INTERNATIONAL STANDARD

ISO 3862

Second edition
1991-11-15

Rubber hoses and hose assemblies — Rubber-covered, spiral wire reinforced, hydraulic type — Specification

Tuyaux et flexibles en caoutchouc — Type hydraulique à revêtement de caoutchouc et armature spiralée de fil métallique — Spécifications

Reference number
ISO 3862:1991(E)

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.

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.

International Standard ISO 3862 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Sub-Committee SC 1, *Hoses (rubber and plastics)*.

This second edition cancels and replaces the first edition (ISO 3862:1980), of which it constitutes a technical revision.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Rubber hoses and hose assemblies — Rubber-covered, spiral wire reinforced, hydraulic type — Specification

1 Scope

This International Standard specifies requirements for rubber-covered, spiral wire reinforced hydraulic hoses suitable for use with petroleum-based and water-based fluids within a temperature range of − 40 °C to + 100 °C for types 1 to 5 inclusive and − 40 °C to + 121 °C for types 6 and 7.

The standard does not include requirements for end fittings. It is limited to the performance of hoses and hose assemblies.

NOTE 1 The hoses are not suitable for use with castor oil-based and ester oil-based fluids. Operating temperatures in excess of 93 °C for types 1 to 5 and 121 °C for types 6 and 7 may materially reduce the life of the hose.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1402:1984, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing.*

ISO 1817:1985, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 4671:1984, *Rubber and plastics hose and hose assemblies — Methods of measurement of dimensions.*

ISO 4672:1988, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests.*

ISO 6803:1984, *Rubber or plastics hoses and hose assemblies — Hydraulic pressure impulse test without flexing.*

ISO 7326:1991, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions.*

ISO 7751:1991[1], *Rubber and plastics hoses and hose assemblies — Ratios of proof and burst pressure to design working pressure.*

ISO 8033:1985, *Rubber and plastics hose — Determination of adhesion between components.*

3 Types

Hoses shall be one of the following seven types:

Type 1: 4-spiral, light steel wire reinforced, rubber-covered.

Type 2: 4-spiral, medium steel wire reinforced, rubber-covered.

Type 3: 4-spiral, heavy steel wire reinforced, rubber-covered.

Type 4: 6-spiral, heavy steel wire reinforced, rubber-covered.

Type 5: 4-spiral, extra high pressure hose.

Type 6: 4-spiral, heavy-duty, high-temperature hose — medium-pressure rating.

Type 7: multiple-spiral, heavy-duty, high-temperature hose — high-pressure rating.

1) To be published.

4 Materials and construction

4.1 The hose shall consist of an oil- and water-resistant rubber lining, spiral plies of steel wire wrapped in alternating directions, and an oil- and weather-resistant synthetic rubber cover. Each wire layer shall be separated by an insulating layer of synthetic rubber.

4.2 The hose shall be uniformly constructed so that the measurement, in accordance with ISO 4671, of the wall thickness at different points shall not differ by more than the values given in table 1.

Table 1 — Permitted variation in wall thickness measurements

Dimensions in millimetres

Nominal bore	Internal diameter to overall diameter	Internal diameter to reinforcement
Up to and including 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

5 Dimensions

The bore diameter of the hose shall comply with the requirements of table 2, when measured in accordance with ISO 4671.

NOTE 2 ISO 1307:1983, *Rubber and plastics hoses — Bore diameters and tolerances on length*, has not been followed for nominal bore or permitted range; the dimensions adopted in table 2 are to ensure compatibility with fittings which are in wide use throughout the world.

The diameter over reinforcement and the outside diameter of the hose shall comply with the requirements of table 3, when measured in accordance with ISO 4671.

