TC 45

International Standard 6808

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Plastics hoses for suction and low-pressure discharge — Petroleum liquids — Specification

Tuyaux en plastique pour aspiration et refoulement basse pression — Liquides pétroliers — 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.

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Plastics hoses for suction and low-pressure discharge — Petroleum liquids — Specification

0 Introduction

This International Standard has been prepared to provide minimum acceptable requirements for the satisfactory performance of polymer reinforced thermoplastics hoses for suction and discharge applications, conveying kerosene, heating oil, diesel fuel and lubricating oils. These hoses are not suitable for conveying automotive or aviation fuel. These hoses are not suitable for metered delivery of any liquid.

The list of nominal bores given in tables 1 and 2 is not intended to be restrictive and will not preclude the manufacture of sizes outside the preferred number range (the basis of the tables) and which may be the subject of individual national standards.

1 Scope and field of application

This International Standard specifies the requirements for two types of polymer reinforced thermoplastics hoses for suction and discharge applications for use with kerosene, heating oil, diesel fuel and lubricating oils in the temperature range − 10 to + 60 °C:

Type 1 − light service;

Type 2 − normal service.

2 References

ISO 176, *Plastics — Determination of loss of plasticizers — Activated carbon method.*

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

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO/R 527, *Plastics — Determination of tensile properties.*

ISO 868, *Plastics — Determination of indentation hardness by means of a durometer (Shore hardness).*

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

ISO 1402, *Rubber hoses — Hydrostatic testing.*

ISO 1746, *Rubber or plastics hoses and tubing — Bending tests.*

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids.*[1]

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

ISO 7233, *Rubber and plastics hoses and hose assemblies — Vacuum resistance — Methods.*

ISO 7751, *Rubber and plastics hoses and hose assemblies — Testing and bursting pressures.*

ISO 8031, *Rubber and plastic hoses — Determination of electrical properties — Specification.*[2]

1) At present at the stage of draft. (Revision of ISO 1817-1975.)
2) At present at the stage of draft.

3 Materials and construction

The hose shall be as uniform as commercially practicable in colour, opacity and other physical properties. A flexible thermoplastics material is supported in its mass by a helix of polymeric material of a similar molecular structure. The reinforcing and flexible components of the wall shall be fused and free from visible cracks, porosity, foreign inclusions or other defects causing the hose to be unserviceable. The hose shall be electrically bonded between couplings. Electrical continuity may be ensured by an antistatic strip welded along the hose on its outer surface. The antistatic strip may consist of a braided copper wire coated with suitable plastics material and shall be anchored to the metallic couplings in a manner which will ensure reliable electrical continuity throughout the life of the hose.

The method of ensuring electrical continuity shall be the responsibility of the manufacturer and shall be carried out to the satisfaction of the user.

4 Dimensions and tolerances

4.1 Bore

The bore of the hose shall meet the requirements of tables 1 and 2, which are in accordance with ISO 1307.

Table 1 — Type 1 hoses — Nominal bores and tolerances

Values in millimetres

Nominal bore	Tolerance
12,5	± 0,75
16	± 0,75
20	± 0,75
25	± 1,25
31,5	± 1,25
40	± 1,50
50	± 1,50
63	± 2,00
80	± 2,00
100	± 2,00
125	± 2,00

Table 2 — Type 2 hoses — Nominal bores and tolerances

Values in millimetres

Nominal bore	Tolerance
12,5	± 0,75
16	± 0,75
20	± 0,75
25	± 1,25
31,5	± 1,25
40	± 1,50
50	± 1,50

NOTE — If special cases call for extra sizes:

a) for smaller or larger dimensions, further numbers should be chosen from the R 10 series of preferred numbers, with tolerances as given in ISO 1307;

b) for intermediate dimensions, numbers should be chosen from the R 20 series of preferred numbers, with the tolerances as given for the next larger size.

4.2 Length

The tolerances on cut lengths shall be as given in table 3.

Table 3 — Tolerances on cut lengths

Nominal bore mm	Tolerance on cut length %
Up to and including 40	± 1
Over 40	± 2

5 Physical tests on finished hose

5.1 Hydrostatic test

The hose when tested by the method specified in ISO 1402 at standard laboratory temperature as specified in ISO 471 shall meet the requirements of table 4.

When examined at proof pressure (i.e. 50 % of minimum bursting pressure) the hose shall show no evidence of leakage, cracking, abrupt distortion or electrical continuity damage.

