bore;
 - OSD hose;
 - protected hose;
 - quick-acting connection;
 - rated system pressure;
 - tolerance;
 - warp;
 - weft;
 - coupling adapter;

- shell clamp and split clamp;
- the definitions to the following terms have been amended:
 - carcass;
 - compound;
 - embedded helix;
 - end reinforcement;
 - female;
 - flexural stiffness;
 - helix;
 - hose deformation;
 - hybrid hose;
 - hydraulic hose;
 - hydrostatic stability test;
 - knitted hose;
 - male;
 - mandrel-built hose;
 - marker yarn;
 - marking;
 - moulded hose;
 - plain end;
 - quick connection;
 - reusable hose fitting;
 - sleeve;
 - straight end;
 - twin hose;
 - vacuum test;
 - vulcanization;
 - wire.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rubber and plastics hoses and hose assemblies — Vocabulary

1 Scope

This document defines terms used in the hose industry.

Recommended terminology for electrical conductivity and resistance of rubber and plastics hoses and hose assemblies can be found in ISO 8031:2020, Annex A.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 General

3.1.1 hose

flexible tube consisting of a *lining* (3.3.2), *reinforcement* (3.4.1) and, usually, a *cover* (3.3.6)

3.1.2

hose assembly

hose (3.1.1) with a *hose fitting* (3.6.4.1) attached to one or both ends

3.1.3

hydraulic hose

hose (3.1.1) with a *braid* (3.4.10) or spiral *reinforcement* (3.4.1) designed for systems which transfer power via fluid under pressure

3.1.4

tubing

flexible polymeric tube without *reinforcement* (3.4.1)

3.1.5

operating conditions

pressure, temperature, motion and environment (including the conveyed fluid) to which a hose (assembly) may be subjected

3.1.6

compound

DEPRECATED: rubber

intimate mixture of a rubber or rubbers or other polymer-forming materials with all the ingredients necessary that are combined to give the desired properties when used in the manufacture of a hose

[SOURCE: ISO 1382:2020, 3.105, modified — “for the finished product” is replaced by “that are combined to give the desired properties when used in the manufacture of a hose”.]

3.2 Hose types

3.2.1 Hose types based on shape and properties

3.2.1.1

hardwall hose

hose (3.1.1) with a built-in wall *reinforcement* (3.4.1) or with a solid elastomer wall of sufficient thickness to prevent the hose to flatten during *bending* (3.7.2.1) or coiling when empty

3.2.1.2

softwall hose

hose (3.1.1) without a supporting helix of rigid or semi-rigid material

3.2.1.3

rough bore hose

hose (3.1.1) in which a reinforcing *helical wire* (3.4.2.5), or its shape, is exposed in the *bore* (3.3.1)

3.2.1.4

smooth-bore hose

hose (3.1.1) in which no reinforcing wire helix or its shape is exposed on the inner surface of the *lining* (3.3.2)

3.2.1.5

oil suction and discharge hose

OS&D hose

hose used for oil suction and discharge in many types of operation

3.2.1.6

layflat hose

collapsible hose

softwall hose (3.2.1.2) which, when unpressurized internally, collapses to such an extent that the inner faces of the *bore* (3.3.1) make contact and the hose cross-section appears flat

3.2.1.7

convoluted hose

hose (3.1.1) fluted helically (externally and/or internally)

3.2.1.8

externally convoluted hose

hose (3.1.1) containing a reinforcing *helix* (3.4.2) in which the outer cover has been formed into corrugations between the turns of the helix

Note 1 to entry: Such hoses may be *rough bore* (3.2.1.3), semi-embedded bore or *smooth bore* (3.2.1.4).

3.2.1.9

corrugated hose

hose (3.1.1) with a *cover* (3.3.6) fluted circumferentially with bellows-like corrugations (externally and/or internally)

Note 1 to entry: Hoses are in production today with internal circumferential corrugations.

