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

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

ICS 83.140.40

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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.

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

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

ISO 27126 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

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

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 4 bar¹⁾ to 14 bar and working temperatures from –30 °C to 150 °C.

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

NOTE The attention of users is drawn to Annex A concerning the selection of the material for the inner wall of layers and any polymeric coating of the inner helix related to the chemical(s) to be conveyed by the hoses and/or hose assemblies.

This standard does not apply to hose assemblies for:

aircraft refuelling	(ISO 1825)
fuel dispensing	(ISO 5772)
oil burners	(ISO 6806)
liquefied petroleum gas and liquefied natural gas	(ISO 27127)
fire fighting	(ISO 14775)
refrigeration circuits	

2 Normative references

The following referenced documents are indispensable for the application 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.

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

EN 10088-1:1995, *Stainless steels — Part 1: List of stainless steels*

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

ISO 1402, *Rubber and plastics hoses and hose assemblies - Hydrostatic testing*

ISO 1746, *Rubber or plastics hoses and tubing - Bending tests*

1) 1 bar = 0,1 MPa

- ISO 2411, *Rubber- or plastics-coated fabrics - Determination of coating adhesion*
- ISO 4671, *Rubber and plastics hose and hose assemblies - Methods of measurement of dimensions*
- ISO 4672, *Rubber and plastics hoses - Sub-ambient temperature flexibility tests*
- ISO 7233, *Rubber and plastics hoses and hose assemblies - Determination of suction resistance*
- ISO 8031, *Rubber and plastics hoses and hose assemblies - Determination of electrical resistance*
- ISO 8330:2000, *Rubber and plastics hoses and hose assemblies - Vocabulary*
- ISO 209, *Wrought aluminium and aluminium alloys — Chemical composition and forms of products*
- ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids*

3 Terms and definitions

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

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard 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.

4 Classification

Hoses are 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
Maximum working pressure (bar)	4	10	14	14
Proof pressure (bar)	6	15	21	21
Minimum burst pressure (bar)	16	40	56	56
Vacuum rating (bar)	0,5	0,9	0,9	0,9
Working temperature range (°C)	−20 to +60	−30 to +80	−30 to +80	−30 to +150

5 Materials and construction

5.1 General

Hoses shall be constructed as shown in Figure 1 and shall consist of the following:

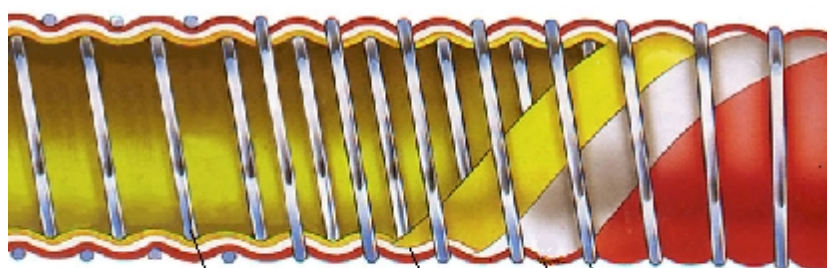
- an internal wire helix (see Clause 5.2);
- a multi-ply wall of layers of films and fabrics made of thermoplastics that in combination give the required properties and provide a complete seal (see also Annex A);
- a cover consisting of a fabric with abrasion resistant polymeric coating; and

— an external wire helix (see Clause 5.2).

5.2 Internal and external wire

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

- stainless steel conforming to EN 10088-1:1995 numbers 1.4306, 1.4401, 1.4404 or 1.4436²⁾;
- carbon steel wire conforming to Annex B and either galvanized in accordance with Annex C or sheathed in a polymeric material of a minimum wall thickness of 0.5mm, resistant to liquid hydrocarbon or liquid chemicals as agreed between purchaser and manufacturer (see Annex A); and
- aluminium wire conforming to ISO 209.



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Key

- 1 Inner wire
- 2 Film
- 3 Fabric
- 4 Outer wire

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

6 Dimensions

6.1 Internal 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 described in ISO 1746 the values 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.

2) No ISO equivalent available according to the knowledge of Project Leader, but he invites suggestions from ISO/TC 45/SC 1 members as comments to this DIS

Table 2 — Dimensions and minimum bend radii

Dimensions in millimetres

Internal diameter	Tolerance	Minimum bend radii			
		Type 1	Type 2	Type 3	Type 4
25	±1	125	125	200	200
32	±1	150	150	200	200
38	±1	150	150	200	200
40	±1	150	150	200	200
50	±1	200	200	225	225
65	±2	200	200	225	225
75	±2	280	280	300	300
80	±2	300	300	350	350
100	±2	400	400	400	400
150	±2	575	575	575	—
200	±3	800	800	800	—
250	±3	1000	1000	1000	—
300	+3	1200	1200	1200	—

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6.2 Tolerance on length <https://standards.iteh.ai/catalog/standards/sist/52cc2e89-876f-4b26-9247-3eb375117817/iso-pwi-27126>

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

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 no 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	Bar	No leakage or other signs of damage at pressure given in Table 1	ISO 1402 with pressure increase not less than 1,7 bar/min
Change in length at proof pressure (max).	%	10	ISO 1402
Twist at proof pressure (max).	°/m	10	ISO 1402
Burst pressure	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 1746
Vacuum	bar	No damage after 30 min when subjected to values in Table 1.	ISO 7233 method B
Crush recovery (max).	%	3	Annex D
Fuel resistance	bar	No leakage at proof pressure	Annex E
Ozone resistance 72 hr at 40°C	—	No cracking observed at x 2 magnification	ISO 7326
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 4672

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

When tested in accordance with the methods given in Table 4, hose assemblies shall conform to Table 4.

Table 4 — Physical properties of hose assemblies

Property	Unit	Requirements	Method(s)
Proof pressure	bar	No leakage or other signs of weakness at pressure given in Table 1	ISO 1402 with a pressure increase not less than 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 1746
Series of hydrostatic tests	bar % °/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	bar	No leakage at proof pressure given in Table 1	Annex I and ISO 1402
Electrical resistance	Ω	≤ 10 ³ for lengths less than 15 m of all sizes and ≤ 10 ² for lengths over 15 m of all sizes. The values obtained to be maintained to the end of the pressure test.	ISO 8031
Burst pressure	bar	≥ value given in Table 1	ISO 1402
Leak tightness	—	No leakage of air when subjected to 3,5 bar for 5 min	Annex J

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 bores 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 meets all requirements of this standard.

Type tests shall be carried out on at least 3 sizes of hose assembly 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. MAN Ltd;
- b) number and year of this International Standard, i.e. ISO 27126:2008;
- c) hose identification e.g. Type 2;
- d) internal diameter e.g. 40;
- e) maximum working pressure;
- 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 Poly[ethylene terephthalate]); and
- h) quarter and year of hose manufacture.

EXAMPLE MAN Ltd — ISO 27126:2008 — Type 2 — 40 — 10 bar — 80 °C — PP — 4Q/08

10.2 Hose assembly marking (standards.iteh.ai)

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; and
- b) the last test date of the hose assembly.