Table 2 — Nominal bore and tolerances

Dimensions in millimetres

Nominal bore	Bore diameter											
	Type 1		Type 2		Types 3 and 4		Type 5		Type 6		Type 7	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
5	—	—	—	—	4,6	5,4	—	—	—	—	—	—
6,3	—	—	6,2	7,0	6,2	6,9	—	—	—	—	—	—
8	7,7	8,5	—	—	7,7	8,5	—	—	—	—	—	—
10	9,3	10,1	9,3	10,1	9,3	10,1	—	—	9,3	10,1	—	—
12,5	12,3	13,5	12,3	13,5	12,5	13,7	12,3	13,5	12,3	13,5	—	—
16	15,5	16,7	15,5	16,7	15,7	16,9	—	—	—	—	—	—
19	18,6	19,8	18,6	19,8	19,0	20,2	18,6	19,8	18,6	19,8	18,6	19,8
25	25,0	26,4	25,0	26,4	25,4	27	25,0	26,4	25,0	26,4	25,0	26,4
31,5	31,4	33,0	31,4	33,0	31,8	33,4	31,4	33,0	31,4	33,0	31,4	33,0
38	37,7	39,3	37,7	39,3	38,1	39,7	37,7	39,3	37,7	39,3	37,7	39,3
51	50,4	52,0	50,4	52,0	50,8	52,5	50,4	52,0	50,4	52,0	50,4	52,0

Table 3 — Limits on diameter

Dimensions in millimetres

Nominal bore	Type 1				Type 2				Type 3				Type 4			
	Diameter over reinforcement		Outside diameter of hose		Diameter over reinforcement		Outside diameter of hose		Diameter over reinforcement		Outside diameter of hose		Diameter over reinforcement		Outside diameter of hose	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
5	—	—	—	—	—	—	—	—	14,3	15,9	18,3	19,8	17,5	19,1	21,4	23,0
6,3	—	—	—	—	14,1	15,3	17,1	18,7	15,8	17,4	19,8	21,4	19,1	20,6	23,0	24,6
8	13,7	14,8	18,4	20,0	—	—	—	—	17,5	19,0	21,4	23,0	20,6	22,2	24,6	26,2
10	16,9	18,0	20,6	22,2	16,9	18,1	20,6	22,2	19,0	20,6	23,0	24,6	22,2	23,8	26,2	27,8
12,5	19,4	21,0	23,8	25,4	19,4	21,0	23,8	25,4	23,0	24,6	27,0	28,6	26,2	27,8	30,2	31,8
16	22,7	24,3	27,0	28,6	23,0	24,6	27,4	29,0	26,2	27,8	30,2	31,8	29,4	30,9	33,3	34,9
19	26,6	28,2	30,6	32,2	27,4	29,0	31,4	33,0	30,9	32,5	35,7	37,3	34,1	35,7	38,9	40,5
25	34,5	36,1	38,5	40,9	34,5	36,1	38,5	40,9	38,9	40,5	43,3	45,6	41,7	44,0	47,2	49,6
31,5	43,3	45,6	49,2	52,4	45,0	47,0	49,2	52,4	44,8	47,2	49,2	52,4	48,0	50,4	53,2	56,4
38	49,6	52,0	55,6	58,7	51,4	53,4	55,6	58,8	51,2	53,6	55,6	58,7	54,4	56,7	59,5	62,7
51	63,9	66,2	69,9	73,0	64,3	66,3	68,2	71,4	64,7	67,1	69,1	72,2	68,6	71,0	73,8	77,0

Nominal bore	Type 5				Type 6				Type 7			
	Diameter over reinforcement		Outside diameter of hose		Diameter over reinforcement		Outside diameter of hose		Diameter over reinforcement		Outside diameter of hose	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
5	—	—	—	—	—	—	—	—	—	—	—	—
6,3	—	—	—	—	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	16,6	17,8	19,5	21,0	—	—	—	—
12,5	21,8	23,4	24,6	26,2	19,9	21,5	23,0	24,6	—	—	—	—
16	—	—	—	—	—	—	—	—	—	—	—	—
19	27,6	29,2	31,4	33,0	26,9	28,4	29,9	31,5	28,2	29,8	31,0	33,2
25	34,4	36,0	37,6	39,8	34,1	35,7	36,8	39,2	34,9	36,4	37,6	39,8
31,5	40,7	43,1	43,9	47,1	42,7	45,1	45,4	48,6	45,6	48,0	48,3	51,3
38	47,6	50,0	51,9	55,1	49,2	51,6	51,9	55,0	53,1	55,5	55,8	58,8
51	62,0	64,4	66,5	69,7	62,5	64,8	65,1	68,3	66,9	69,3	69,5	72,7

