International Standard 6806

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

Tuyaux en caoutchouc et flexibles pour brûleurs — 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6806 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

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

1 Scope and field of application

This International Standard specifies requirements for rubber hoses and hose assemblies for use in oil burners. Such hose assemblies should not be used, without special assessment, for purposes other than oil burner installations.

Two types of hose assemblies 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 of 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 of 100 °C.

2 References

ISO 37, *Rubber, vulcanized — Determination of tensile stress-strain properties.*

ISO 48, *Vulcanized rubbers — Determination of hardness.*

ISO 188, *Rubber, vulcanized — Accelerated ageing or heat-resistance tests.*

ISO 1307, *Rubber and plastics, hoses — Bore diameters and tolerances on length.*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing.*[1)]

ISO 1436, *Rubber products — Hoses and hose assemblies — Wire reinforced hydraulic type.*

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

ISO 2592, *Petroleum products — Determination of flash and fire points — Cleveland open cup method.*

ISO 2977, *Petroleum products and hydrocarbon solvents — Determination of aniline point and mixed aniline point.*

ISO 4671, *Rubber and plastics hose and hose assemblies — Methods of measurement of dimensions.*

ISO 4672, *Rubber products — Hoses, low-temperature flexibility tests.*

ISO 5282, *Aromatic hydrocarbons — Determination of total sulfur content — Pitt-Ruprecht reduction and spectrophotometric method.*

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

ASTM D 1177, *Standard test method for freezing point of aqueous engine coolant solution.*

DIN 51751, *Testing of liquid mineral oil hydrocarbons; determination of distillation range.*

DIN 53538/2, *Testing of rubber; standard-reference-elastomers; butadiene-acrylonitrile rubber to characterize test liquids and greases based on petroleum products.*

3 Construction

Hoses in accordance with this International Standard shall consist of either;

a) an internally smooth rubber lining and an external corrosion resisting 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.

1) At present at the stage of draft. (Revision of ISO 1402-1974.)

4 Dimensions and tolerances

4.1 Bore

The bore 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 bores

Values in millimetres

Nominal bore	Tolerance
5	± 0,5
6,3 8 10 12,5 16 20	± 0,75
25	± 1,25

4.2 Bending radii

The hoses should not be used at bending radii, measured at the inside of the bend, smaller than the minimum bending radii specified in table 2.

Table 2 — Minimum bending radii

Dimensions in millimetres

Nominal bore	Minimum bending radius
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 MN/m²	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 ± 1 °C
Change in elongation at break (lining and cover)	35 % max.	3 days at 100 ± 1 °C
Oil resistance:		ISO 1817:
Volume change:		70^{+2}_{0} h in No. 3 oil
— lining	−5 % to +15 %	at 70 ± 1 °C for type 1
— cover	−5 % to +60 %	at 125 ± 1 °C for type 2
Hardness change*		
— lining	± 10 IRHD	ISO 48

* 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 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	1,6	16	6,4	64
Minimum burst pressure	3,15	31,5	12,6	126

6.2 Oil resistance

When tested in accordance with the method specified in annex A, the reduction in the internal diameter of the hose shall not exceed 10 %.

NOTE — A more suitable test oil is under consideration and will be specified when details are available.

6.3 External pressure test

When tested in accordance with the method specified in annex B, the reduction in the external diameter of the hose shall not exceed 6 %.

6.4 Low-temperature flexibility

When tested in accordance with method B of ISO 4672, at a temperature of -40 ± 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 C, 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 D, there shall be no leakage or damage after 30 000 cycles.

7 Marking

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

a) the number of this International Standard;

b) the nominal bore size;

c) the type number;

d) the manufacturer's mark or reference;

e) the quarter and year of manufacture.

Annex A

Determination of oil resistance

(Forms an integral part of the Standard.)

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

Annex B

Determination of resistance to external pressure

(Forms an integral part of the Standard.)

