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Rubber hoses and hose assemblies for dispensing liquefied petroleum gases (LPGs) — Specification

*Tuyaux et flexibles en caoutchouc destinés à la fourniture de gaz de
pétrole liquéfiés (GPL) — Spécifications*

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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 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*.

This second edition cancels and replaces the first edition (ISO 11759:1999), which has been technically revised.

The main changes are the following:

- a) [Clause 2](#), ISO 1746 and ISO 4672 are deleted, and replaced with ISO 10619-1 and ISO 10619-2 and inclusion of ISO 4671, and
- b) [Annex B](#) on test frequency and [Annex C](#) on production test were added.

Rubber hoses and hose assemblies for dispensing liquefied petroleum gases (LPGs) — Specification

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

1 Scope

This International Standard specifies the requirements for flexible rubber hoses and hose assemblies used for the transfer of metered quantities of liquefied petroleum gases (LPGs) from dispensing equipment to motor vehicles.

The hoses and hose assemblies specified in this International Standard are intended for use “wet”, i.e. permanently filled with liquid, in the temperature range from -40 °C to $+60\text{ °C}$.

The maximum working pressure is 2 MPa (20 bar).

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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 1307, *Rubber and plastics hoses — Hose sizes, minimum and maximum inside diameters, and tolerances on cut-to-length hoses*

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

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

ISO 4080, *Rubber and plastics hoses and hose assemblies — Determination of permeability to gas*

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

ISO 6801, *Rubber or plastics hoses — Determination of volumetric expansion*

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

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

ISO 8033, *Rubber and plastics hoses — Determination of adhesion between components*

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*

3 Terms and definitions

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

4 Classification

Two types of hose are specified, as follows:

Type 1: Hoses with textile reinforcement, incorporating a metallic bonding element, suitable for reeling on a drum or draping in a single loop.

Type 2: Hoses with a fine wire reinforcement, suitable for reeling on a drum or draping in a single loop.

5 Materials and construction

Hoses shall consist of the following:

- a smooth, fuel-resistant lining of rubber;
- one or more layers of textile or corrosion-resistant wires, for example stainless steel or tinned copper;
- an electrically conductive element (Type 1) typically consisting of not less than two bonding wires of a braided construction each containing a minimum of nine strands of corrosion-resistant metal;
- an abrasion and weather-resistant rubber cover.

The hose cover can be pricked to release trapped gases.

6 Hydrostatic requirements

When the hose or hose assembly is tested in accordance with ISO 1402, the pressure rating shall comply with the values given in [Table 1](#).

Table 1 — Pressure ratings

Property	Pressure rating MPa	Pressure rating bar ^a
Maximum working pressure	2	20
Proof test pressure	4	40
Minimum burst pressure	10	100
^a 1 bar = 0,1 MPa		

7 Dimensions and tolerances

7.1 When measured by the method described in ISO 4671, the inside and outside diameters of the hose shall comply with the dimensions and tolerances given in [Table 2](#).

7.2 The tolerances on cut lengths shall be as specified in ISO 1307.

Table 2 — Hose sizes and inside and outside diameters and tolerances

Hose size	Inside diameter mm	Tolerance mm	Outside diameter mm	Tolerance mm
16	16	±0,8	26	±1,0
19	19	±0,8	29	±1,0
20	20	±0,8	30	±1,0
25	25	±1,25	35	±1,25

7.3 Lining and cover thickness

When measured by the method described in ISO 4671, the minimum thickness of the lining shall be 1,6 mm and that of the cover 1,0 mm.

8 Physical properties of materials

The values of physical properties of the materials used for the manufacture of hoses shall be as given in [Table 3](#).

Table 3 — Physical properties of materials

Property	Unit	Requirement	Test piece	Method of test
Tensile strength			Test piece cut from hose or from test sheet	ISO 37 type 1 or type 2 dumb-bell
Lining	min.	MPa		
Cover	min.	MPa		
Elongation at break			Test piece cut from hose or from test sheet	ISO 37 type 1 or type 2 dumb-bell
Lining	min.	%		
Cover	min.	%		
Accelerated ageing: change for lining and cover			Test piece cut from hose or from test sheet	ISO 188, 72 h at 100 °C
Tensile strength	max.	%		
Elongation at break	max.	%		
Resistance of lining to liquids: change in tensile strength and elongation at break		Not less than 65 % of original values	Test piece cut from hose lining or from test sheet	ISO 1817, 72 h at 23 °C, immersion in <i>n</i> -hexane

9 Performance requirements for hoses and hose assemblies

The values of physical properties of hoses and hose assemblies shall be as given in [Table 4](#).

Table 4 — Physical properties of hoses and hose assemblies

Property	Unit	Requirement	Test piece	Method of test
Proof test pressure	—	No leakage or other signs of weakness	Full length of hose or hose assembly	ISO 1402
Burst pressure	min.	MPa (bar)	Short length cut from hose	ISO 1402

Table 4 (continued)

Property	Unit	Requirement	Test piece	Method of test
Change in length at proof pressure max.	%	± 7	Hydrostatic proof test piece cut from hose	ISO 1402
Volumetric expansion max.	%	+6	Test piece cut from hose	ISO 6801: test pressure 10 bar
Flexibility at ambient temperature	—	$T/D > 0,8$	Short length cut from hose	ISO 10619-1, method A, using $10 \times$ the internal diameter as the value for diameter C
Low-temperature flexibility	—	No cracks or breaks	Short length cut from hose	ISO 10619-2, method B, $-40\text{ }^{\circ}\text{C}$
Ozone resistance of cover	—	No cracks under $\times 2$ magnification	Short length cut from hose	ISO 7326:1991, method 1
Adhesion between components min.	kN/m	2	Short length cut from hose	ISO 8033
Electrical continuity or resistance of hose or hose assembly (fitting to fitting)	W/m	Not more than $10\ \Omega/\text{m}$ or $10\ \Omega/\text{assembly}$	Length of hose or hose assembly	ISO 8031
Flexibility test under reverse bending	—	>50 000 cycles, no failure or increase in electrical resistance to a value higher than that specified	Hose assembly	Annex A
LPG permeability max	$\text{cm}^3/(\text{m} \times \text{h})$	400 ISO/FDIS 11759	Short length cut from hose	ISO 4080

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10 Frequency of testing

The minimum frequency of testing shall conform to the schedule given in [Annex B](#).

Type tests are those tests carried out in order to verify that the hose meets all requirements of this International Standard.

Routine tests are those tests carried out on each length of finished hose.

Production tests are those tests carried out per batch, see schedule given in [Annex C](#) is for guidance only.

11 Type tests

Type testing is carried out in order to confirm that all the materials, construction, and test requirements of this International Standard have been met by the method of manufacture and hose design.

Type testing shall be repeated at a maximum of every five years or whenever a change in the method of manufacture or materials occurs.

Type testing shall be performed for all sizes and types except those of same size and construction.

12 Marking

Hoses shall be clearly and durably marked, at least every metre, with at least the following information:

- a) the manufacturer's name or identification;

- b) the manufacturer's product identification (optional);
- c) the number of this International Standard (i.e. ISO 11759:2014);
- d) the type of hose;
- e) the hose size;
- f) the maximum working pressure, in MPa and bar;
- g) for hoses the quarter and year of manufacture and for assemblies the date of assembly (e.g. 2Q14).

EXAMPLE XXX ISO 11759 — Type 1 - 16 - 20 MPa (20 bar) - 2Q14

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