
**Rubber hoses and hose assemblies for
use in oil burners — Specification**

*Tuyaux et flexibles en caoutchouc pour brûleurs à fuel —
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).

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 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 the following URL: 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 fourth edition cancels and replaces the third edition (ISO 6806:2014), which has been technically revised with the following changes:

- [Table 3](#) has been amended;
- [Clause 10](#) has been amended.

Rubber hoses and hose assemblies for use in oil burners — Specification

1 Scope

This document specifies the minimum requirements for rubber hoses and hose assemblies for use in oil burners.

The following two types of hose assembly are specified.

- Type 1: Hose assemblies for flux and reflux, but not for insertion between the oil burner pump and the atomizing connection; maximum working pressure 1,0 MPa (10 bar); maximum oil temperature 100 °C.
- Type 2: Hose assemblies for insertion between the oil burner pump and the atomizing connection; maximum working pressure 4,0 MPa (40 bar); maximum oil temperature 100 °C.

The hose assemblies specified in this document are not intended to be used, without special assessment, for purposes other than oil burner installations.

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 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

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 1436, *Rubber hoses and hose assemblies — Wire-braid-reinforced hydraulic types for oil-based or water-based fluids — Specification*

ISO 1817, *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, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

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

ISO 10619-2:2011, *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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>

— ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Construction

Hoses in accordance with this document shall consist of either

- a) an internally smooth rubber lining and an external corrosion-resistant metal braid, or
- b) an internally smooth rubber lining, a reinforcement consisting of one or more layers of textile or corrosion-resistant metal braid and a rubber outer cover.

The hoses shall be fitted with permanently attached couplings.

Both the couplings and the metal braid shall be provided with suitable corrosion protection. The metals used shall not have any deleterious effects on the rubber components.

5 Dimensions and tolerances

5.1 Inside diameter

The inside diameter of the hose shall be in accordance with the dimensions and tolerances given in [Table 1](#), which is in accordance with ISO 1307 for the nominal size.

Table 1 — Nominal size

Nominal size	Inside diameter mm	Tolerance mm
5	5	±0,5
6,3	6,3	±0,75
8	8	
10	10	
12,5	12,5	
16	16	
20	20	±1,25
25	25	

5.2 Bend radii

The hoses shall not be used at bend radii, measured at the inside of the bend, smaller than the minimum bend radii specified in [Table 2](#).

Table 2 — Minimum bend radii

Nominal size	Minimum bend radius mm
5	50
6,3	60
8	75
10	80
12,5	105
16	120
20	145
25	165

5.3 Thickness of lining and cover

When measured in accordance with ISO 4671, the minimum thickness of the lining and cover shall be not less than 1,7 mm and 1,3 mm, respectively.

6 Physical requirements for lining and cover

When tested in accordance with the methods of test indicated, the lining and cover shall comply with the requirements of [Table 3](#).

Table 3 — Physical requirements for lining and cover

Property	Requirement	Method of test
Oil resistance:		ISO 1817
Volume change:		$\left(72 \begin{smallmatrix} 0 \\ -2 \end{smallmatrix} \right)$ h in oil No. 3
— lining	-5 % to +15 %	at 70 °C ± 1 °C for type 1
— cover	-5 % to +60 %	at 125 °C ± 2 °C for type 2
Hardness change after resistance test: ^a		
— lining	±10 IRHD	ISO 48

^a No initial hardness is specified, but a limit on hardness change after oil immersion is included to ensure that a lining with adequate oil resistance is employed.

7 Physical requirements for hoses and hose assemblies

7.1 Hydrostatic tests

7.1.1 Proof pressure test

When tested in accordance with the method specified in ISO 1402 to the proof test pressure specified in [Table 4](#), the hose assembly shall show no signs of leakage or distortion or movement of the couplings.

7.1.2 Burst pressure test

When tested in accordance with the method specified in ISO 1402, the hose assembly shall show no signs of leakage or failure before the minimum burst pressure specified in [Table 4](#) has been attained.

