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

*Tuyaux et flexibles en caoutchouc — Types hydrauliques 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

This fifth edition cancels and replaces the fourth edition (ISO 1436:2009), which has been technically revised. It also incorporates the Technical Corrigendum ISO 1436:2009/Cor. 1:2010.

The main changes compared to the previous edition are as follows:

- [Clause 1](#) has been updated to be more precise;
- [Clause 2](#) has been updated: ISO 4672 has been deleted and replaced by ISO 10619-2, and ISO 10619-1 has been added;
- [8.1](#) has been revised: year of publication of a standard shall be included in the marking if previous edition is used.

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

1 Scope

This document specifies requirements for six types of wire-braid-reinforced hose and hose assembly of nominal size from 5 to 51 plus, for one of the five types (type R2ATS), nominal size 63.

They are suitable for use with:

- oil-based hydraulic fluids HH, HL, HM, HR and HV as defined in ISO 6743-4 at temperatures ranging from -40 °C to $+100\text{ °C}$;
- water-based fluids HFC, HFAE, HFAS and HFB as defined in ISO 6743-4 at temperatures ranging from 0 °C to $+60\text{ °C}$;
- water at temperatures ranging from 0 °C to $+60\text{ °C}$.

This document 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 or thermoplastic — 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 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 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8033:2016, *Rubber and plastics hoses — Determination of adhesion between components*

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

ISO 1436:2017(E)

ISO 10619-1:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2:2011, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Classification

Six types of hose are specified, distinguished by their construction, working pressure and oil resistance.

- Type 1ST: hoses with a single braid of wire reinforcement and having a thick cover.
- Type 2ST: hoses with two braids of wire reinforcement and having a thick cover.
- Types 1SN and R1ATS: hoses with a single braid of wire reinforcement and having a thin cover.
- Types 2SN and R2ATS: hoses with two braids of wire reinforcement and having a thin cover.

NOTE Types 1SN and R1ATS and types 2SN and R2ATS have the same reinforcement dimensions as type 1ST and type 2ST, respectively, except that they have thinner covers designed to assemble with fittings without removal of the cover or a portion of the cover. SAE J 517 defines a type S as having the same dimensions and construction as the type R1AT and type R2AT, which were specified in ISO 1436-1:2001 and ISO 1436-2:2005, but with a higher maximum working pressure. This document uses type R1ATS and type R2ATS to represent these hose types.

5 Materials and construction

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 document.

Hose assemblies shall be manufactured only with those hose fittings whose correct functioning has been verified in accordance with 7.2, 7.4, 7.5 and 7.6. The manufacturer's instructions shall be followed for the preparation and fabrication of hose assemblies.

Table 1 — Dimensions of hoses

Nominal size ^a	All types		Types R1ATS, 1SN, 1ST		Type 1ST		Types 1SN, R1ATS		Types R2ATS, 2SN, 2ST		Type 2ST		Types 2SN, R2ATS			
	Inside diameter mm		Diameter over reinforcement mm		Outside diameter of hose mm		Outside diameter of hose mm		Cover thickness mm		Diameter over reinforcement mm		Outside diameter of hose mm		Cover thickness mm	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
5	4,6	5,4	8,9	10,1	11,9	13,5	12,5	0,8	1,5	10,6	11,7	15,1	16,7	0,8	1,5	
6,3	6,1	7,0	10,6	11,7	15,1	16,7	14,1	0,8	1,5	12,1	13,3	16,7	18,3	0,8	1,5	
8	7,7	8,5	12,1	13,3	16,7	18,3	15,7	0,8	1,5	13,7	14,9	18,3	19,9	0,8	1,5	
10	9,3	10,1	14,5	15,7	19,0	20,6	18,1	0,8	1,5	16,1	17,3	20,6	22,2	0,8	1,5	
12,5	12,3	13,5	17,5	19,1	22,2	23,8	21,5	0,8	1,5	19,0	20,6	23,8	25,4	0,8	1,5	
16	15,5	16,7	20,6	22,2	25,4	27,0	24,7	0,8	1,5	22,2	23,8	27,0	28,6	0,8	1,5	
19	18,6	19,8	24,6	26,2	29,4	31,0	28,6	0,8	1,5	26,2	27,8	31,0	32,6	0,8	1,5	
25	25,0	26,4	32,5	34,1	36,9	39,3	36,6	0,8	1,5	34,1	35,7	38,5	40,9	0,8	1,5	
31,5	31,4	33,0	39,3	41,7	44,4	47,6	44,8	1,0	2,0	43,2	45,7	49,2	52,4	1,0	2,0	
38	37,7	39,3	45,6	48,0	50,8	54,0	52,1	1,3	2,5	49,6	52,0	55,6	58,8	1,3	2,5	
51	50,4	52,0	58,7	61,9	65,1	68,3	65,9	1,3	2,5	62,3	64,7	68,2	71,4	1,3	2,5	
63b	63,1	65,1								74,6	77,8			1,3	2,5	

^a The nominal sizes correspond to those given in ISO 1307.

