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Plastics hoses — Textile-reinforced types for compressed-air applications — Specification

Tuyaux en plastique — Types armés de textile pour applications avec de l'air comprimé — Spécifications

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 5774 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This third edition cancels and replaces the second edition (ISO 5774:1997), which has been technically revised.

Introduction

This International Standard has been prepared to provide minimum acceptable requirements for the satisfactory performance of flexible thermoplastics hoses, textile reinforced, for compressed-air applications.

Maximum working pressures of each hose type are specified with two operating temperatures.

Some hose materials will require a hydrolysis test (given in Annex A).

Plastics hoses — Textile-reinforced types for compressed-air applications — Specification

1 Scope

This International Standard specifies the requirements for four types of flexible thermoplastic hose, textile reinforced, for compressed-air applications in the temperature range from − 10 °C to + 60 °C.

The four types are classified as light service for a maximum working pressure of 7 bar at 23 °C and 4,5 bar at 60 °C, medium service for a maximum working pressure of 10 bar at 23 °C and 6,5 bar at 60 °C, heavy service for a maximum working pressure of 16 bar at 23 °C and 11 bar at 60 °C, and heavy service for use in mining for a maximum working pressure of 25 bar at 23 °C and 13 bar at 60 °C.

2 Normative references

The following referenced documents are indispensable for the application 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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scales for assessing change in colour*

ISO 176:2005, *Plastics — Determination of loss of plasticizers — Activated carbon method*

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

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

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

ISO 4672:1997, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests*

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

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

ISO 8331, *Rubber and plastics hoses and hose assemblies — Guide to selection, storage, use and maintenance*

ISO 11758:1995, *Rubber and plastics hoses — Exposure to a xenon arc lamp — Determination of changes in colour and appearance*

3 Terms and definitions

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

4 Classification

Hoses are designated as one of the following four types depending on their pressure rating at the specified temperature:

Type A: General industrial use — light service — for a maximum working pressure of 7 bar at 23 °C and 4,5 bar at 60 °C.

Type B: General industrial use — medium service — for a maximum working pressure of 10 bar at 23 °C and 6,5 bar at 60 °C.

Type C: Heavy service — for a maximum working pressure of 16 bar at 23 °C and 11 bar at 60 °C.

Type D: Heavy service — for use in mining and outdoor work — for a maximum working pressure of 25 bar at 23 °C and 13 bar at 60 °C.

The hoses are not intended for the transport of oil. However, compressed air coming from a compressor may contain some oil in suspension.

5 Couplings and end fittings

Hoses may be fitted with the appropriate coupling type and end fitting to form hose assemblies.

NOTE Guidance on coupling type is given in Annex D and ISO/TR 17784.

6 Materials and construction

The hoses shall consist of:

a) a lining made of a flexible thermoplastics material;

b) a reinforcement made of a natural or synthetic textile material applied by any suitable technique;

c) a cover made of a flexible thermoplastics material.

The lining and the cover shall be of uniform thickness, concentric, fully gelled and free from visible cracks, porosity, foreign inclusions and any other defects which could cause the hose to be unserviceable.

7 Dimensions and tolerances

7.1 Inside diameter, tolerances and minimum wall thickness

When measured in accordance with ISO 4671, the inside diameter of hoses shall lie within the tolerance limits given in Table 1 and the wall thickness shall meet the minimum requirement given in the table.

Table 1 — Nominal bores, inside diameters, tolerances and minimum wall thicknesses

Nominal bore	Inside diameter mm	Tolerance mm	Minimum wall thickness mm			
			Type A	Type B	Type C	Type D
4	4	± 0,25	1,5	1,5	1,5	2,0
5	5	± 0,25	1,5	1,5	1,5	2,0
6,3	6,3	± 0,25	1,5	1,5	1,5	2,3
8	8	± 0,25	1,5	1,5	1,5	2,3
9	8,5	± 0,25	1,5	1,5	1,5	2,3
10	9,5	± 0,35	1,5	1,5	1,8	2,3
12,5	12,5	± 0,35	2,0	2,0	2,3	2,8
16	16	± 0,5	2,4	2,4	2,8	3,0
19	19	± 0,7	2,4	2,4	2,8	3,5
25	25	± 1,2	2,7	3,0	3,3	4,0
31,5	31,5	± 1,2	3,0	3,3	3,5	4,5
38	38	± 1,2	3,0	3,5	3,8	4,5
40	40	± 1,5	3,3	3,5	4,1	5,0
50	50	± 1,5	3,5	3,8	4,5	5,0

7.2 Concentricity

When determined in accordance with ISO 4671, the concentricity, based on the difference in indicator reading between the inside surface of the lining and the outside surface of the cover, shall be no greater than 0,3 mm for hoses of minimum wall thickness from 1,5 mm up to and including 3,0 mm, no greater than 10 % of the wall thickness for hoses of minimum wall thickness over 3,0 mm and up to and including 5,0 mm, and no greater than 15 % of the wall thickness for hoses of minimum wall thickness over 5,0 mm as given in Table 2.