3.2.1.10

spiralled hose

hose (3.1.1) reinforced with strands wound helically in layers, with adjacent layers in opposing directions

3.2.1.11

pre-shaped hose

pre-formed hose

hose vulcanized or formed into a particular shape

3.2.1.12**semi-rigid hose**

hose that maintains its round cross-section even when unpressurized

3.2.2 Hose types based on reinforcement and other components**3.2.2.1****wire-reinforced hose**

hose (3.1.1) in which the primary *reinforcement* (3.4.1) is wire

3.2.2.2**helix-reinforced hose**

hose (3.1.1) in which reinforcing *helical wire(s)* or *plastic* (3.4.2.5) are incorporated

3.2.2.3**armoured hose**

hose (3.1.1) with a protective covering, generally applied as a *braid* (3.4.10) or *helix* (3.4.2), to minimize physical damage

3.2.2.4**woven hose**

hose (3.1.1) in which *reinforcement* (3.4.1) has been applied by circular weaving

3.2.2.5**round-woven hose**

hose (3.1.1) with a round-woven *reinforcement* (3.4.1)

EXAMPLE Fire-fighting hose, rig supply hose.

3.2.2.6**wrapped-ply hose**

hose (3.1.1) in which a *reinforcement* (3.4.1) of woven *fabric* (3.4.4.1) is wrapped in layers

3.2.2.7**braided hose**

hose (3.1.1) in which the reinforcement has been applied as interwoven spiral strands

3.2.2.8**knitted hose**

hose (3.1.1) with *knitted ply* (3.4.13)

3.2.3 Hose types based on production method**3.2.3.1****moulded hose**

hose (3.1.1) vulcanized in a rigid mould or inside a plastic sheath that is subsequently removed

3.2.3.2**machine-made hose**

hose (3.1.1) not made by hand on a mandrel

Note 1 to entry: Particularly, *wrapped-ply hose* (3.2.2.6).

3.2.3.3**mandrel-built hose**

hose (3.1.1) fabricated on a *mandrel* (3.10.1)

3.2.3.4**twin hose**

two hoses linked in parallel to each other during manufacture

3.2.3.5

composite hose

multilayer hose

hose (3.1.1) consisting of layers of non-vulcanized materials in sheeting form held together by two metal or plastics spirals

3.2.3.6

hand-built hose

hose (3.1.1) made by hand on a *mandrel* (3.10.1), reinforced by textile or wire, or combination of both, and a *cover* (3.3.6)

3.2.4 Hose types based on material

3.2.4.1

rubber hose

hose (3.1.1) consisting of a *lining* (3.3.2) made of vulcanized rubber with a *reinforcement* (3.4.1), generally textile or metal wire, and usually a *cover* (3.3.6) made of vulcanized rubber

3.2.4.2

plastics hose

hose (3.1.1) consisting of a *lining* (3.3.2) made of plastics material with a *reinforcement* (3.4.1) of textile material or metal wire and a *cover* (3.3.6) of plastics material

3.2.4.3

thermoplastics hose

hose (3.1.1) consisting of a *lining* (3.3.2) made of thermoplastic material with *reinforcement* (3.4.1) of a textile material or metal wire and a *cover* (3.3.6) made of thermoplastic material

3.2.4.4

hybrid hose

hose consisting of a rubber *lining* (3.3.2) and thermoplastic *cover* (3.3.6) or thermoplastic lining and rubber cover

3.3 Hose parts and components other than the reinforcement and end

3.3.1

bore

inside of a hose through which the material to be conveyed passes

3.3.2

lining

innermost continuous all-rubber or plastics element of a hose

3.3.3

hose wall

material between the internal and external surfaces of a *hose* (3.1.1)

3.3.4

veneer

thin innermost layer forming an integral part of the hose *lining* (3.3.2), applied for some special purpose

3.3.5

breaker ply

open mesh *fabric* (3.4.4) used to enhance the bond between a hose *lining* (3.3.2) or *cover* (3.3.6) and its *carcass* (3.4.15) and to spread impact

Note 1 to entry: This element can also add *reinforcement* (3.4.1) to these components.

3.3.6**cover**

outer layer covering the *reinforcement* (3.4.1)

3.3.7**rubber tubing**

flexible tube made of vulcanized rubber without a *reinforcement* (3.4.1)

3.3.8**jacket**

seamless tubular braided or woven ply generally on the outside of a hose

3.3.9**marking**

mark or symbol identifying the *hose* (3.1.1) in accordance with the relevant International Standard

Note 1 to entry: In the relevant International Standard, a colour code may be included at the option of the manufacturer.

Note 2 to entry: The mark or symbol is embossed, inlaid or printed on the hose, *coupling* (3.6.4.1) or *hose assembly* (3.1.2).