Table 4 — Hydrostatic pressure requirements

Parameter	Pressure requirements			
	Type 1		Type 2	
	MPa	bar	MPa	bar
Maximum working pressure	1,0	10	4,0	40
Proof test pressure	2,0	20	8,0	80
Minimum burst pressure	4,0	40	16,0	160

7.2 Oil swell

When tested in accordance with the method specified in [Annex C](#), the reduction in the inside diameter of the hose shall not exceed 10 %.

7.3 External pressure test

When tested in accordance with the method specified in [Annex D](#), the reduction in the outside diameter of the hose shall not exceed 6 %.

7.4 Low-temperature flexibility

When tested in accordance with ISO 10619-2:2011, method B at a temperature of $-40\text{ °C} \pm 2\text{ °C}$, the hose shall not crack and shall show no signs of leakage when proof pressure is subsequently tested in accordance with [7.1](#).

7.5 Flammability

When tested in accordance with the method specified in [Annex E](#), the hose shall show no signs of leakage.

7.6 Ozone resistance (cover only)

When tested in accordance with ISO 7326, there shall be no signs of cracking.

7.7 Impulse test

When tested in accordance with the method specified in [Annex F](#), there shall be no leakage or damage after completion of 30 000 cycles.

8 Frequency of testing

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

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

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

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

9 Type tests

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

Type testing shall be repeated at least every 5 years or whenever a change in the method of manufacture or materials occurs.

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

10 Marking

Hose assemblies complying with the requirements of this document shall be marked with the following information:

- a) the number of this document;
- b) the nominal bore size;
- c) the type;
- d) the manufacturer's mark or reference;
- e) the quarter and year of manufacture.

EXAMPLE ISO 6806 – 10 – Type 2 – MAN – 2Q16

NOTE Hoses (e.g. with metal braiding) can be marked by a metal identification plate.

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Annex A
(normative)

Test frequency

Table A.1 gives the frequency of testing for type tests and routine tests (see Clauses 8 and 9 for description of these tests).

Table A.1 — Frequency of testing for type tests and routine tests

Property	Type tests	Routine tests
Compound tests		
Oil resistance test for cover	x	N/A
Oil resistance test for lining	x	N/A
Hose test		
Visual examination (inside and outside)	x	x
Measurement of inside diameter	x	x
Measurement of outside diameter	x	x
Measurement of outer cover thickness	x	N/A
Measurement of liner thickness	x	N/A
Proof pressure test	x	x
Burst test	x	N/A
Oil swell test	x	N/A
External pressure resistance test	x	N/A
Low temperature flexibility test	x	N/A
Flammability test	x	N/A
Ozone resistance test (cover only)	x	N/A
Impulse test	x	N/A
x = test carried out N/A = not applicable		

Annex B (informative)

Production tests

[Table B.1](#) gives the suggested frequency for production tests (see [Clause 8](#)), to be carried out per batch or per 10 batches as indicated in [Table B.1](#).

A batch is defined as 3 000 m of hose.

Table B.1 — Recommended test frequency

Property	Production test	
	Per batch	Per 10 batches
Compound tests		
Oil resistance test for cover	N/A	N/A
Oil resistance test for lining	N/A	x
Hose test		
Visual examination (inside and outside)	x	x
Measurement of inside diameter	x	x
Measurement of outside diameter	x	x
Measurement of outer cover thickness	x	N/A
Measurement of liner thickness	x	x
Proof pressure test	x	x
Burst test	N/A	N/A
Oil swell test	N/A	x
External pressure resistance test	N/A	x
Low-temperature flexibility test	N/A	x
Flammability test	N/A	x
Ozone resistance test (cover only)	N/A	x
Impulse test	N/A	x
x = test carried out		
N/A = not applicable		

Annex C
(normative)

Determination of oil swell

Measure the internal diameter in accordance with ISO 4671 of a hose of length at least 500 mm. Fill the hose assembly with No. 3 oil as specified in ISO 1817 and condition it for 28 days at 100 °C with the ends sealed. At the end of this period, re-measure the internal diameter of the hose and express the result as a percentage change from the original.

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Annex D (normative)

Determination of resistance to external pressure

Measure the free length, l , between the fittings of a hose assembly of length about 500 mm. Seal one end and attach the other end to a connector inside a pressure vessel. Connect the other end of the connector to a calibrated glass standpipe (see [Figure D.1](#)).

