
**Rubber hoses and hose assemblies —
Compact wire-braid-reinforced hydraulic
types for oil-based or water-based
fluids — Specification**

*Tuyaux et flexibles en caoutchouc — Types hydrauliques compacts
avec armature de fils métalliques tressés pour fluides à base d'huile ou
à base d'eau — 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 11237 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This first edition cancels and replaces ISO 11237-1:2004 and ISO 11237-2:2006, which have been technically revised and combined in a single document. The main changes are the use of the megapascal as the preferred unit of pressure, the removal of the abrasion test requirement and the replacement of ISO 4397 by ISO 1307 in Clause 2 and Table 1.

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Rubber hoses and hose assemblies — Compact wire-braid-reinforced hydraulic types for oil-based or water-based fluids — Specification

1 Scope

This International Standard specifies requirements for five types of compact, wire-braid-reinforced hose and hose assembly of nominal size from 5 to 31,5. 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 -40 °C to $+60\text{ °C}$ and oil-based hydraulic fluids HH, HL, HM, HR and HV as defined in ISO 6743-4 at temperatures ranging from -40 °C to $+100\text{ °C}$.

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

NOTE It is the responsibility of the user, in consultation with the hose manufacturer, to establish the compatibility of the hose with the fluid to be used.

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 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 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 tests¹⁾*

ISO 6605, *Hydraulic fluid power — Hoses and hose assemblies — Test methods*

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 7233, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

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

1) Under revision as ISO 10619-2.

ISO 8033:2006, *Rubber and plastics hoses — Determination of adhesion between components*

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

3 Terms and definitions

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

4 Classification

Five types of hose are specified, distinguished by their construction, working pressure and minimum bend radius. These hoses have thin covers designed to permit fitting assembly without the removal of the cover or a portion of the cover.

- a) Type 1SC: hoses with a single braid of wire reinforcement.
- b) Type 2SC: hoses with two braids of wire reinforcement.
- c) Type R16S: hoses with one or two braids of wire reinforcement.
- d) Type R17: 21 MPa (210 bar) constant pressure hoses with one or two braids of wire reinforcement.
- e) Type R19: 28 MPa (280 bar) constant pressure hoses with one or two braids of wire reinforcement.

NOTE Types R16S, R17 and R19 are not subjected to the vacuum resistance tests.

5 Materials and construction

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5.1 Hoses

Hoses shall consist of a rubber lining resistant to oil- or water-based hydraulic fluids, one or two layers of high-tensile steel wire and a weather- and oil-resistant rubber cover.

5.2 Hose assemblies

Hose assemblies shall be manufactured using hoses conforming to the requirements of this International Standard.

Hose assemblies shall be manufactured only with those hose fittings whose correct functioning has been verified in accordance with Subclauses 7.2, 7.3, 7.5, 7.6 and 7.7 of this International Standard. The manufacturer's instructions shall be followed for the preparation and fabrication of hose assemblies.

6 Dimensions

6.1 Hose diameters and cover thickness

When measured in accordance with ISO 4671, the hose diameters shall conform to the values given in Table 1 and the cover thickness to 6.3.

Table 1 — Dimensions of hoses

Nominal size ^a	All types		Type 1SC			Type 2SC			Type R16S		Type R17		Type R19	
	Inside diameter		Diameter over wire		Outside diameter of hose	Diameter over wire		Outside diameter of hose	Diameter over wire		Outside diameter of hose		Diameter over wire	
	mm		mm		mm	mm		mm	mm		mm		mm	
	min.	max.	min.	max.	max.	min.	max.	max.	max.	max.	max.	max.	max.	max.
5	4,6	5,4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10,1	11,6	10,8	12,7
6,3	6,1	6,9	9,6	10,8	13,5	10,6	11,7	14,2	12,3	14,5	11,0	13,2	12,4	14,4
8	7,7	8,5	10,9	12,1	14,5	12,1	13,3	16,0	13,3	15,8	13,0	15,0	14,2	16,3
10	9,3	10,1	12,7	14,5	16,9	14,4	15,6	18,3	15,9	18,8	15,0	17,0	16,0	18,0
12,5	12,3	13,5	15,9	18,1	20,4	17,5	19,1	21,5	19,1	22,0	18,8	21,1	20,4	22,6
16	15,5	16,7	19,8	21,0	23,0	20,5	22,3	24,7	22,5	25,4	23,6	25,9	25,9	27,5
19	18,6	19,8	23,2	24,4	26,7	24,6	26,4	28,6	26,3	29,0	27,7	30,3	29,7	32,5
25	25,0	26,4	30,7	31,9	34,9	32,5	34,3	36,6	34,0	36,6	35,6	38,6	N/A	N/A
31,5	31,4	33,0	37,8	39,0	42,2	39,3	41,7	44,3	41,9	44,3	N/A	N/A	N/A	N/A

NOTE N/A = Not available.