3.3.10**barrier**

thin layer of film (polymeric) within the construction of the hose for preventing fluid or gas from diffusing through the *hose wall* (3.3.3) to the atmosphere

3.3.11**armouring**

protective covering over a hose, generally applied as a *braid* (3.4.10) or *helix* (3.4.2) to prevent mechanical damage or to support the *reinforcement* (3.4.1) of a hose section

3.4 Hose reinforcement parts and components**3.4.1****reinforcement**

non-rubber strengthening member of a hose

Note 1 to entry: See *carcass* (3.4.15).

3.4.2**helix**

shape formed by spiralling a wire or other material around or within the body of the hose

3.4.2.1**embedded helix**

helical wire (3.4.2.5) entirely enclosed by the *hose wall* (3.3.3)

3.4.2.2**embedding layer**

layer of rubber in which is embedded a reinforcing *helix* (3.4.2) of wire or other material

3.4.2.3**filler strip**

material added during fabrication of a hose containing a supporting *helix* (3.4.2) to fill the spaces between the successive turns of the helix

3.4.2.4

semi-embedded helix

semi-embedded spiral

helical wire (3.4.2.5), concentric with the *bore* (3.3.1), semi-embedded in the *lining* (3.3.2) of a *hose* (3.1.1) so that only a portion of the wire is exposed

3.4.2.5

helical wire

helix wire

spiralled wire cord

wire or wire cord spiralled over or under the *reinforcement* (3.4.1) around or within the wall of the hose construction to prevent flattening or *kinking* (3.12.4) during *bending* (3.7.2.1) of the hose or under vacuum

Note 1 to entry: The helical wire may be bonded or unbonded to the hose wall by design.

3.4.3

wire cord

reinforcement material of thin metal wires which consist of several strands of fine wires twisted together

3.4.3.1

textile cord

reinforcement material of textile yarns which consists of several strands of fine yarns twisted together

3.4.4

fabric

plane structure produced by interlaced *yarns* (3.4.6), fibres or filaments

3.4.4.1

woven fabric

flat structure composed of two series of interlaced *yarns* (3.4.6) or filaments, one parallel to the axis of the *fabric* (3.4.4) and the other transverse

3.4.4.2

bias cut

cut made diagonally across a textile material at an angle less than 90° to the longitudinal axis

3.4.4.3

bias seam

seam at which *bias cut* (3.4.4.2) fabrics are joined together

3.4.4.4

bias angle

smaller included angle between the warp threads of a cloth and a diagonal line cutting across the warp threads

3.4.5

reinforcement angle

angle formed by the intersection of a *reinforcement* (3.4.1) strand and a line parallel to the axis of the *hose* (3.1.1)

3.4.6

yarn

slender, very long, ribbon-like or cylinder-shaped composition of filaments which are twisted, laid or spun together

3.4.7**marker yarn**

identification yarn

tracer yarn

yarn (3.4.6) which is placed in the hose during manufacture for traceability

3.4.8**ply**

layer of *reinforcement* (3.4.1)

3.4.9**transition layer**

transition ply

rubber layer between two plies of different rubber *compounds* (3.1.6) which do not adhere to each other after *vulcanization* (3.10.7)

Note 1 to entry: The transition layer provides a good bond to both rubber layers.

3.4.10**braid**

continuous *sleeve* (3.6.4.11) of interwoven single or multiple strands of *yarn* (3.4.6) textile or wire

3.4.11**insulating layer**

material between plies of *reinforcement* (3.4.1)

3.4.12**reinforcing rings**

steel or plastics rings, embedded over the reinforcement layers of some hose designs, which have the same function as a helical or body *wire* (3.4.14)

3.4.13**knitted ply**

layer of textile *reinforcement* (3.4.1) in which the *yarns* (3.4.6) are applied in an interlocking looped configuration in a continuous tubular structure

3.4.14**wire**

metallic component used in a hose to give added strength, increased dimensional stability, or crush resistance, and can provide a path for electrical continuity

3.4.15**carcass**

fabric (3.4.4), cord and/or metal reinforcing section of a *hose* (3.1.1), including any rubber layers used to promote *adhesion* (3.8.14), as distinguished from the hose tube or *cover* (3.3.6)

Note 1 to entry: See *reinforcement* (3.4.1).

3.5 Hose end types**3.5.1****soft end**

hose end in which the rigid *reinforcement* (3.4.1) of the body, usually wire, is omitted

3.5.2**straight end**

end of a *hose* (3.1.1), the structure and dimensions of which are identical to those of the body of the hose, except corrugations and helix reinforcement is omitted

Note 1 to entry: Constructed to prevent leaks due to a helix or wall corrugations in the area of the fitting.