Measure the free length between the fittings, l, 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 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 ± 0,005 MPa (0,6 ± 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 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;

δh is the change in the level, in millimetres, of the meniscus;

d_s is the internal diameter, in millimetres, of the hose;

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.

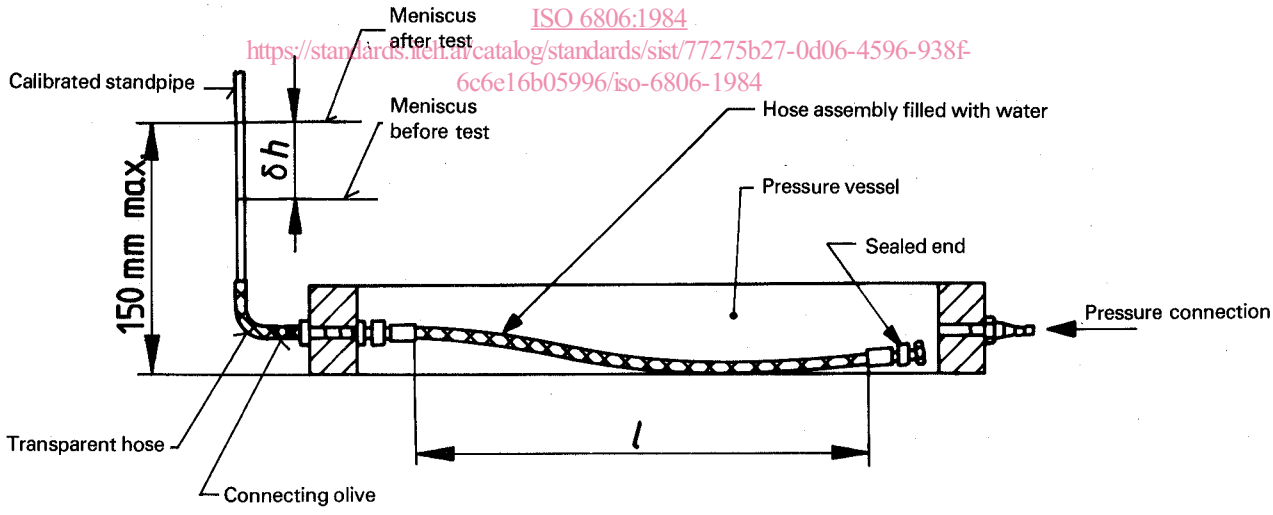

Figure 1 — Apparatus for determination of resistance to external pressure

Annex C

Determination of flammability

(Forms an integral part of the Standard.)

C.1 Procedure

Seal one end of a hose assembly of length about 1 000 mm. Fill the assembly to about 90 % of its volume with the test oil specified in clause C.2 and connect the assembly to a water pressure standpipe. Bend the assembly as shown in figure 2 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 ± 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 with the requirements of this test. Adequate precautions shall be taken in the event of failure to restrict the spread of fire and to ensure the safety of personnel.

C.2 Specifications for test oil

C.2.1 Composition

1-methylnaphthalene	20 % (V/V)
straight-chain paraffin (C_{12} to C_{18})	80 % (V/V)

C.2.2 Requirements

See table 5.

Table 5 — Requirements for test oil

Property	Requirement	Method of test
Aniline point	78 ± 1,5 °C	ISO 2977
Flash point	100 °C min.	ISO 2592
Freezing point	2,5 ± 0,7 °C	ASTM D 1177
Sulfur content	0,1 % (m/m) max.	ISO 5282
Change in mass of standard rubber	31,5 ± 1,0 %	DIN 53538/2
Boiling range: initial temperature	242,5 ± 1,5 °C	DIN 51751
Up to 250 °C	4 to 14 % (V/V)	
260 °C	47 to 60 % (V/V)	
270 °C	74 to 81 % (V/V)	
280 °C	91 to 94 % (V/V)	
290 °C	98 to 99 % (V/V)	

