INTERNATIONAL STANDARD

ISO 3862

Fifth edition
2020-02

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

Tuyaux et flexibles en caoutchouc — Types hydrauliques avec armature hélicoïdale de fils métalliques pour fluides à base d'huile ou à base d'eau — Spécifications

Reference number
ISO 3862:2020(E)

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Published in Switzerland

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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 of 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 www.iso.org/iso/foreword.html.

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 3862:2017), which has been technically revised.

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

— in Clause 1, the temperature of water and water-based fluids has been increased from +60 °C to +70 °C;

— in 6.1, definitions of Table 1, Table 2, Table 3 and Table 4 have been updated;

— Table 1 has been split into Table 1, Table 2 and Table 3; subsequent tables and references have been renumbered;

— dimensions in Table 1, Table 2 and Table3 have been updated;

— in Table 5, Table 6 and Table 7, maximum working pressure, proof pressure and minimum burst pressure have been updated;

— in 7.4.2 and 7.9.3, the temperature of water and water-based fluids has been increased from +60 °C to +70 °C;

— in Clause 9, some of the marking requirements have been revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

1 Scope

This document specifies requirements for five types of spiral-wire-reinforced hydraulic hoses and hose assemblies of nominal size from 6,3 to 51.

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 °C for types 4SP and 4SH hoses and from −40 °C to +120 °C for types R12, R13 and R15 hoses;

— water-based fluids HFC, HFAE, HFAS and HFB as defined in ISO 6743-4 at temperatures ranging from −40 °C to +70 °C;

— water at temperatures ranging from 0 °C to +70 °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 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 — Test methods for hoses and hose assemblies*

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 7326:2016, *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 10619-1:2017, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2:2017, *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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Classification

Five types of hoses are specified, distinguished by their construction, working pressure and oil resistance:

— Type 4SP: medium-pressure hoses with four plies of steel wire spiral.

— Type 4SH: high-pressure hoses with four plies of steel wire spiral.

— Type R12: heavy-duty high-temperature hoses with a medium-pressure rating having four plies of steel wire spiral.

— Type R13: heavy-duty high-temperature hoses with a high-pressure rating having a multiple-steel-wire spiral.

— Type R15: heavy-duty high-temperature hoses with an extra-high-pressure rating having a multiple-steel-wire spiral.

5 Materials and construction

5.1 Hoses

Hoses shall consist of a rubber lining resistant to oil- or water-based hydraulic fluids or water, spiral plies of steel wire wrapped in alternating directions, and an oil- and weather-resistant rubber cover. Each spiral wire ply shall be separated by an insulating layer.

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.

6 Dimensions

6.1 Hose diameters and hose concentricity

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

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

When measured in accordance with ISO 4671, the outside diameter of hoses shall conform to the values given in Table 3.

When measured in accordance with ISO 4671, the concentricity of hoses shall conform to the values given in Table 4.

Table 1 — Inside diameters of hoses

Nominal size[a]	Inside diameter mm									
	Type 4SP		Type 4SH		Type R12		Type R13		Type R15	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
6,3	6,2	7,0	—	—	—	—	—	—	—	—
10	9,4	10,1	—	—	9,3	10,1	—	—	9,3	10,1
12,5	12,6	13,5	—	—	12,3	13,5	—	—	12,3	13,5
16	15,8	16,7	—	—	15,5	16,7	—	—	—	—
19	18,8	19,8	19,1	19,8	18,6	19,8	18,6	19,8	18,6	19,8
25	25,4	26,4	25,5	26,4	25,0	26,4	25,0	26,4	25,0	26,4
31,5	31,8	33,0	32,0	33,0	31,4	33,0	31,4	33,0	31,4	33,0
38	38,0	39,3	38,2	39,3	37,7	39,3	37,7	39,3	37,7	39,3
51	50,6	52,0	50,6	52,0	50,4	52,0	50,4	52,0	50,4	52,0