Table 4 — Hydrostatic test at standard laboratory temperature

Nominal bore mm	Working pressure MPa (bar)		Minimum bursting pressure MPa (bar)	
	Type 1	Type 2	Type 1	Type 2
12,5 up to and including 25	0,3 (3)	0,55 (5,5)	1,2 (12)	2,8 (28)
31,5 up to and including 50	0,3 (3)	0,4 (4)	1,2 (12)	2,0 (20)
63,5 up to and including 125	0,3 (3)	–	1,2 (12)	–

The values given in table 4 are based on the following safety ratios:

Type 1 – 4 : 1;

Type 2 – 5 : 1.

5.2 Hydrostatic test (55 ± 2 °C)

The hose when tested by the method specified in ISO 1402 at 55 ± 2 °C, shall meet the requirements of table 5.

Table 5 — Hydrostatic test at 55 ± 2 °C (all bore sizes)

Working pressure MPa (bar)		Minimum bursting pressure MPa (bar)	
Type 1	Type 2	Type 1	Type 2
0,07 (0,7)	0,15 (1,5)	0,3 (3)	0,8 (8)

The above values given in table 5 are based on the following safety ratios:

Type 1 – 4 : 1;

Type 2 – 5 : 1.

5.3 Change in length (for type 2 only)

When tested by the method specified in ISO 1402 at standard laboratory temperature as specified in ISO 471, the hose shall not change in length by more than 20 %.

NOTE — Electrical continuity is also tested at this time (see 5.9).

5.4 Vacuum test

When tested in accordance with the method specified in ISO 7233 using an internal pressure (less than atmospheric pressure) of 65 kPa (650 mbar) for Type 1 and 80 kPa (800 mbar) for Type 2, the hose shall not fail due to collapse or fracture at a point which is more than one diameter distance from the coupling.

In the event of failure closer to the coupling, the test shall be disregarded and a further test piece shall be tested.

5.5 Reinforcement fracture test

When tested in accordance with the method specified in the annex, the polymer reinforcement shall be capable of reverse bending without cracking after 336 h extended over the appropriate size extension piece listed in table 6.

NOTE — This period is intended as a control test. For a type test, a period of four months should be used.

Table 6 — Extension pieces for fracture test

Values in millimetres

Nominal bore	Block width
12,5	10
16	12
20	16
25	19
31,5	23
40	27
50	31
63	34
80	38
100	44
125	49

5.6 Minimum bend diameter

When tested in accordance with the requirements of ISO 1746 at standard laboratory temperature using a minimum diameter of curvature (c) of eight times the nominal bore, the hose shall not crack.

5.7 Cold bend test

5.7.1 When tested at −10 ± 2 °C in accordance with the requirements of ISO 4672 (method B), except that conditioning shall be for 5 h at that temperature using a minimum diameter of curvature of 32 times the nominal bore, the hose shall not crack.

5.7.2 When tested as in 5.7.1, but after ageing at 100 ± 1 °C in No. 3 oil for 70 $^{+2}_{0}$ h as specified in ISO 1817, the hose shall not crack.

5.8 Electrical continuity

The hose, when tested in accordance with ISO 8031, shall not show an electrical resistance, measured between couplings, exceeding 2,0 MΩ/m of length.

6 Physical properties of flexible thermoplastics material

6.1 Loss in mass on heating

The flexible thermoplastics material used in the construction shall, when tested in accordance with ISO 176 (method B), have a loss in mass not greater than 4 %.

6.2 Tensile strength and elongation at break

The minimum tensile strength and elongation at break of the flexible thermoplastics material used in the construction, when tested by the method specified in ISO/R 527, shall be as shown in table 7.

Table 7 — Tensile strength and elongation at break

Tensile strength MPa	Elongation at break %
7	200

6.3 Fuel resistance

The flexible thermoplastics material used in the construction, when tested in accordance with ISO 1817, after immersion in standard liquid B for 48 $^{+2}_{0}$ h at standard laboratory temperature as specified in ISO 471, shall not exceed the limits in table 8.

Table 8 — Fuel resistance

Property	Limit
Change in tensile strength, % of original value, max.	− 30
Change in elongation at break, % of original value, max.	− 30
Change in volume, %	− 5 to + 25

6.4 Oil resistance

The flexible thermoplastics material used in the construction, when tested in accordance with ISO 1817 after immersion in standard oil No. 3 for 70 $^{+2}_{0}$ h at 70 ± 1 °C, shall not exceed the limits in table 9.