Table 2 — Concentricity

Minimum wall thickness mm	Concentricity
1,5 to 3,0	⩽ 0,3 mm
over 3,0 to 5,0	⩽ 10 % of wall thickness
over 5,0	⩽ 15 % of wall thickness

7.3 Tolerances on length

The tolerances on cut lengths of hose shall be in accordance with ISO 1307.

8 Physical properties

8.1 Plastic compounds

8.1.1 Tensile strength and elongation at break of lining and cover

When determined in accordance with ISO 37, the tensile strength and elongation at break shall not be less than the values given in Table 3.

Table 3 — Tensile strength and elongation at break

Hose component	Minimum tensile strength MPa	Minimum elongation at break %
Lining	15,0	250
Cover	15,0	250

Testing shall be carried out either on test pieces taken from the hose wall or on test pieces taken from a sheet of hose material made using a laboratory press.

8.1.2 Resistance to ageing

After ageing for 7 days at a temperature of (70 ± 2) °C, as specified in ISO 188, the tensile strength and elongation at break of the lining and cover, as determined by ISO 37, shall not vary by more than the values given in Table 4 in comparison with the values of these properties before ageing.

Table 4 — Change in tensile strength and elongation from original value

Hose component	Change in tensile strength from original value %	Change in elongation at break from original value %
Lining	15	25
Cover	15	25

8.1.3 Loss in mass on heating

When tested in accordance with method B of ISO 176:2005, the materials of the lining and cover shall have a loss in mass not greater than 2 %.

8.1.4 Resistance to liquids

After immersion in oil No. 1 as described in ISO 1817 at (60 ± 1) °C for 72 h, the volume of a test piece shall not vary by more than 15 %.

8.1.5 Hydrolysis test

When materials are used in the lining and/or cover that are susceptible to hydrolysis, a hydrolysis test shall be carried out, using the method specified in Annex A, either on ISO 37 dumb-bell test pieces taken from the hose wall or on ISO 37 dumb-bell test pieces taken from a sheet of material made using a laboratory press.

After exposure to (95 ± 5) % relative humidity at (80 ± 2) °C for 500 h, neither the lining nor the cover shall show visible evidence of cracking, porosity or other defects.

The values of the tensile strength and the elongation at break of the ISO 37 dumb-bell test pieces after the hydrolysis test shall be more than 40 % of the original values.

8.2 Performance requirements on finished hoses

8.2.1 Hydrostatic requirements

When tested in accordance with ISO 1402, hoses shall meet the requirements specified in Table 5.

Table 5 — Hydrostatic pressure requirements at 23 °C and 60 °C

Hose type	Maximum working pressure bar [a]		Proof pressure bar [a]	Minimum burst pressure bar [a]		Change in dimensions at proof pressure 23 °C	
	23 °C	60 °C	23 °C	23 °C	60 °C	Length %	Diameter %
A	7	4,5	14	28	18	± 8	± 10
B	10	6,5	20	40	26	± 8	± 10
C	16	11	32	64	45	± 8	± 10
D	25	13	50	100	50	± 8	± 10
[a] 1 bar = 0,1 MPa							

During and after the proof pressure test, the hose shall be examined for evidence of leakage, cracking, abrupt distortion (indicating an irregularity in the construction) or any other faults. No such defects shall be observed.

8.2.2 Adhesion

When determined in accordance with ISO 8033, the adhesion between the lining and the cover shall not be less than 2,0 kN/m.

Use type 1 test pieces for hoses of inside diameter up to 32 mm, and type 2 test pieces for hoses of inside diameter of 38 mm and above.

8.2.3 Exposure to a xenon arc lamp

When tested in accordance with ISO 11758, preferably without water spray (see below), the cover shall show no evidence of cracking. Any change in colour caused by the exposure shall be determined by comparing the exposed test pieces with unexposed test pieces using the grey scale (see ISO 105-A02). The grey-scale rating thus determined shall be more than 3.

Testing without spraying is recommended. By agreement between the interested parties, however, testing with spraying may be carried out (see ISO 11758:1995, Annex B).