3.5.3

enlarged end

expanded end

hose end having a diameter greater than the internal diameter of the hose to accommodate a *coupling* (3.6.4.1) or to fit on to pipework

3.5.4

capped end

DEPRECATED: sealed end

hose end covered to protect its internal elements

3.5.5

plain end

un-modified end of a corrugated or helix reinforced hose, in contrast to a straight end

3.5.6

reinforced end

hose end equipped with extra *reinforcement* (3.4.1) to achieve additional strength or stiffness

3.5.7

end-reinforcement

extra *reinforcement* (3.4.1) applied to the end of a hose to provide additional strength or stiffening

3.6 Hose assembly terms

3.6.1 General hose assembly terms

3.6.1.1

fitting

device attached to the end of the *hose* (3.1.1) to facilitate connection to equipment or another hose

Note 1 to entry: The actual *coupling* (3.6.4.1) is either part of the fitting or a separate device attached to the hose fitting.

3.6.1.2

adapter

accessory, which can exist in various sizes and materials, designed to complete the connection between *hose fitting* (3.6.4.1) and another piping system component, or to change a hose fitting from one type or size to another type or size

Note 1 to entry: Often, a tube fitting is used.

3.6.1.3

hose guard

external protection on a *hose assembly* (3.1.2) to provide additional protection against abrasion, heat or chemical substances

Note 1 to entry: While spring forms and flat steel or plastic coils are in common use, a variety of materials can be used to suit each particular situation.

3.6.1.4

female, adj

forming an internal thread or recess, which may be of a fixed part or a swivel nut and is designed to hold a mating (male) part

3.6.1.5

male, adj

forming the external thread or part which enters into the female part to provide a connection

3.6.1.6**nozzle**

spout

part of an end-fitting attached to the free end of a *hose assembly* (3.1.2) from which the fluid is dispensed

3.6.2 Connections**3.6.2.1****flange connection**

connection obtained between a *hose assembly* (3.1.2) and another hose assembly or a pipeline end or a manifold by bolting together the flanges

3.6.2.2**quick connection****quick acting connection****quick-release connection**

connection that can be rapidly made by engaging the two mating parts and that can also be broken rapidly by simple action

3.6.2.3**threaded connection**

connection obtained between two hose assemblies, or a *hose assembly* (3.1.2) and a pipeline end or manifold, by screwing together the two connector elements

3.6.2.4**banjo**

hollow fitting clamped between seals and incorporating a hollow bolt to allow 360° rotation of connecting pipe work or *hose* (3.1.1)

3.6.3 Types of fittings**3.6.3.1****wired-on fitting**

wired-in fitting

method of fitting attachment by winding wire in a spiral, usually under tension, on to the outside of the *hose* (3.1.1), directly over the *nipple* (3.6.4.10)

3.6.3.2**clamped hose fitting**

hose fitting (3.6.4.1) that is secured in position by means of a clamp

3.6.3.3**hose connector**

fitting that has a *nipple* (3.6.4.10) at both ends that can be inserted to connect two hose lengths together

3.6.3.4**permanent fitting**

fitting that, once installed, may not be removed for use in another *hose* (3.1.1)

Note 1 to entry: This is the case with crimped, swaged and built-in fittings.

3.6.3.5**plain-end fitting**

fitting with ends without a thread, groove or bevel, typically used for welding

Note 1 to entry: Example is for a flange attachment.

3.6.3.6

reusable hose fitting

reusable coupling

hose fitting (3.6.4.1) that is so designed that it can be disassembled from a *hose assembly* (3.1.2) and reassembled to another hose assembly without losing its function

3.6.3.7

built-in hose fitting

hose fitting (3.6.4.1) that is built into the hose construction during manufacture, and subsequently vulcanized in position

3.6.4 Parts of hose fittings, couplings and other components

3.6.4.1

hose fitting

coupling

connector

end-fitting

fitting, usually made of metal, attached to the end of a *hose* (3.1.1) to facilitate connection to equipment or another hose

Note 1 to entry: A female fitting carries the internal fastening; a male coupling carries the external fastening.

3.6.4.1.1

swivel coupling

coupling (3.6.4.1) that allows the fitting to rotate

3.6.4.1.2

elbow

hose fitting (3.6.4.1) bent to present the termination at a more suitable connecting angle

Note 1 to entry: Standard angles of 90°, 60°, 45° and 30° are common, with customized variations.

