
**Plastics hoses and hose assemblies —
Textile-reinforced types for hydraulic
applications — Specification**

*Tuyaux et flexibles en plastique — Types hydrauliques avec armature
textile — 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.

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 3949 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This fourth edition cancels and replaces the third edition (ISO 3949:2004), which has been technically revised.

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Plastics hoses and hose assemblies — Textile-reinforced types for hydraulic applications — Specification

1 Scope

This International Standard specifies requirements for three types of textile-reinforced thermoplastics hose and hose assembly of nominal size from 3,2 to 25. Each type is divided into two classes dependent on electrical conductivity requirements. They are suitable for use with water-based hydraulic fluids HFC, HFAE, HFAS and HFB as defined in ISO 6743-4 at temperatures ranging from 0 °C to +60 °C and oil-based hydraulic fluids HH, HL, HM, HR and HV as defined in ISO 6743-4 at temperatures ranging from –40 °C to +100 °C;

This International Standard does not include requirements for end fittings. It is limited to the performance of hoses and hose assemblies.

NOTE Operating temperatures in excess of 100 °C may materially reduce the life of the hose.

2 Normative references

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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 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1817, *Rubber, vulcanized — 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 4672:1997, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests*

ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*

ISO 7326:2006, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

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

ISO 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

3 Terms and definitions

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

4 Classification

Three types of hose are specified, distinguished by their maximum working pressure:

- a) Type R7: hoses with one or more layers of reinforcement.
- b) Type R8: hoses with one or more layers of reinforcement, for operation at higher working pressures.
- c) Type R18: hoses with one or more layers of reinforcement, 21,0 MPa (210 bar) working pressure based.

Each type of hose is divided into two classes according to its electrical properties:

- 1) Class 1, no electrical requirements.
- 2) Class 2, "non-conductive" (see 7.8).

5 Materials and construction

5.1 Hoses

Hoses shall consist of a seamless thermoplastic lining resistant to hydraulic fluids, with suitable textile yarn reinforcement and a thermoplastic cover resistant to hydraulic fluids, water and the weather.

For class 2 hoses, the cover shall not be perforated. The cover shall be orange (colour code RAL 2004).

5.2 Hose assemblies

Hose assemblies shall only be manufactured with those hose fittings whose functionality confirms to the requirements of 7.1, 7.4, 7.5 and, for class 2 only, 7.8.

Follow the manufacturer's instructions for proper preparation and fabrication of hose assemblies.

6 Dimensions and tolerances

6.1 Diameters

When measured in accordance with ISO 4671, the diameters of the hoses shall conform to the values given in Table 1.

Table 1 — Dimensions of hoses

Nominal size	Inside diameter mm						Maximum outside diameter mm		
	Type R7		Type R8		Type R18		Type R7	Type R8	Type R18
	min.	max.	min.	max.	min.	max.			
3,2	3,4	4,0	3,4	4,0	3,4	4,0	9,5	10,5	9,5
5	4,6	5,4	4,6	5,4	4,6	5,4	11,4	14,6	10,8
6,3	6,2	7,0	6,2	7,0	6,2	7,0	13,7	16,8	13,5
8	7,7	8,5	—	—	7,7	8,5	15,6	18,6	16,6
10	9,3	10,3	9,3	10,3	9,3	10,3	18,4	20,3	18,4
12,5	12,3	13,5	12,3	13,5	12,3	13,5	22,5	24,6	22,8
16	15,6	16,7	15,6	16,7	15,5	16,8	25,8	29,8	27,2
19	18,6	19,8	18,6	19,8	18,6	19,8	28,6	33,0	31,5
25	25,0	26,4	25,0	26,4	25,0	26,4	34,7	38,6	40,4

6.2 Concentricity

When measured in accordance with ISO 4671, the concentricity of hoses shall conform to Table 2.

Table 2 — Concentricity of hoses

Nominal size	Maximum variation in wall thickness between inside diameter and outside diameter mm
Up to and including 6,3	0,8
Over 6,3 and including 19	1,0
Over 19	1,3

7 Physical properties

7.1 Hydrostatic requirements

When tested in accordance with ISO 1402 at the relevant proof pressure given in Table 3 and the relevant minimum burst pressure given in Table 4, the hoses and hose assemblies shall not leak.

Table 3 — Proof pressure

Nominal size	Type		
	R7	R8	R18
	MPa (bar)	MPa (bar)	MPa (bar)
3,2	42,0 (420)	84,0 (840)	42,0 (420)
5	42,0 (420)	70,0 (700)	42,0 (420)
6,3	38,5 (385)	70,0 (700)	42,0 (420)
8	35,0 (350)	—	42,0 (420)
10	31,5 (315)	56,0 (560)	42,0 (420)
12,5	28,0 (280)	49,0 (490)	42,0 (420)
16	21,0 (210)	38,5 (385)	42,0 (420)
19	17,5 (175)	31,5 (315)	42,0 (420)
25	14,0 (140)	28,0 (280)	42,0 (420)

Table 4 — Minimum burst pressure

Nominal size	Type		
	R7	R8	R18
	MPa (bar)	MPa (bar)	MPa (bar)
3,2	84,0 (840)	168,0 (1 680)	84,0 (840)
5	84,0 (840)	140,0 (1 400)	84,0 (840)
6,3	77,0 (770)	140,0 (1 400)	84,0 (840)
8	70,0 (700)	—	84,0 (840)
10	63,0 (630)	112,0 (1 120)	84,0 (840)
12,5	56,0 (560)	98,0 (980)	84,0 (840)
16	42,0 (420)	77,0 (770)	84,0 (840)
19	35,0 (350)	63,0 (630)	84,0 (840)
25	28,0 (280)	56,0 (560)	84,0 (840)

Table 5 — Maximum working pressure

Nominal size	Type		
	R7	R8	R18
	MPa (bar)	MPa (bar)	MPa (bar)
3,2	21,0 (210)	42,0 (420)	21,0 (210)
5	21,0 (210)	35,0 (350)	21,0 (210)
6,3	19,2 (192)	35,0 (350)	21,0 (210)
8	17,5 (175)	—	21,0 (210)
10	15,8 (158)	28,0 (280)	21,0 (210)
12,5	14,0 (140)	24,5 (245)	21,0 (210)
16	10,5 (105)	19,2 (192)	21,0 (210)
19	8,8 (88)	15,8 (158)	21,0 (210)
25	7,0 (70)	14,0 (140)	21,0 (210)

7.2 Change in length

When tested in accordance with ISO 1402, the change in length of hose at the maximum working pressure (see Table 5) shall not exceed $\pm 3\%$.

7.3 Minimum bend radius (standards.iteh.ai)

Use test pieces having a length at least 4 times the minimum bend radius. Measure the hose outside diameter with vernier callipers in the straight lay position before bending the hose. Bend the hose through 180° to the minimum bend radius and measure the flatness with the calliper.

When bent to the minimum bend radius in Table 6, measured on the inside of the bend, the flatness shall not exceed 10 % of the original outside diameter.

Table 6 — Minimum bend radius

Nominal size	Minimum bend radius mm	
	Type	
	R7 and R8	R18
3,2	25	25
5	90	30
6,3	100	45
8	115	50
10	125	75
12,5	180	90
16	205	125
19	240	165
25	300	250