
**Thermoplastic multi-layer (non-
vulcanized) hoses and hose
assemblies for the transfer of
hydrocarbons, solvents and
chemicals — Specification**

*Tuyaux et flexibles multicouches (non vulcanisés) thermoplastiques
pour le transfert des hydrocarbures, des solvants et des produits
chimiques — Spécifications*

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ISO 27126:2014

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Published in Switzerland

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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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

ISO 27126 is based on EN 13765:2010 with the following modifications to comply with the requirements of ISO/TC 45/SC 1:

- the pressure unit “bar” has been replaced by “MPa (bar)”;
- all references to EN or EN/ISO standards have been replaced by references to ISO standards wherever possible;
- references in [Clause 2](#) have been amended;
- [Table 2](#) has been amended (tolerance for ID 150 only, the other tolerances are already sufficient to accommodate the required changes of ID to include inch size mandrels);
- [Table 3](#) now requires the change in length and twist to be measured at maximum working pressure instead of proof pressure and [Annex H](#) has been amended accordingly;
- in [Table 4](#), the reference to the test method clause, to determine electrical resistance between fittings according to ISO 8031 has been corrected;
- [Annex G](#) has been amended in order to describe the method of detection of failure after completion of test;
- in [Clause 10](#), the marking has been amended according ISO/TC45/SC1 remarks.

Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of hydrocarbons, solvents and chemicals — Specification

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies requirements for four types of thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for carrying hydrocarbons, solvents and chemicals. It specifies bore sizes from 25 mm to 300 mm, working pressures from 0,4 MPa (4 bar) to 1,4 MPa (14 bar) and working temperatures from –30 °C to 150 °C, according to type.

Type 1 hoses are suitable for vapour applications. Types 2 to 4 hoses are suitable for liquid applications.

NOTE 1 See [Annex A](#) concerning the selection of the material for the inner wall of layers and any polymeric coating of the internal wire helix related to the chemical(s) to be conveyed by the hoses and/or hose assemblies.

NOTE 2 It is intended that the manufacturer be consulted where a polymeric coated internal wire is being considered for use with low conductivity hydrocarbons or chemicals.

This International Standard does not apply to hoses and hose assemblies for:

- aircraft refuelling <https://standards.iteh.ai/catalog/standards/sist/2b9c6310-9b6c-4e8d-9e79-3d73bda853aa/iso-27126-2014> see (ISO 1825);
- fuel dispensing see (ISO 5772);
- oil burners see (ISO 6806);
- liquefied petroleum gas and liquefied natural gas see (ISO 27127);
- fire fighting see (ISO 14557);
- offshore liquefied natural gas see (EN 1474–2);
- refrigeration circuits.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 1402:2009, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 7233:2006, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

ISO 7326:2006, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8031:2009, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO 10619-1, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

ISO 16143-3:2005, *Stainless steels for general purposes — Part 3: Wire*

EN 590, *Automotive fuels — Diesel — Requirements and test methods*

EN 10088-3:2005, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

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3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the terms and definitions given in ISO 8330 apply.

[ISO 27126:2014](https://standards.iteh.ai/catalog/standards/sist/2b9c6310-9b6c-4c84-9c79-3d73bda853aa/iso-27126-2014)

4 Classification

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Hoses shall be classified according to working pressure and working temperature range as given in [Table 1](#).

Table 1 — Pressure and temperature range

	Type 1		Type 2		Type 3		Type 4	
	MPa	Bar	MPa	Bar	MPa	Bar	MPa	Bar
Maximum working pressure	0,4	4	1,0	10	1,4	14	1,4	14
Proof pressure	0,6	6	1,5	15	2,1	21	2,1	21
Minimum burst pressure	1,6	16	4	40	5,6	56	5,6	56
Vacuum rating	0,05	0,5	0,09	0,9	0,09	0,9	0,09	0,9
Working temperature range (°C)	-20 to +60		-30 to +80		-30 to +80		-30 to +150	
NOTE	1 bar = 0,1 MPa.							

5 Materials and construction

5.1 General

Hoses shall be constructed as shown in [Figure 1](#) and shall consist of the following:

- an internal wire helix (see [5.2](#));

- a multi-ply wall of layers of films and fabrics made of thermoplastics that in combination give the required properties and provide a complete seal (see also [Annex A](#));
- a cover consisting of a fabric with abrasion resistant polymeric coating;
- an external wire helix (see [5.2](#)).