3.6.4.2

clamp

hose clamp

metal band around the outside of a *hose* to bind the *hose* (3.1.1) to a *hose fitting* (3.6.4.1), thus making a *hose assembly* (3.1.2)

3.6.4.2.1

interlocking clamp

clamp that engages the *hose fitting* (3.6.4.1) in a manner which prevents the clamp from sliding off the hose fitting

Note 1 to entry: Typically, a bolt or U-bolt with fingers which interlock with a ring on the fitting.

3.6.4.2.2

band

thin strip of metal used as a non-bolted clamp

3.6.4.3

bead

raised ring on the end of a *nipple* (3.6.4.10), typically of a semi-circular profile which is machined, cast, or roll-formed and used to prevent the hose fitting from slipping out of the hose or a metal ring that is welded, shrunk or cast on to the outer surface of a nipple

3.6.4.4

barb

one or multiple raised rings on the *nipple* (3.6.4.10), typically of a ramp-shaped profile which is machined or cast and used to prevent the hose fitting from slipping out of the hose

3.6.4.5**binding-in wire**

nipple wire

wire used to anchor a *hose* (3.1.1) to a *nipple* (3.6.4.10), usually applied during the construction of the hose assembly

3.6.4.6**bolt hole circle**

circle on the flange face around which the centres of the bolt holes are distributed

3.6.4.7**collar****ferrule****socketshell**

portion of a *hose fitting* (3.6.4.1) that is compressed by *swaging* (3.6.5.3) or *crimping* (3.6.5.1) to seat the hose on to the fitting *serrations* (3.6.4.12) and create a permanent attachment

Note 1 to entry: With *reusable fittings* (3.6.3.6), locking and sealing are accomplished mechanically by the collar without swaging or crimping.

Note 2 to entry: a) "swaging" means to axially compress down onto the hose, b) "crimping" means to radially compress onto the hose, and c) "reusable" means to compress from within due to internal expansion.

3.6.4.8**collar**

< nipple > raised portion of a *nipple* (3.6.4.10) that functions as a connection for a *ferrule* (3.6.4.7) or other locking device or functions as a hose stop

3.6.4.9**interlocking ferrule**

ferrule which physically engages the *hose fitting* (3.6.4.1), preventing the ferrule from sliding off the fitting

Note 1 to entry: Physical engagement can be fixed or blocked.

3.6.4.10**nipple**

spigot

hose nipple

hose fitting stem

insert

hosetail

tail

shank

section of the *fitting* (3.6.4.1) that is inserted into the hose

3.6.4.11**sleeve**

material put around the hose to provide protection against kinking, abrasion or other damage

3.6.4.12**serration**

corrugation or other features that increase the holding power of the *nipple* (3.6.4.10) or *ferrule* (3.6.4.7)

3.6.5 Methods of assembling**3.6.5.1****crimping**

hose fitting (3.6.4.1) attachment method utilizing a number of fingers or dies mounted in a radial configuration, the dies closing perpendicular to the hose and fitting axis, thus compressing the collar or ferrule radially around the hose and creating a lock and seal between the hose and fitting

3.6.5.2

skiving

removal of a short length of *cover* (3.3.6) or *lining* (3.3.2) to permit the attachment of a *hose fitting* (3.6.4.1) directly over the hose *reinforcement* (3.4.1) which ensures a metal to metal connection

Note 1 to entry: "skiving" is called "internal skiving" if the *rubber tubing* (3.3.7) or *lining* (3.3.2) is removed.

3.6.5.3

swaging

method of *hose fitting* (3.6.4.1) attachment that incorporates a set of die sections designed to progressively reduce the collar or ferrule diameter to the required final value by mechanically forcing the fitting axially into the mating die sections

3.7 Sizes and geometrical properties of hoses and hose assemblies

3.7.1 Sizes

3.7.1.1

nominal size

DEPRECATED: nominal bore size

DEPRECATED: nominal bore

size given to a hose for the purpose of identification

Note 1 to entry: It is dimensionless.

3.7.1.2

inside diameter

ID

diameter of the *bore* (3.3.1) of a hose

Note 1 to entry: It is expressed in millimetres.

3.7.1.3

outside diameter

OD

diameter of the exterior of the cross-section of a hose

Note 1 to entry: It is expressed in millimetres.

