INTERNATIONAL STANDARD

ISO 6806

Third edition
2014-09-15

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

Tuyaux et flexibles en caoutchouc pour brûleurs — Spécifications

Reference number
ISO 6806:2014(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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 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, *Hoses (rubber and plastics)*.

This third edition cancels and replaces the second edition (ISO 6806:1992), of which it constitutes a minor revision.

The following changes (mainly editorial) were made as required to bring the standard up to date.

— Clause 2 (Normative references) has been updated where necessary. Reference to ISO 4672 has been replaced by ISO 10619-2 and the new titles of ISO 1307, ISO 1436 and ISO 4671 have been quoted.

— Wherever necessary the terminology has been amended to conform to ISO 8330.

— New Clause 7 (Frequency of testing) and Clause 8 (Type tests) have been introduced; new Annexes A and B (Tables A.1 and B.1) have been introduced to standardize the frequency of the tests already required in the previous edition (ISO 6806:1992).

— Clause 9 (Marking) has been amended (maximum working pressure and date of publication of this International Standard to be marked on hose).

— No technical changes from requirements already specified in the second edition (ISO 6806:1992) have been made.

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

1 Scope

This International Standard 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; working pressure 4,0 MPa (40 bar); maximum oil temperature 100 °C.

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

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

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 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 10619-2:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

3 Construction

Hoses in accordance with this International Standard 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.

4 Dimensions and tolerances

4.1 Inside diameter

The inside diameter of the hose shall be in accordance with the nominal dimensions and tolerances given in Table 1, which is in accordance with ISO 1307.

Table 1 — Nominal size

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

4.2 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

4.3 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.

5 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
Tensile strength (lining and cover)	8,0 MPa	ISO 37
Elongation at break (lining and cover)	250 % min.	ISO 37
Accelerated ageing:		ISO 188
Change in tensile strength (lining and cover)	30 % max.	3 days at 100 °C ± 1 °C
Change in elongation at break (lining and cover)	35 % max.	3 days at 100 °C ± 1 °C
Oil resistance:		ISO 1817
Volume change:		$\left(72\ ^{0}_{-2}\right)$ h in No. 3 oil
— 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:[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.

6 Physical requirements for hoses and hose assemblies

6.1 Hydrostatic tests

6.1.1 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.

6.1.2 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 design 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

6.2 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 %.

6.3 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 %.

6.4 Low-temperature flexibility

When tested in accordance with method B of ISO 10619-2:2011 at a temperature of −40 °C ± 2 °C, the hose shall not crack and shall show no signs of leakage when subsequently proof pressure tested in accordance with 6.1.

6.5 Flammability

When tested in accordance with the method specified in Annex E, the hose shall show no signs of leakage.

6.6 Ozone resistance (cover only)

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

6.7 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.

7 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 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 B, which is for guidance only).

8 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 least every five 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.

9 Marking

Hoses shall be marked with at least the following information, and the marking shall be repeated every 1,0 m or less:

a) the manufacturer's mark or reference;

b) the number and year of publication of this International Standard;

c) the type number, e.g. type 2;

d) the nominal size, e.g. 20;

e) the maximum working pressure, in MPa and/or bars, including units, e.g. 4 MPa/40 bar;

f) the quarter and year of manufacture, e.g. 2Q14.

EXAMPLE MANxxxx ISO 6806:2014 – type 2/20/4 MPa/40 bar/2Q14.

Annex A
(normative)

Test frequency

Table A.1 gives the frequency of testing for type tests and routine tests (see Clauses 7 and 8 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
NOTE X = test carried out, N/A = not applicable.		

Annex B
(informative)

Production tests

Table B.1 give the suggested frequency for production tests (see Clause 7), to be carried out per batch or per 10 batches as indicated in this table.

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
NOTE 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.

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 the formula:

$$\frac{d_k^2 \times \Delta h}{d_s^2 \times l} \times 100$$

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;

I 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.