^b This nominal size is for type R2ATS only.

6 Dimensions

6.1 Hose diameters, cover thickness and hose concentricity

When measured in accordance with ISO 4671, the hose diameters and the cover thickness (where appropriate) shall conform to the values given in [Table 1](#).

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

Nominal size	Maximum variation in wall thickness mm		
	Between inside diameter and outside diameter	Between inside diameter and reinforcement diameter	
	All types	Types 1ST, 1SN and R1ATS	Types 2ST, 2SN and R2ATS
Up to and including 6,3	0,8	0,4	0,5
Greater than 6,3 and up to and including 19	1,0	0,6	0,7
Greater than 19	1,3	0,8	0,9

6.2 Length

The length of supplied hoses and hose assemblies shall be the subject of agreement between the manufacturer and the purchaser.

NOTE Recommendations for supplied lengths of hoses and hose assemblies are given in [Annex C](#).

7 Performance requirements

7.1 General

The requirements for type and routine testing are given in [Annex A](#) and recommendations for production acceptance testing in [Annex B](#).

7.2 Hydrostatic requirements

When determined in accordance with ISO 1402 or ISO 6605, the proof pressure and the minimum burst pressure of hoses and hose assemblies shall conform to the values given in [Table 3](#).

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 % or -4 %.

Table 3 — Maximum working pressure, proof pressure and minimum burst pressure

Nominal size	Maximum working pressure		Proof pressure		Minimum burst pressure	
	Types 1ST, 1SN and R1ATS	Types 2ST, 2SN and R2ATS	Types 1ST, 1SN and R1ATS	Types 2ST, 2SN and R2ATS	Types 1ST, 1SN and R1ATS	Types 2ST, 2SN and R2ATS
	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)
5	25,0 (250)	41,5 (415)	50,0 (500)	83,0 (830)	100,0 (1 000)	166,0 (1 660)
6,3	22,5 (225)	40,0 (400)	45,0 (450)	80,0 (800)	90,0 (900)	160,0 (1 600)
8	21,5 (215)	35,0 (350)	43,0 (430)	70,0 (700)	86,0 (860)	140,0 (1 400)
10	18,0 (180)	33,0 (330)	36,0 (360)	66,0 (660)	72,0 (720)	132,0 (1 320)
12,5	16,0 (160)	27,5 (275)	32,0 (320)	55,0 (550)	64,0 (640)	110,0 (1 100)
16	13,0 (130)	25,0 (250)	26,0 (260)	50,0 (500)	52,0 (520)	100,0 (1 000)
19	10,5 (105)	21,5 (215)	21,0 (210)	43,0 (430)	42,0 (420)	86,0 (860)
25	8,7 (87)	16,5 (165)	18,0 (180)	33,0 (330)	36,0 (360)	66,0 (660)
31,5	6,2 (62)	12,5 (125)	13,0 (130)	25,0 (250)	26,0 (260)	50,0 (500)
38	5,0 (50)	9,0 (90)	10,0 (100)	18,0 (180)	20,0 (200)	36,0 (360)
51	4,0 (40)	8,0 (80)	8,0 (80)	16,0 (160)	16,0 (160)	32,0 (320)
63 ^a	—	7,0 (70)	—	14,0 (140)	—	28,0 (280)

^a This nominal size is for type R2ATS only.

7.3 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 4](#)) and measure the flatness with the callipers.

When the hose is bent to the minimum bend radius given in [Table 4](#), measured in accordance with method A1 of ISO 10619-1:2011, the flatness shall not exceed 10 % of the original outside diameter.

Table 4 — Minimum bend radius

Nominal size	Minimum bend radius mm
5	90
6,3	100
8	115
10	130
12,5	180
16	200
19	240
25	300
31,5	420
38	500
51	630
63	760