
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*

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Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Classification	2
5 Materials and construction	2
6 Dimensions	3
6.1 Inside diameters, with tolerances and minimum bend radii.....	3
6.2 Tolerance on length.....	4
7 Performance requirements of hoses and hose assemblies	4
7.1 Film and fabric.....	4
7.2 Hoses.....	4
7.3 End fittings.....	5
7.4 Hose assemblies.....	5
7.5 Electrical continuity.....	6
8 Test frequency	6
9 Type tests	6
10 Marking	7
10.1 Hose marking.....	7
10.2 Hose assembly marking.....	7
Annex A (normative) Method of test for crush recovery	8
Annex B (normative) Method of test for thermal ageing	10
Annex C (normative) Method of test of fittings subjected to low temperatures	11
Annex D (normative) Sequence of hydrostatic tests	12
Annex E (normative) Method of test for fitting security	13
Annex F (normative) Method of test for leak tightness	15
Annex G (normative) Method of test for flammability	16
Annex H (normative) Type and routine tests for hoses and hose assemblies	18
Annex I (informative) Batch tests for hoses and hose assemblies	19
Bibliography	20

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).

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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*.

This second edition cancels and replaces the first edition (ISO 27127:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the normative references have been updated and revised ([Clause 2](#));
- the tolerance on the minimum temperature has been removed ([Table 1](#));
- material numbers of helix have been added ([Clause 5](#));
- the tolerance on inside diameter 150 has been modified ([Table 2](#));
- change in length and twist at proof pressure has been modified to maximum working pressure ([Clause 7](#));
- flammability test has been added ([Table 3](#));
- burst pressure has been added ([Table 4](#));
- multi-components adhesive for hoses assemblies has been added ([Clause 7](#));
- the electrical resistance requirement between end fittings has been modified ([Clause 7](#));
- marking of the hose and assembly has been updated ([Clause 10](#));
- in [Annex A](#), thickness has been replaced by outside diameter (equals to the distance between the two plates) and tolerances on test force have been added;
- in [Annex D](#), the beginning of the test has been editorially revised;

- in [Annex E](#), a cycle has been specified and the end of the tests has been editorially revised;
- [Annex G](#) on a method of test for flammability has been added;
- in [Annex H](#) and [Annex I](#), the tests requirements have been updated.

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.

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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 determine the applicability of any other restrictions.

1 Scope

This document 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 onshore duties, and the other for offshore.

— Class A hose is for use onshore.

— Class B hose is for use offshore.

This document is applicable for hose sizes from 25 mm to 250 mm, working pressures from 10,5 bar to 25 bar and operating temperatures from $-196\text{ }^{\circ}\text{C}$ to $+45\text{ }^{\circ}\text{C}$, according to class.

NOTE Offshore liquefied natural gas (LNG) hose assemblies are also specified in EN 1474-2. EN 1474-2 does not only specify offshore use, but also ship to shore and other LNG transfer applications.

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

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

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

ISO 1402:2021, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

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

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8031:2020, *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 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO 16143-3:2014, *Stainless steels for general purposes — Part 3: Wire*

EN 10088-3:2014, *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*

3 Terms and definitions

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

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/>

4 Classification

Hoses shall be classified as given in [Table 1](#) according to their

- usage:
 - Class A hose is for use onshore,
 - Class B hose is for use offshore,
- working pressure and
- working temperature range.

Table 1 — Pressure and temperature range

Pressure/temperature	Class A Type 1		Class B Type 1		Class A Type 2		Class B Type 2	
	MPa	bar	MPa	bar	MPa	bar	MPa	bar
Maximum working pressure	2,50	25	2	20	1,30	13	1,05	10,5
Proof pressure	3,75	37,5	3	30	1,95	19,5	1,58	15,8
Minimum burst pressure	10	100	10	100	5,20	52	5,25	52,5
Working temperature range (°C)	-50 to +45		-50 to +45		-196 to +45		-196 to +45	
NOTE 1 1 bar = 0,1 MPa.								
NOTE 2 Due to pressurization during test and operations, the temperature of the fluid can increase. The indicated temperatures are measured at atmospheric pressure.								