Table 9 — Oil resistance

Property	Limit
Change in tensile strength, % of original value, max.	− 40
Change in elongation at break, % of original value, max.	− 40
Change in volume, %	− 5 to + 25

6.5 Resistance to accelerated ageing

After ageing according to the method described in ISO 188 for 3 days at 100 ± 1 °C, the flexible thermoplastics material shall not exceed the limits in table 10 when in accordance with the methods specified in ISO/R 527 and ISO 868.

Table 10 — Change in properties on ageing

Property	Limit
Change in tensile strength, % of original value, max.	− 20
Change in elongation at break, % of original value, max.	− 50
Change in hardness, max. (degrees Shore A)	+ 10

7 Marking

The hose shall be marked using a contrasting indelible ink with the following information. Characters shall be at least 5 mm high.

a) Manufacturer's name or trade mark.

b) Number of this International Standard.

c) Hose type.

d) Hose nominal bore.

e) Quarter and year of manufacture (last two digits).

Annex

Reinforcement fracture test

A.1 Apparatus

The apparatus comprises lengths of hardwood or metal of rectangular section with one cross-section dimension of the appropriate value given in table 6.

A.2 Test pieces

The test piece shall contain three helices of reinforcement. The test piece shall be split with a clean cut along its length. Three test pieces shall be tested.

A.3 Conditioning

No test shall be carried out within 24 h of manufacture. Test pieces shall be conditioned at standard laboratory temperature as specified in ISO 471 for at least 3 h, which may be part of the 24 h, before testing.

A.4 Procedure

Open up the test piece and place it on the block extension appropriate to its bore as specified in table 6.

Leave in this condition for either 336 h or 4 months, as appropriate.

Reverse bend the sample until the outside surfaces touch, as indicated in the figure, and examine for cracking of the helix.

A.5 Test report

The test report shall include the following information:

a) either no failure or the position and mode of failure of samples, as applicable;

b) the test temperature;

c) the test period.

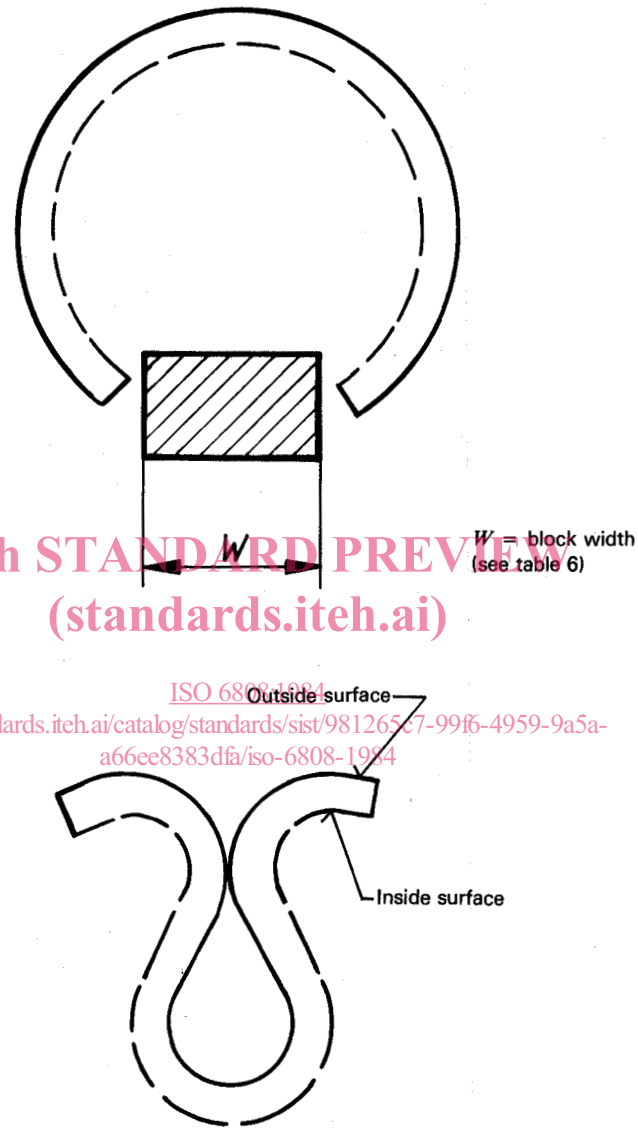

Figure — Diagrammatic representation of reinforcement fracture test