3.7.1.4

free length

length of the hose portion between the *hose fittings* (3.6.4.1) for a *hose assembly* (3.1.2) in the free state

3.7.2 Bending dimensions

3.7.2.1

bending

forcing the *hose* (3.1.1) out of a straight line into a curved position

Note 1 to entry: This term can be applied to hoses and hose assemblies.

3.7.2.2

bend radius

radius of a bent section of *hose* (3.1.1) measured to the innermost surface of the curved portion

Note 1 to entry: This term can be applied to hoses and hose assemblies.

3.7.2.3**minimum bend radius**

smallest specified radius to which a hose (3.1.1) may be bent in service

Note 1 to entry: See *bend radius* (3.7.2.2).

Note 2 to entry: This term can be applied to hoses and hose assemblies.

3.7.2.4**coiling diameter**

minimum diameter of coil to which a hose (3.1.1) can be coiled without damage

3.7.2.5**reeling diameter**

minimum diameter of reel on which a hose (3.1.1) can be coiled without damage by *kinking* (3.12.4) or distortion

Note 1 to entry: See *collapsible hose* (3.2.1.6).

Note 2 to entry: This term can be applied to hoses and hose assemblies.

3.7.3 Reinforcement angles and spacing**3.7.3.1****angle of braid**

angle of lay

acute angle between any strand of the *braid* (3.4.10) and a line parallel to the axis of the hose

3.7.3.2**spiral lay**

angle and *pitch* (3.7.3.4) in which a spiral *reinforcement* (3.4.1) is applied to a hose (3.1.1) or other cylindrical article

Note 1 to entry: See *angle of braid* (3.7.3.1).

3.7.3.3**helix angle**

acute angle between any strand of helical *reinforcement* (3.4.1) and a line parallel to the axis

3.7.3.4**pitch**

lay

distance between two consecutive turns of a helix measured parallel to the axis

Note 1 to entry: This term may also apply to other reinforcing components.

3.7.3.5**spacing**

distance between adjacent turns of reinforcing wire measured parallel to the axis of the helix

Note 1 to entry: This term may also apply to rings or other hoop type reinforcements.

Note 2 to entry: Spacing is the *pitch* (3.7.3.4) minus the width of the wire.

3.8 Mechanical properties**3.8.1****hydrostatic stability**

ability to resist, within limits, changes in length and/or diameter and/or *twist* (3.12.8) at a specified pressure

Note 1 to entry: This term can be applied to hoses and hose assemblies.

3.8.2

burst pressure

pressure at which rupture of the hose occurs when tested to the relevant International Standard

Note 1 to entry: This term can be applied to hoses and hose assemblies.

3.8.3

maximum working pressure

DEPRECATED: rated pressure

DEPRECATED: design pressure

maximum pressure which the *hose* (3.1.1) is designed to withstand, including any momentary surges, during service

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

Note 2 to entry: The maximum working pressure is expressed in SI units (MPa, kPa) or bar, or both.

3.8.4

proof pressure

pressure applied during a non-destructive test and held for a specified period of time to prove the integrity of the construction

Note 1 to entry: It is expressed in SI units (MPa, Pa) or in bar (or both).

Note 2 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.8.5

permeability

property of a material of transmitting gases and liquids by passage through one surface and out at another surface by diffusion and sorption processes

Note 1 to entry: Not to be confused with "porosity".

Note 2 to entry: The property of permeability involves the diffusion of molecules, called the permeant, through a membrane or interface. The permeability property works through diffusion; the permeant will move from high concentration to low concentration across the interface.

Note 3 to entry: In a pressurized hose the permeant can pass from the inside of the hose to the outside through the hose *lining* (3.3.2) and *cover* (3.3.6).

3.8.6

effusion

escape of gas from inside the hose through the *lining* (3.3.2) into the *carcass* (3.4.15)

3.8.7

diffusion

escape of gas from inside the hose through the *carcass* (3.4.15) and *cover* (3.3.6) into the environment

3.8.8

flexibility

ease of *bending* (3.7.2.1) a hose (3.1.1) without it being damaged by kinking, collapse, breaking or cracking

Note 1 to entry: A hose can be bent around a mandrel for test purposes.

3.8.9

stiffness

flexural stiffness

resistance of a hose to *bending* (3.7.2.1)

3.8.10**working temperature**

maximum or minimum temperature at which a hose (3.1.1) is designed to be used

Note 1 to entry: This term can be applied to hoses and hose assemblies.