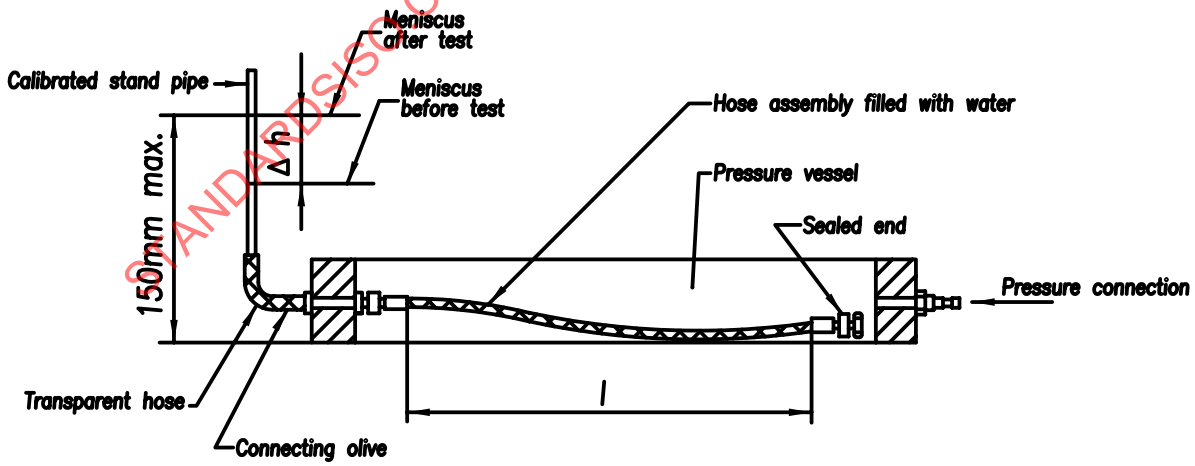

Figure D.1 — Apparatus for determination of resistance to external pressure

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 No. 3 oil 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 °C ± 75 °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.

Dimensions in millimetres

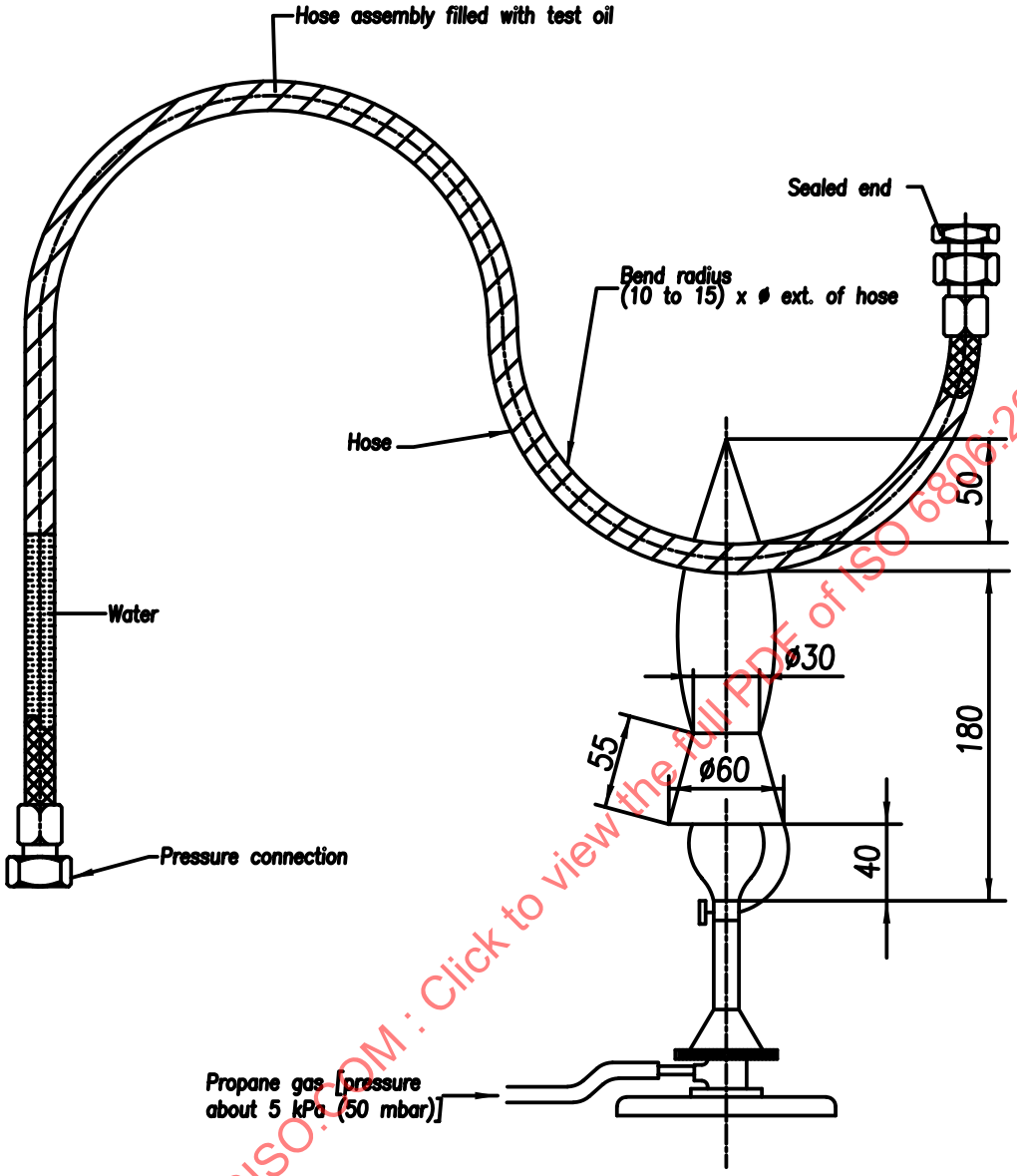

Figure E.1 — Arrangement for flammability test