Close the pressure vessel, fill the hose assembly and standpipe with water, free from entrained air, and condition for 1 h at 70 °C. Apply a pressure of 0,06 MPa ± 0,005 MPa (0,6 bar ± 0,05 bar) within the pressure vessel and, after 5 min, read the change in the level of the meniscus, Δh , in the standpipe.

Calculate the reduction in the internal diameter of the hose assembly, expressed as a percentage, using [Formula \(D.1\)](#):

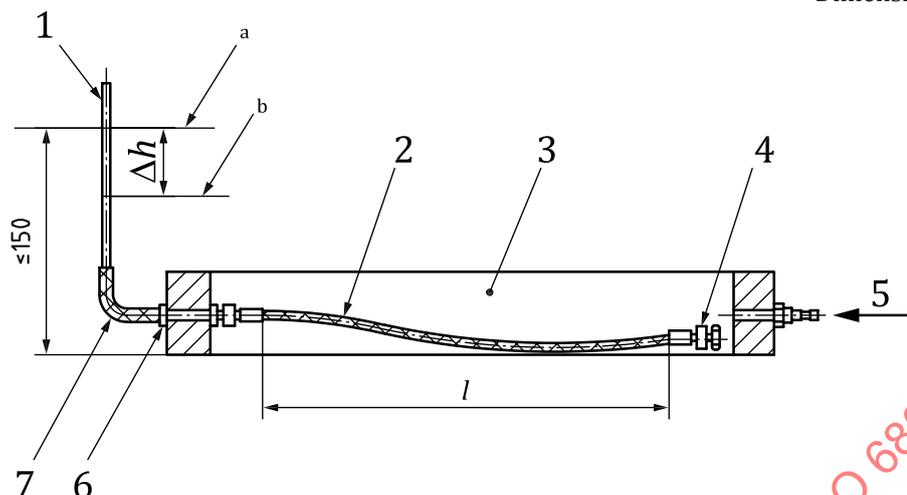
$$\frac{d_k^2 \times \Delta h}{d_s^2 \times l} \times 100 \quad (D.1)$$

where

- d_k is the internal diameter, in millimetres, of the standpipe;
- d_s is the internal diameter, in millimetres, of the hose;
- Δh is the change in the level, in millimetres, of the meniscus;
- l is the free length, in millimetres, of the hose.

The internal diameter of the standpipe shall be selected so that the meniscus does not rise by more than 150 mm above the lowest point of the hose assembly.

Dimensions in millimetres



Key

- 1 calibrated stand pipe
- 2 hose assembly filled with water
- 3 pressure vessel
- 4 sealed end
- 5 pressure connection
- 6 connecting olive
- 7 transparent hose
- a Meniscus after test.
- b Meniscus before test.

Figure D.1 — Apparatus for determination of resistance to external pressure

Annex E (normative)

Determination of flammability

Seal one end of a hose assembly of length about 1 000 mm. Fill the assembly to about 90 % of its volume with oil No. 3 as specified in ISO 1817 and connect the assembly to a water pressure standpipe. Bend the assembly as shown in [Figure E.1](#) and, using laboratory clamps, fix it in this position.