5.2 Internal and external wire

Wire shall be chosen in accordance with its chemical resistance from one of the following materials:

- austenitic stainless steel wire conforming to EN 10088-3, Table 4, numbers 1.4436 (X3CrNiMo 17-13-3) or ISO 16143-3:2005, Table 1: X2CrNi 19-11, X5CrNiMo 17-12-2, X2CrNiMo 17-12-2;
- carbon steel wire conforming to [Annex B](#) and either galvanised in accordance with [Annex C](#) or sheathed in a polymeric material of a minimum wall thickness of 0,5 mm, resistant to liquid hydrocarbon or liquid chemicals as agreed between purchaser and manufacturer (see [Annex A](#));
- aluminium wire conforming to ISO 209.



Key

- 1 internal wire
- 2 film
- 3 fabric
- 4 external wire

Figure 1 — Section of a typical thermoplastic multi-layer hose

6 Dimensions

6.1 Inside diameters, with tolerances and minimum bend radii

When measured in accordance with ISO 4671, the values of the internal diameters of the hose shall conform to [Table 2](#). When tested by the method specified in ISO 10619-1 the value of the minimum bend radius shall be as given in [Table 2](#). The hose shall show no sign of permanent deformation of the cross section i.e. kinking.

Table 2 — Dimensions and minimum bend radii

Dimensions in millimetres, except where specified as “inch”

Inside diameter		Tolerance	Minimum bend radii			
mm	Inch		Type 1	Type 2	Type 3	Type 4
25	1	±1	125	125	200	200
32	1,1/4	±1	150	150	200	200
38	1,1/2	±1	150	150	200	200
40	1,1/2	±1	150	150	200	200
50	2	±1	200	200	225	225
65	2,1/2	±2	200	200	225	225
75	3	±2	280	280	300	300
80	3	±2	300	300	350	350
100	4	±2	400	400	400	400
125	5	±2	500	500	500	—
150	6	±3	575	575	575	—
200	8	±3	800	800	800	—
250	10	±3	1 000	1 000	1 000	—
300	12	±3	1 200	1 200	1 200	—

6.2 Tolerance on length

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When tested in accordance with ISO 4671, the tolerance on the measured length of delivered hose assemblies shall be $\begin{matrix} +2 \\ -1 \end{matrix}$ %.

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7 Performance requirements of hoses and hose assemblies

7.1 Cover

When tested in accordance with ISO 2411, the adhesion between the fabric used for the outer cover and its abrasion resistant coating shall be not less than 1,5 kN/m.

7.2 Hoses

When tested in accordance with the methods given in [Table 3](#), the physical properties of the hoses shall conform to [Table 3](#).

Table 3 — Physical properties of hoses

Property	Unit	Requirements	Method(s)
Proof pressure	MPa bar	No leakage or other signs of damage at pressure given in Table 1 .	ISO 1402 with pressure increase not less than 0,17 MPa/min (1,7 bar/min)
Change in length at maximum working pressure	%	8	ISO 1402:2009, 8.2 initial length measured when the hose is pressurized to 0,07 MPa (0,7 bar) for 2 min
Twist at maximum working pressure	°/m	8	ISO 1402:2009, 8.2 initial reading taken when hose is pressurized to 0,07 MPa (0,7 bar) for 2 min
Burst pressure	MPa bar	≥ values in Table 1	ISO 1402
Bend	—	No leakage or visible damage when the hose is bent to the radius given in Table 2 and subjected to proof pressure.	ISO 10619-1
Vacuum	MPa bar	No damage after 30 min when subjected to values in Table 1 .	ISO 7233:2006, method B
Crush recovery (max.)	%	3	Annex D
Fuel resistance	MPa bar	No leakage at proof pressure	Annex E
Thermal ageing	—	No leakage at proof pressure given in Table 1 .	Annex F
Flammability	—	See Annex G .	Annex G
Low temperature flexibility	—	Test at minimum temperature given in Table 1 .	ISO 10619-2
Ozone resistance (cover only)	—	No cracks after 72 h at 40°C at ×2 magnification	ISO 7326:2006, method 3

7.3 End fittings

End fittings shall be made from materials depending on their chemical resistance to the product conveyed.