3.8.11**working pressure**

pressure to which a hose (3.1.1) will be subjected, including any momentary surges, during service

Note 1 to entry: This term can be applied to hoses and hose assemblies (3.1.2).

3.8.12**pull-off force****fitting pull-out force**

force required to pull a hose (3.1.1) from its attachment

3.8.13**torsion**

deformation of a hose assembly (3.1.2) by twisting of the hose body caused by external force or incorrect installation

3.8.14**adhesion**

strength of bond between cured rubber surfaces or between a cured rubber surface and a non-rubber surface or the strength of bond between two non-rubber (plastics) hose layers fused or glued together

3.8.15**ply adhesion**

force required to separate two adjoining plies of a hose (3.1.1)

3.8.16**vacuum resistance**

resistance to vacuum

ability to withstand a specified vacuum in the bore (3.3.1) without collapse or delamination of the lining (3.3.2) or separation between hose layers

Note 1 to entry: This term can be applied to hoses (3.1.1) and hose assemblies (3.1.2).

3.8.17**vacuum stability**

ability of a hose (3.1.1) to resist, within limits, changes in length and/or diameter when subjected to a specified vacuum in the bore (3.3.1)

Note 1 to entry: This term can be applied to hoses and hose assemblies (3.1.2).

3.8.18**elongation**

change in length of a hose (3.1.1)

Note 1 to entry: It is expressed numerically as a percentage of the initial length.

Note 2 to entry: This term can be applied to hoses and hose assemblies (3.1.2).

3.9 Electrical aspects

3.9.1

bonded hose construction

hose (3.1.1) with conductive metallic elements incorporated in the hose construction

Note 1 to entry: When determined in accordance with ISO 8031, the electrical resistance per unit length in the case of hoses (lengths without couplings), or the electrical resistance between the fittings, in the case of hose assemblies, does not exceed $10^2 \Omega$ in a bonded hose construction.

3.9.2

static wire

wire incorporated in a *hose* (3.1.1) to conduct static electricity

3.9.3

anti-static wire

bonding wire

conducting wire

metal wire incorporated in the *hose wall* (3.3.3) in order to remove static electricity generated in the *hose* (3.1.1), and usually connected to the *couplings* (3.6.4.1) of a *hose assembly* (3.1.2)

Note 1 to entry: It is usually manufactured from thin braided copper wires.

3.9.4

conductivity

property of a hose or hose assembly to conduct electricity

Note 1 to entry: Recommended terminology and limits for electrical properties are given in ISO 8031:2020, Annex A.

Note 2 to entry: Recommended hose classifications are (per length of hose assembly):

- electrically insulating hose: $> 10^8 \Omega$; per assembly;
- electrically conductive or anti-static hose: $< 10^6 \Omega$ (grade Ω); per assembly;
- electrically bonded hose: $< 10^2 \Omega$ (grade M); per assembly;
- electrically continuous hose: $< 10^2 \Omega$; per assembly;
- electrically discontinuous hose: $> 2,5 \times 10^4 \Omega$; per assembly.

Note 3 to entry: A classification for a long hose length without end fittings in ohm per metre (Ω/m) is still to be established.

3.9.5

linear resistance

opposition to the flow of a current through a *hose* (3.1.1)

Note 1 to entry: It is expressed in ohms per metre (Ω/m).

Note 2 to entry: It is measured in accordance with ISO 8031.

3.9.6

static conductivity

capability to provide a path for dissipation of static electricity

3.9.7

static bonding

use of conductive material to eliminate static electrical charges

3.9.8**unbonded helix**

unbonded spiral

helical wire that is, by design, not connected to the end fitting/coupling

3.9.9**conductive hose**

hose (3.1.1) incorporating electrically conducting materials in the hose construction, the electrical resistance in the case of hoses, or the resistance between the fittings in the case of hose assemblies, being between $10^2 \Omega$ and $10^6 \Omega$

Note 1 to entry: Recommended terminology and limits for electrical properties are given in ISO 8031:2020, Annex A.

3.9.10**non-conductive hose**

insulated hose

hose (3.1.1) made of non-conductive material

Note 1 to entry: It does not incorporate conductive elements and is not capable of dissipating electrostatic charges.