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

Table 2 — Diameter over the reinforcement of hoses

Nominal size[a]	Diameter over the reinforcement mm									
	Type 4SP		Type 4SH		Type R12		Type R13		Type R15	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
6,3	14,1	15,3	—	—	—	—	—	—	—	—
10	16,9	18,1	—	—	16,6	17,8	—	—	—	20,3
12,5	19,4	21,0	—	—	19,9	21,5	—	—	—	24,0
16	23,0	24,6	—	—	23,8	25,4	—	—	—	—
19	27,4	29,0	27,6	29,2	26,9	28,4	28,2	29,8	—	32,9
25	34,5	36,1	34,4	36,0	34,1	35,7	34,9	36,4	—	38,9
31,5	45,0	47,0	40,9	42,9	42,7	45,1	45,6	48,0	—	48,4
38	51,4	53,4	47,8	49,8	49,2	51,6	53,1	55,5	—	56,3
51	64,3	66,3	62,2	64,2	62,5	64,8	66,9	69,3	—	71,0

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

Table 3 — Outside diameters of hoses

Nominal size[a]	Outside diameters of hose mm									
	Type 4SP		Type 4SH		Type R12		Type R13		Type R15	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
6,3	17,1	18,7	—	—	—	—	—	—	—	—
10	20,6	22,2	—	—	19,5	21,0	—	—	—	23,3
12,5	23,8	25,4	—	—	23,0	24,6	—	—	—	26,8
16	27,4	29,0	—	—	26,6	28,2	—	—	—	—
19	31,4	33,0	31,4	33,0	29,9	31,5	31,0	33,2	—	36,1
25	38,5	40,9	37,5	39,9	36,8	39,2	37,6	39,8	—	42,9
31,5	49,2	52,4	43,9	47,1	45,4	48,6	48,3	51,3	—	51,5
38	55,6	58,8	51,9	55,1	51,9	55,0	55,8	58,8	—	59,6
51	68,2	71,4	66,5	69,7	65,1	68,3	69,5	72,7	—	74,0

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

Table 4 — Concentricity of hoses

Nominal size	Maximum variation in wall thickness mm	
	Between inside diameter and outside diameter	Between inside diameter and reinforcement outside diameter
6,3	0,8	0,5
over 6,3 and up to and including 19	1,0	0,7
over 19	1,3	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 tested in accordance with ISO 1402 or ISO 6605 at the relevant proof pressure given in Table 5 and the relevant minimum burst pressure given in Table 6, the hoses and hose assemblies shall not leak.

When determined in accordance with ISO 1402 or ISO 6605, the change in length of hoses at the maximum working pressure (see Table 7) shall not exceed +2 % or −4 % for types 4SP and 4SH, or +2 % or −2 % for types R12, R13 and R15.

Table 5 — Proof pressure

Nominal size	Type				
	4SP	4SH	R12	R13	R15
	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)
6,3	90,0 (900)	—	56,0 (560)	—	—
10	90,0 (900)	—	56,0 (560)	—	84,0 (840)
12,5	84,0 (840)	—	56,0 (560)	—	84,0 (840)
16	70,0 (700)	—	56,0 (560)	—	—
19	70,0 (700)	84,0 (840)	56,0 (560)	70,0 (700)	84,0 (840)
25	56,0 (560)	76,0 (760)	56,0 (560)	70,0 (700)	84,0 (840)
31,5	42,0 (420)	65,0 (650)	42,0 (420)	70,0 (700)	84,0 (840)
38	37,0 (370)	58,0 (580)	35,0 (350)	70,0 (700)	84,0 (840)
51	33,0 (330)	50,0 (500)	35,0 (350)	70,0 (700)	84,0 (840)

Table 6 — Minimum burst pressure

Nominal size	Type				
	4SP	4SH	R12	R13	R15
	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)	MPa (bar)
6,3	180,0 (1 800)	—	—	—	—
10	180,0 (1 800)	—	112,0 (1 120)	—	168,0 (1 680)
12,5	168,0 (1 680)	—	112,0 (1 120)	—	168,0 (1 680)
16	140,0 (1 400)	—	112,0 (1 120)	—	—
19	140,0 (1 400)	168,0 (1 680)	112,0 (1 120)	140,0 (1 400)	168,0 (1 680)
25	112,0 (1 120)	152,0 (1 520)	112,0 (1 120)	140,0 (1 400)	168,0 (1 680)
31,5	84,0 (840)	130,0 (1 300)	84,0 (840)	140,0 (1 400)	168,0 (1 680)
38	74,0 (740)	116,0 (1 160)	70,0 (700)	140,0 (1 400)	168,0 (1 680)
51	66,0 (660)	100,0 (1 000)	70,0 (700)	140,0 (1 400)	168,0 (1 680)