For all types of end fittings, the part of the fitting that enters the hose and forms the means by which the fitting is connected to the hose shall be provided with scrolls or protrusions on the surface that correspond to the pitch of the internal helix wire of the hose.

7.4 Hose assemblies

Hose assemblies shall be fitted with end fittings as described in [7.3](#).

End fittings shall be attached to the hose by one of the following methods:

- a) by the use of a seal and a metal ferrule which is swaged or crimped;
- b) by the use of a thermoset resin e.g. epoxy and a metal ferrule that is swaged or crimped.

When tested in accordance with the methods given in [Table 4](#), the physical properties of hose assemblies shall conform to [Table 4](#).

Table 4 — Physical properties of hose assemblies

Property	Unit	Requirements	Method(s)
Proof pressure	MPa bar	No leakage or other signs of weakness at pressure given in Table 1	ISO 1402 with pressure increase not less than 0,17 MPa/min (1,7 bar/min)
Bend	—	No leakage or visible damage when the hose is bent to the radius given in Table 2 and subjected to proof pressure.	ISO 10619-1
Series of hydrostatic tests	MPa bar % o/m	≥ burst pressure given in Table 1 , change in length given in Table 3 , twist as given in Table 3	Annex H
Security of end fitting	MPa bar	No leakage at proof pressure given in Table 1	Annex I and ISO 1402
Electrical resistance between end fittings	Ω	≤ 2,5 Ω/m for sizes less than 50 mm. ≤ 1,0 Ω/m for the 50 mm size and above sizes	ISO 8031:2009, 4.8.1 and 5.1
Burst pressure	MPa bar	≥ value given in Table 1	ISO 1402
Leak tightness	—	No leakage of air when subjected to 0,35 MPa (3,5 bar) for 5 min	Annex J

7.5 Electrical continuity

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There shall be electrical continuity between both internal and external wires and the end fittings. Where a wire is sheathed in polymeric material the sheath shall be stripped back for some of the length that engages with the fittings or the ferrule to ensure continuity.

Manufacturers shall demonstrate by testing or calculation that the measured overall electrical resistance of the hose assembly incorporates both internal and external wires being part of the circuit.

For the transfer of non conductive fluids the use of a hose with a non polymeric coated internal wire should be considered.

8 Test frequency

Routine tests shall be carried out on each hose assembly and in accordance with [Annex K](#).

It is recommended that batch tests are carried out for every 10 000 m of manufacture or once a year, varying the sizes and types and in accordance with [Annex L](#).

9 Type tests

Type tests are those tests carried out to determine that the hose assembly design, materials and methods of manufacture confirm that the hose/assembly meets all the requirements of this International Standard.

Type tests shall be carried out on at least three sizes of hose including the smallest and the largest size of each type in the manufacturer's range.

Type tests shall be repeated and the results recorded at least once every five years or whenever a change in the materials and/or method of manufacture is made.

10 Marking

10.1 Hose marking

Each hose shall be permanently marked at an interval of not greater than 1 m with lettering of a minimum height of 10 mm and with at least the following information:

- a) manufacturer's identification, e.g. XXX Ltd;
- b) number and year of this International Standard, i.e. ISO 27126:2014;
- c) hose identification e.g. Type 2;
- d) inside diameter, e.g. 40 mm;
- e) maximum working pressure in MPa and bar;
- f) maximum working temperature;
- g) material of hose inner liquid barrier layer as referenced in ISO 1043-1, e.g. PP (for polypropylene) or PET (for polyethylene terephthalate);
- h) quarter and year of hose manufacture.

EXAMPLE XXX Ltd — ISO 27126:2014 — Type 2 — 40 — 1 MPa (10 bar) — 80 °C — PP — 2Q/14

10.2 Hose assembly marking

Each hose assembly shall be permanently marked on the ferrule at one end with all the information given in [10.1](#) and in addition:

- a) the hose assembly serial number; [ISO 27126:2014](https://standards.iteh.ai/catalog/standards/sist/2b9c6310-9b6c-4c84-9c79-3d73bda853aa/iso-27126-2014)
- b) the last test date of the hose assembly;
- c) quarter and year of hose assembly manufacture. e.g. 2Q/14.