3.10 Hose production methods and tools**3.10.1****mandrel**

rigid or flexible rod or tube of circular cross-section on which certain types of hose are manufactured

3.10.1.1**flexible mandrel**

long, round, smooth rod capable of being coiled in a circle of small diameter

Note 1 to entry: It is used for support during the manufacture of certain types of hose (the mandrel is made of rubber or plastics material and may have a core of flexible wire to prevent stretching).

3.10.1.2**rigid mandrel**

metallic rod or cylinder used to support the hose during manufacturing

3.10.2**wrapped cure**vulcanizing process using a tensioned strip of *fabric* (3.4.4) to apply external pressure

Note 1 to entry: See *spiral wrapping* (3.10.3).

3.10.3**spiral wrapping**

method of applying external pressure to a *hose* (3.1.1) during *vulcanization* (3.10.7) by using a narrow strip of cloth wound helically, with overlaps, along the hose

3.10.4**straight wrapping**

lightweight *fabric* (3.4.4) wrapped around the *hose* (3.1.1) to impart pressure and consolidate the hose during *vulcanization* (3.10.7), the warp threads of the fabric being parallel to the axis of the hose

3.10.5**wrapper mark**impression left on the surface of a hose by a material used during *vulcanization* (3.10.7)

Note 1 to entry: See *cloth-marked finish* (3.10.6).

Note 2 to entry: The marks usually show the characteristics of the woven pattern and the wrapper edge.

3.10.6

cloth-marked finish

appearance of the vulcanized *cover* (3.3.6) produced by straight or *spiral wrapping* (3.10.3) used during *vulcanization* (3.10.7) and subsequently removed

Note 1 to entry: See *wrapper mark* (3.10.5).

3.10.7

vulcanization

cure

process, usually involving heat, in which rubber, through a change in its chemical structure is converted to a condition in which the elastic properties are conferred or re-established or improved or extended over a greater range of temperatures

EXAMPLE Crosslinking.

[SOURCE: ISO 1382:2020, 3.542, modified — Note 1 to entry has been deleted and an EXAMPLE has been added.]

3.10.8

pricking

perforation of a hose *cover* (3.3.6) designed to prevent *blisters* (3.12.1) on the cover formed by the expansion of gases trapped in the interstices of the *reinforcement* (3.4.1)

3.10.9

consolidated, adv

in a state in which the components of the hose are firmly brought together by the application of pressure during manufacture

Note 1 to entry: Components cannot be considered bonded until after *vulcanization* (3.10.7). Consolidation procedures may be carried out several times during construction.

3.10.10

splice

joint or junction made by lapping or butting, straight or at an angle, and held together through *vulcanization* (3.10.7) or mechanical means

3.10.11

lap

part that extends over itself or over a similar part, usually by a desired and predetermined amount

3.10.12

lap seam

seam made by placing the edge of one piece of material so that it extends flat over the edge of a second piece of material

3.11 Hose tests and operation conditions

3.11.1

hydrostatic stability test

non-destructive test to determine the *hydrostatic stability* (3.8.1)

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.2

impulse

pressure of short duration that may be cyclic, and which produces sudden stress

3.11.3**impulse test**

pulsating pressure test, usually applied to *hydraulic hoses* (3.1.3)

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.4**proof pressure test**

pressure holding test to prove the structural integrity of a hose

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.5**vacuum test**

test of the *vacuum resistance* (3.8.17) of a *hose* (3.1.1)

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.6**bending force**

load required to induce *bending* (3.7.2.1) around a specified radius and hence a measure of *stiffness* (3.8.9)

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.7**test pressure**

positive or negative pressure to which the *hose* (3.1.1) is subjected for a specified period of time under standardized conditions

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).

3.11.8**system operating pressure**

operating pressure

pressure actually present in the piping system in which the hose is used during service

3.12 Hose and hose assembly deformations and defects**3.12.1****blister**

hollow space between layers in the *hose wall* (3.3.3), in which air or other gasses are entrapped

Note 1 to entry: This is a special case of a blister as defined in ISO 1382:2020, 3.54.

3.12.2**hose deformation**

change in hose geometry as measured according to a specified standard procedure

Note 1 to entry: Generally, outside diameter, length, locally positioned bulging, ovality.

3.12.3**kink**

permanent or temporary deformation of a section of the hose *bore* (3.3.1)

3.12.4**kinking**

permanent or temporary distortion of a hose by excessive *bending* (3.7.2.1), leading to closure or partial closure of the hose bore and/or permanent deformation

Note 1 to entry: This term can be applied to *hoses* (3.1.1) and *hose assemblies* (3.1.2).