Dimensions in millimetres

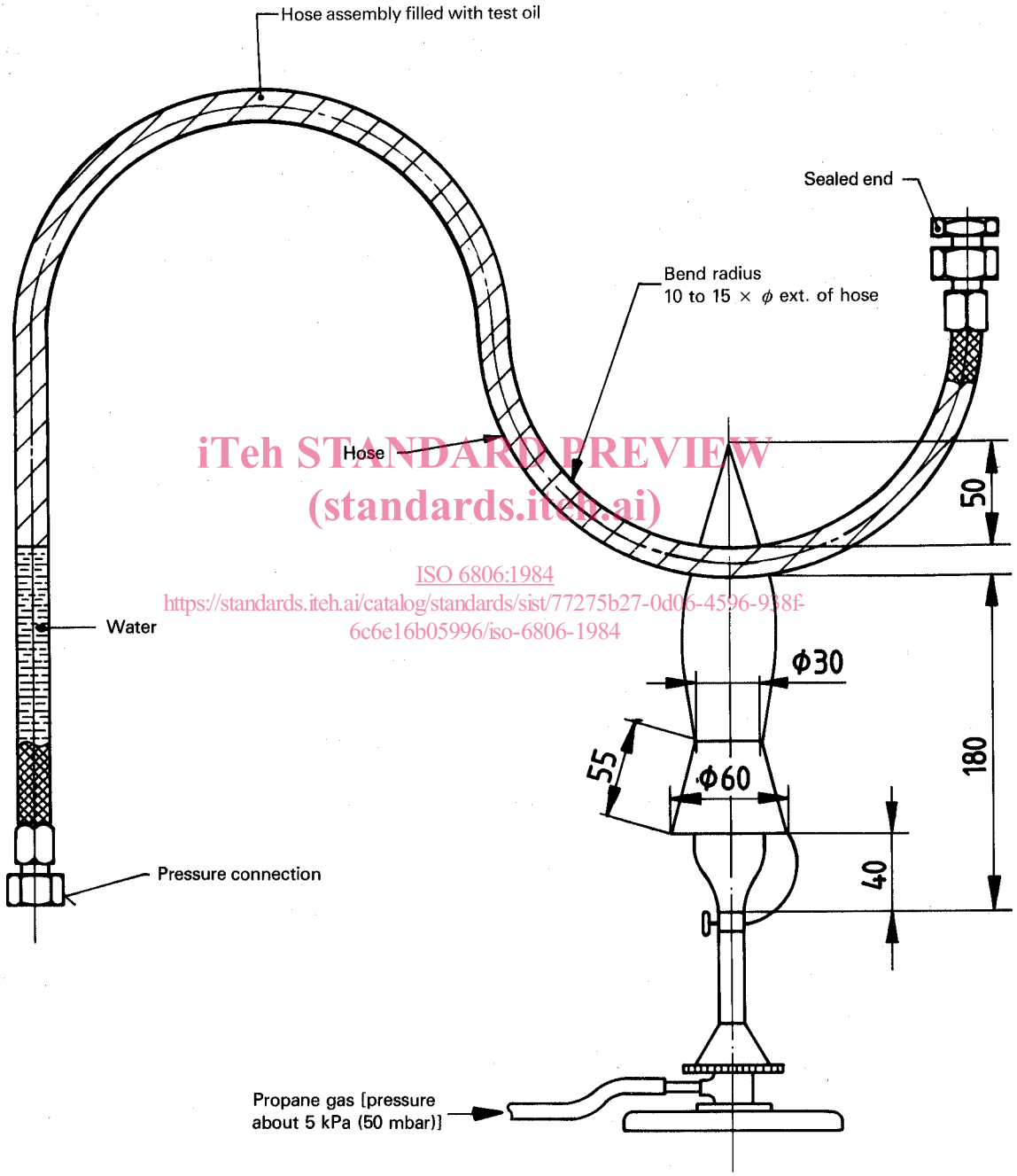

Figure 2 — Arrangement for flammability test