^a Nominal sizes are in accordance with ISO 1307.

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6.2 Concentricity

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

Table 2 — Concentricity of hoses (all types)

Nominal size	Maximum variation in wall thickness	
	mm	
	Between inside diameter and outside diameter	Between inside diameter and reinforcement diameter
Up to and including 6,3	0,8	0,5
Over 6,3 and up to and including 19	1,0	0,6
Over 19	1,3	0,8

6.3 Hose cover thickness

When measured in accordance with ISO 4671, the cover thickness of all types of hose shall lie in the range 0,8 mm to 1,5 mm.

7 Performance requirements

7.1 General

The requirements for type and routine testing are given in Annex A and recommendations for periodic testing in Annex B.

7.2 Change in length requirements

When determined in accordance with ISO 1402 or ISO 6605, the change in length of hoses at the maximum working pressure shall not exceed +2 % to –4 %. Maximum working pressure values are given in Table 3.

Table 3 — Maximum working pressure

Nominal size	Type							
	1SC		2SC/R16S		R17		R19	
	Maximum working pressure							
	MPa	bar	MPa	bar	MPa	bar	MPa	bar
5	N/A		N/A		21	210	28	280
6,3	22,5	225	40	400	21	210	28	280
8	21,5	215	35	350	21	210	28	280
10	18	180	33	330	21	210	28	280
12,5	16	160	27,5	275	21	210	28	280
16	13	130	25	250	21	210	28	280
19	10,5	105	21,5	215	21	210	28	280
25	8,8	88	16,5	165	21	210	N/A	
31,5	6,3	63	12,5	125	N/A		N/A	

NOTE 1 MPa = 10 bar; N/A = Not available.

Table 4 — Proof pressure

Nominal size	Type							
	1SC		2SC/R16S		R17		R19	
	Proof pressure							
	MPa	bar	MPa	bar	MPa	bar	MPa	bar
5	N/A		N/A		42	420	56	560
6,3	45	450	80	800	42	420	56	560
8	43	430	70	700	42	420	56	560
10	36	360	66	660	42	420	56	560
12,5	32	320	55	550	42	420	56	560
16	26	260	50	500	42	420	56	560
19	21	210	43	430	42	420	56	560
25	17,6	176	33	330	42	420	N/A	
31,5	12,5	125	25	250	N/A		N/A	

NOTE 1 MPa = 10 bar; N/A = Not available.

Table 5 — Minimum burst pressure

Nominal size	Type							
	1SC		2SC/R16S		R17		R19	
	Minimum burst pressure							
	MPa	bar	MPa	bar	MPa	bar	MPa	bar
5	N/A		N/A		84	840	112	1 120
6,3	90	900	160	1 600	84	840	112	1 120
8	86	860	140	1 400	84	840	112	1 120
10	72	720	132	1 320	84	840	112	1 120
12,5	64	640	110	1 100	84	840	112	1 120
16	52	520	100	1 000	84	840	112	1 120
19	42	420	86	860	84	840	112	1 120
25	35,2	352	66	660	84	840	N/A	
31,5	25	250	50	500	N/A		N/A	

NOTE 1 MPa = 10 bar; N/A = Not available.

7.3 Hydrostatic requirements

When determined in accordance with ISO 1402 or ISO 6605, the proof pressure (see Table 4) and the minimum burst pressure (see Table 5) of hoses and hose assemblies shall conform to the values in the respective tables.

7.4 Minimum bend radius

Use a test piece having a length at least four times the minimum bend radius. Measure the hose outside diameter with callipers in the straight-lay position before bending the hose. Bend the hose through 180° to the minimum bend radius (see Table 6) and measure the flatness with the callipers.

When the hose is bent to the minimum bend radius given 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 1SC	Type 2SC	Type R16S	Type R17	Type R19
5	N/A	N/A	N/A	45	45
6,3	75	75	50	50	50
8	85	85	55	55	55
10	90	90	65	65	65
12,5	130	130	90	90	90
16	150	170	100	100	100
19	180	200	120	120	120
25	230	250	150	150	N/A
31,5	250	280	210	N/A	N/A

NOTE N/A = Not available.