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Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of liquid petroleum gas and liquefied natural gas — Specification

Tuyaux et flexibles multicouches (non vulcanisés) thermoplastiques pour le transfert de gaz de pétrole liquide et de gaz naturel liquéfié — Spécifications

ICS 75.200; 83.140.40

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 27127 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

Thermoplastic multi-layer (non-vulcanized) hoses and hose assemblies for the transfer of liquid petroleum gas and liquefied natural gas — Specification

1 Scope

This International Standard specifies requirements for two types of thermoplastic multi-layer (non-vulcanized) transfer hoses and hose assemblies for carrying liquefied petroleum gas and liquefied natural gas. Each type is subdivided into two classes, one for on shore duties, and the other for offshore.

It specifies sizes from 25 mm to 250 mm, working pressures from 10,5[1)] bar to 25 bar and operating temperatures from –175 °C to +45 °C.

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*

ISO 148-1, *Metallic materials - Charpy impact test - Part 1: Test method*

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

ISO 7326, *Rubber and plastics hoses - Assessment of ozone resistance under static conditions.*

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

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

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

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 8031, *Rubber and plastics hoses and hose assemblies - Determination of electrical resistance*

ISO 8330:2000, R*ubber and plastics hoses and hose assemblies - Vocabulary*

BS 2782-3, *Method 326 – B:1977*

3 Terms and definitions

For the purpose 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

[1)] 1 bar = 0,1 MPa.

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 their usage, working pressure and working temperature range as given in Table 1.

Table 1 — Pressure and temperature range

Pressure/temperature	Class A[a]	Class B[b]	Class A	Class B
	Type 1	Type 1	Type 2	Type 2
Maximum working pressure (bar)	25	20	13	10,5
Proof pressure (bar)	37,5	30	19,5	15,8
Minimum burst pressure (bar)	100	100	52	52,5
Working temperature range (°C)	-50 ± 3 to +45	-50 ± 3 to +45	-175 ± 5 to +45	-175 ± 5 to +45
[a] Class A is for use onshore [b] Class B is for use offshore				

5 Materials and construction

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

5.1 Class A

— an internal wire helix of stainless steel conforming to EN 10088-1:1995, numbers 1.4306, 1.4401, 1.4404 or 1.4436;[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; and

— an external wire helix of stainless steel conforming to EN 10088-1:1995, numbers 1.4306, 1.4401, 1.4404 or 1.4436

5.2 Class B

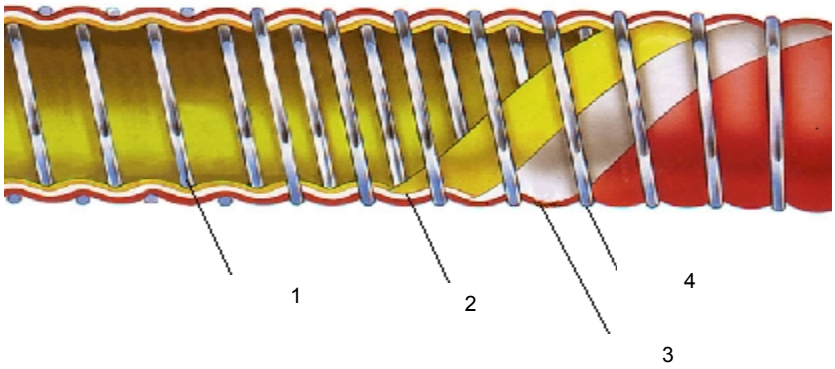
— an internal wire helix of stainless steel conforming to EN 10088-1:1995, numbers 1.4401, 1.4404 or 1.4436;

— 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; and

2) No ISO equivalent according to the knowledge of the project leader; but he invites suggestions from ISO/TC 45/SC 1 members as comments to this DIS

— an external wire helix of stainless steel conforming to EN 10088-1:1995, numbers 1.4401, 1.4404 or 1.4436.

NOTE By agreement between manufacturer and purchaser, the outer layer may have colour identification.



Key

1 Inner wire
2 Film
3 Fabric
4 Outer wire

Figure 1 — Section of a typical thermoplastic multilayer 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 diameter of the hose shall conform to Table 2. When tested by the method described in ISO 1746 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 radius

Dimensions in millimetres

Internal diameter	Tolerance	Minimum bend radius
25	±1	150
32	±1	175
38	±1	175
40	±1	200
50	±1	200
65	±2	200
75	±2	250
80	±2	250
100	±2	500
150	±2	660
200	±3	910
250	±3	2 500

6.2 Tolerance on length

When tested in accordance with ISO 4671 the tolerance on the measured length of delivered hose assemblies shall be $^{+2}_{-1}$ %.

7 Performance requirements of hoses and hose assemblies

7.1 Film and fabric

When tested at the minimum temperature, Type 1: –50 ± 3 °C and Type 2: –175 ± 5 °C, (and in accordance with BS 2782-3: Method 326B: 1977 or equivalent) samples of film and fabric shall have an elongation at break of not less than 10%[3)]

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.

3) No known ISO equivalent available according to Project Leader, but he invites suggestions from ISO/TC 45/SC 1 members as comments to this DIS.

Table 3 — Physical properties of hoses

Property	Unit	Requirement	Method
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 radius given in Table 2 and subjected to the proof pressure	ISO 1746
Crush recovery (max)	%	3	Annex A
Ozone resistance 72 hr at 40 °C	bar	No cracking observed at x 2 magnification	ISO 7326
Thermal ageing	—	No leakage at proof pressure given in Table 1.	Annex B
Low temperature flexibility	—	Test at minimum temperature given in Table 1	ISO 4672

7.3 End fittings

End fittings and metallic ferrules shall be made from the following materials depending on the type of hose to be used in the assembly:

Type 1 hose: LT (low temperature) grade carbon steel or stainless steel.

Type 2 hose: Austenitic stainless steel tested in accordance with Annex C.

For all types of end fittings, that 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 Clause 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 which is swaged.

NOTE Hoses should be assembled by the hose manufacturer.

When tested by the methods given in Table 4, hose assembly 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 is subjected to the proof pressure	ISO 1746
Series of hydrostatic tests	bar % °/m	≥ burst pressure given in Table 1 change in length as in Table 3 twist as given in Table 3	Annex D
Security of end fitting	bar	No leakage at proof pressure given in Table 1	Annex E and ISO 1402
Electrical resistance	Ω	≤ 10 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
Leak tightness	—	No leakage of air when subjected to 3,5 bar for 5 min	Annex F

8 Test frequency

Routine tests shall be carried out on each hose assembly and in accordance with Annex G.

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 H.

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 the requirements of this standard.

Type tests shall be carried out on at least 3 sizes of hose assembly including the smallest and largest for each type in the manufacturer's range.

Type tests shall be repeated, and the results recorded, at least 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 assembly shall be permanently marked at an interval of not greater than 1 m with lettering of a minimum height of 10mm with at least the following information:

a) manufacturer's name or identification mark, e.g. MAN Ltd;

b) number and year of this International Standard, i.e. ISO 27127:2008;

c) hose identification (class and type) e.g. Class B – Type 1;

d) internal diameter, e.g. 40;

e) maximum working pressure;

f) the working temperature range;

g) material of the hose inner liquid barrier layer as referenced in ISO 1043-1 e.g. PP (polypropylene); and

h) quarter and year of hose manufacture, e.g. 4Q/08.

EXAMPLE MAN Ltd — ISO 27127: 2008 —Class B — Type 1 — 40 — 20 — 50 +45 °C — PP — 4Q/08

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; and

b) the last test date of the hose assembly.