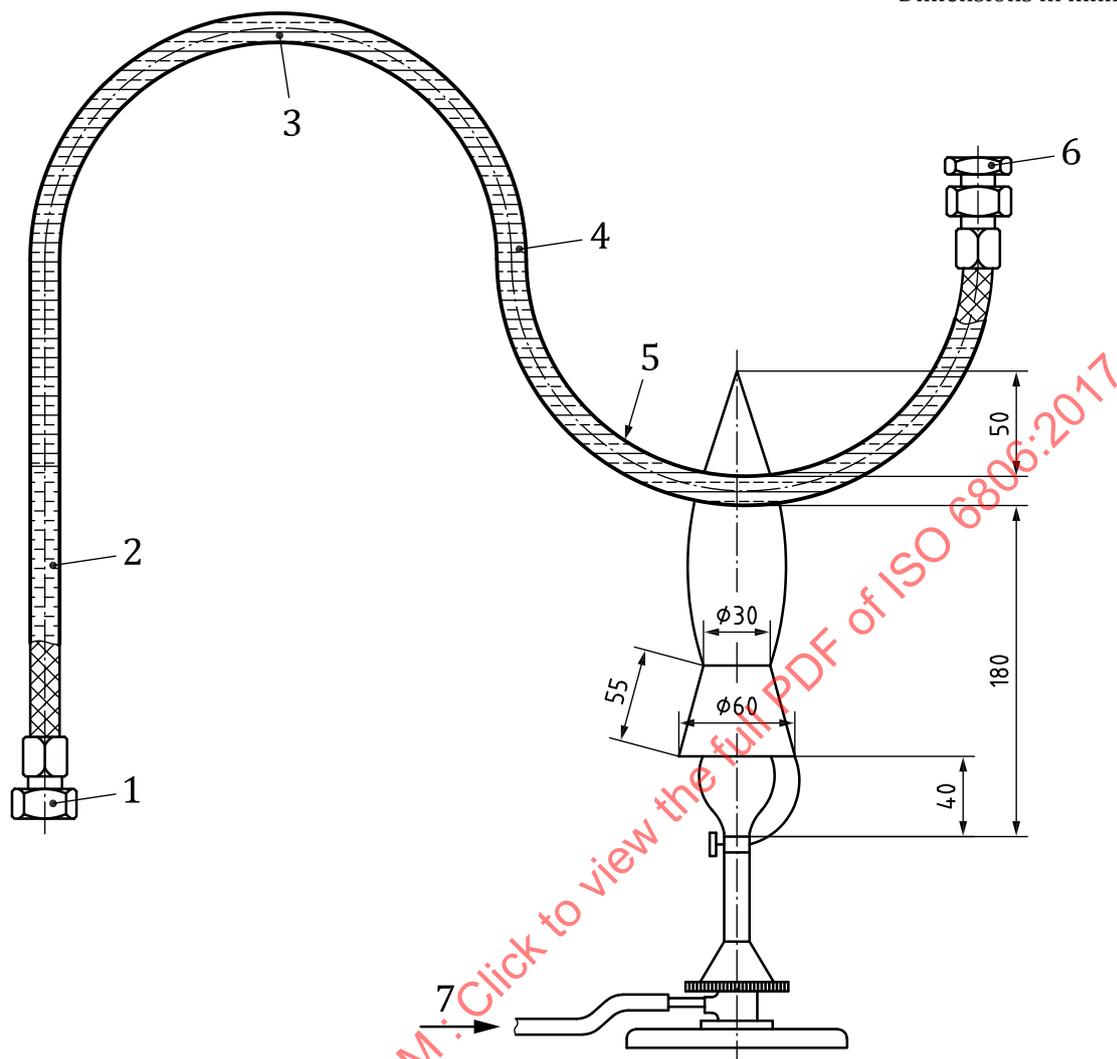
Apply internal water pressure to the assembly. The water pressure shall be 0,5 MPa (5 bar) for type 1 hose assemblies and 4,0 MPa (40 bar) for type 2 hose assemblies.

Expose the lowest bent portion of the hose assembly for 5 min to the flame of a Bunsen burner burning propane gas at a temperature of $675\text{ °C} \pm 75\text{ °C}$. The nominal inside diameter of the burner tube shall be 10 mm and the air inlet shall be closed. The pressure of the propane gas fed to the Bunsen burner shall be approximately 5 kPa (50 mbar). Use a burner tip of frustum shape to stabilize the flame.

WARNING — Attention is drawn to the potential fire hazard associated with hose failing to meet the requirements of this test. Adequate precautions shall be taken to restrict the spread of fire and to ensure the safety of personnel in the event of failure.

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Dimensions in millimetres



Key

- 1 pressure connection
- 2 water
- 3 hose assembly filled with test oil
- 4 hose
- 5 bend radius (10 to 15) × ø ext. of hose
- 6 sealed end
- 7 propane gas (pressure about 5 kPa [50 mbar])

Figure E.1 — Arrangement for flammability test