5 Materials and construction

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

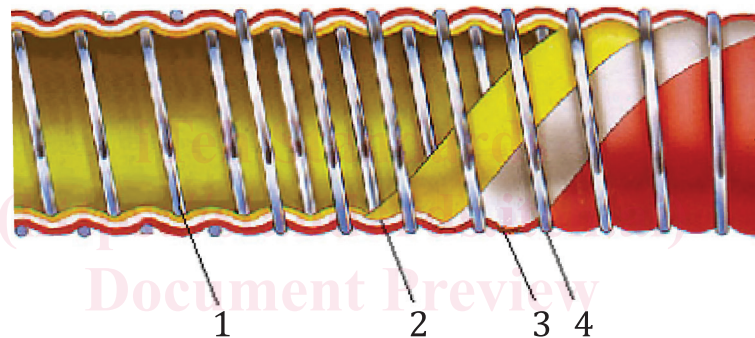
- a) **Class A:**
 - 1) an internal wire helix of austenitic stainless steel conforming to EN 10088-3:2014, Table 2, numbers 1.4306, 1.4401, 1.4404 or 1.4436 (X3CrNiMo 17-13-3) or ISO 16143-3:2014, Table 1 X2CrNi 19-11, X5CrNiMo 17-12-2, X2CrNiMo 17-12-2;

- 2) a multi-ply wall of layers of films and fabrics made of thermoplastics that in combination give the required properties specified in [Table 1](#) and provide a complete seal;
- 3) an external wire helix of austenitic stainless steel conforming to EN 10088-3:2014, Table 2, numbers 1.4306, 1.4401, 1.4404 or 1.4436 (X3CrNiMo 17-13-3) or ISO 16143-3:2014, Table 1 X2CrNi 19-11, X5CrNiMo 17-12-2, X2CrNiMo 17-12-2;

b) Class B:

- 1) an internal wire helix of austenitic stainless steel conforming to EN 10088-3:2014, Table 2, numbers 1.4306, 1.4401, 1.4404 or 1.4436 (X3CrNiMo 17-13-3) or ISO 16143-3:2014, Table 1 X2CrNi 19-11, X5CrNiMo 17-12-2, X2CrNiMo 17-12-2;
- 2) a multi-ply wall of layers of films and fabrics made of thermoplastics that in combination give the required properties specified in [Table 1](#) and provide a complete seal;
- 3) an external wire helix of austenitic stainless steel conforming to EN 10088-3:2014, Table 2, numbers 1.4306, 1.4401, 1.4404 or 1.4436 (X3CrNiMo 17-13-3) or ISO 16143-3:2014, Table 1 X2CrNi 19-11, X5CrNiMo 17-12-2, X2CrNiMo 17-12-2.

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



Key

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

Figure 1 — Section of a typical thermoplastic multilayer hose

6 Dimensions

6.1 Inside diameters, with tolerances and minimum bend radii

When measured in accordance with ISO 4671, the values of the inside diameter of the hose shall conform to [Table 2](#). When tested by the method described 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 radius

Dimensions in millimetres, except where specified as “inch”

Inside diameter		Tolerance	Minimum bend radius
mm	inch		
25	1	±1	150
32	1 1/4	±1	175
38	1 1/2	±1	175
40	1 1/2	±1	200
50	2	±1	200
65	2 1/2	±2	200
75	3	±2	250
80	3	±2	250
100	4	±2	500
125	5	±2	550
150	6	±3	660
200	8	±3	910
250	10	±3	2 500
300	12	±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 % to -1 %.

7 Performance requirements of hoses and hose assemblies

7.1 Film and fabric

When tested at the minimum temperature, Type 1: -50 °C ± 3 °C and Type 2: -196 °C ± 5 °C (and in accordance with ISO 13934-1 or equivalent for fabric testing and ISO 527-1 or equivalent for film testing) samples of film and fabric shall have an elongation at break of not less than 10 %.

7.2 Hoses

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

Table 3 — Physical properties of hoses

Property	Unit	Requirement	Method
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 proof pressure	%	10	ISO 1402:2021, 8.2 initial length measured when the hose is pressurized to 0,07 MPa (0,7 bar)
Twist at proof pressure	°/m	10	ISO 1402:2021, 8.2 initial reading taken when hose is pressurized to 0,07 MPa (0,7 bar)