Table 4 — Design pressure ratings

Nominal bore	Design working pressure													
	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7	
mm	MPa	bar[1]	MPa	bar[1]	MPa	bar[1]	MPa	bar[1]	MPa	bar[1]	MPa	bar[1]	MPa	bar[1]
5	—	—	—	—	69,0	690	86,0	860	—	—	—	—	—	—
6,3	—	—	42,0	420	60,5	605	77,5	775	—	—	—	—	—	—
8	36,0	360	—	—	56,0	560	71,5	715	—	—	—	—	—	—
10	31,0	310	38,0	380	51,5	515	69,0	690	—	—	27,6	276	—	—
12,5	27,5	275	34,5	345	43,0	430	51,5	515	55,0	550	27,6	276	—	—
16	22,5	225	34,5	345	38,0	380	48,0	480	—	—	—	—	—	—
19	20,5	205	27,5	275	34,5	345	43,0	430	42,0	420	27,6	276	34,5	345
25	20,5	205	27,5	275	27,5	275	34,5	345	38,0	380	27,6	276	34,5	345
31,5	17,0	170	21,0	210	20,5	205	24,0	240	32,5	325	20,7	207	34,5	345
38	14,0	140	18,5	185	17,0	170	20,5	205	29,0	290	17,2	172	34,5	345
51	14,0	140	16,5	165	17,0	170	20,5	205	25,0	250	17,2	172	34,5	345

1) 1 bar = 10^5 N/m^2 = 0,1 MPa

6 Hydrostatic requirements

When tested in accordance with ISO 1402, the design working pressure of the hose shall comply with the requirements of table 4. The ratios of proof and minimum burst pressure to design working pressure shall be in accordance with category 3 of ISO 7751, i.e. the proof pressure shall be twice the design working pressure, and the minimum burst pressure four times the design working pressure.

7 Minimum bend radius and change in length at design working pressure

7.1 The hose shall be capable of performing at design working pressure when curved to a radius not less than that in table 5, measured on the inside of the bend.

NOTE 3 Should any portion of the hose be curved to a radius less than the specified minimum bend radius, the performance capability of the hose will be reduced.

7.2 The change in length of the hose at the design working pressure shall not exceed + 2 % and − 4 % for types 1 to 5 and + 2 % and − 2 % for types 6 and 7.

8 Tolerance on hose length

8.1 Hoses shall be supplied in lengths as specified by the purchaser, subject to a tolerance on the specified lengths of ± 1 % or ± 3 mm, whichever is the greater.

8.2 When no specific hose lengths have been ordered, the percentages of different lengths in any given delivery shall be as follows:

— over 13 m: not less than 65 % of total length;

— 7,5 m to 13 m: not more than 35 % of total length;

— 1 m to 7,5 m: not more than 10 % of total length.

No length shall be less than 1 m.

9 Impulse test requirements

9.1 Four unaged samples of hose with end fittings shall be tested in accordance with the method specified in ISO 6803.

9.2 Type 1 hoses, when tested at 133 % of the design working pressure with circulating test fluid at a temperature of 93 °C, shall withstand a minimum of 200 000 impulse cycles for hoses of nominal bores 8 mm, 10 mm and 12,5 mm, and 300 000 impulse cycles for all other nominal bores.

Type 2 and type 3 hoses with a nominal bore of 12,5 mm and larger, and type 4 hoses with a nominal bore of 19 mm and larger, when tested at 133 % of the design working pressure with circulating test fluid at a temperature of 93 °C, shall withstand a minimum of 400 000 impulse cycles.

NOTE 4 Hose sizes 5 mm, 6,3 mm, 8 mm and 10 mm of types 2 and 3, and 5 mm, 6,3 mm, 8 mm, 10 mm, 12,5 mm and 16 mm of type 4 are not usually submitted