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

*Tuyaux et flexibles en caoutchouc — Types hydrauliques avec
armature de textile 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 4079 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This third edition of ISO 4079 cancels and replaces ISO 4079-1:2001 and ISO 4079-2:2005, which have been technically revised and combined in a single document. The main changes are as follows:

- pressures are now given in megapascals as the preferred unit;
- the requirement for an abrasion test has been deleted;
- ISO 4397 has been replaced by ISO 1307.

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

1 Scope

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

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 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 tests*¹⁾

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*

1) Under revision as ISO 10619-2.

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

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

ISO 8330, *Rubber and plastics hoses 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:

- Type 1TE: hoses with a single braid of textile reinforcement.
- Type 2TE: hoses with one or more braid(s) of textile reinforcement.
- Type 3TE: hoses with one or more braid(s) of textile reinforcement (higher working pressure).
- Type R3: hoses with two braids of textile reinforcement.
- Type R6: hoses with a single braid of textile reinforcement.

NOTE Type 1TE is not subjected to the impulse or vacuum resistance tests. Type R3 is not subjected to the vacuum resistance test. Type R6 is not subjected to the impulse or vacuum resistance tests.

5 Materials and construction

5.1 Hoses

Hoses shall consist of a rubber lining that is resistant to water- and oil-based hydraulic fluids, one or more layers of suitable textile yarn and a weather- and oil-resistant rubber cover.

Hoses shall be designed to enable end fittings to be assembled without removal of the cover.

5.2 Hose assemblies

Hose assemblies shall be manufactured only with those hose fittings whose functionality has been verified in accordance with Subclauses 7.2, 7.4, 7.5 and 7.6 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 hose concentricity

When measured in accordance with ISO 4671, the inside and outside diameters of hoses 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 1 — Dimensions of hoses

Nominal size ^a	Inside diameter mm						Outside diameter mm					
	Types 1TE, 2TE, 3TE ^b		Type R6		Type R3		Type 1TE		Type 2TE		Type 3TE	
	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
5	4,4	5,2	4,2	5,4	4,5	5,4	10,0	11,6	11,0	12,6	12,0	13,6
6,3	5,9	6,9	5,6	7,2	6,1	7,0	11,6	13,2	12,6	14,2	13,6	15,2
8	7,4	8,4	7,2	8,8	7,6	8,5	13,1	14,7	14,1	15,7	16,1	17,7
10	9,0	10,0	8,7	10,3	9,2	10,1	14,7	16,3	15,7	17,3	17,7	19,3
12,5	12,1	13,3	11,9	13,5	12,4	13,5	17,7	19,7	18,7	20,7	20,7	22,7
16	15,3	16,5	15,1	16,7	15,6	16,7	21,9	23,9	22,9	24,9	24,9	26,9
19	18,2	19,8	18,3	19,9	18,7	19,8	—	—	26,0	28,0	28,0	30,0
25	24,6	26,2	—	—	25,1	26,2	—	—	32,9	35,9	34,4	37,4
31,5	30,8	32,8	—	—	31,4	32,9	—	—	—	—	40,8	43,8
38	37,1	39,1	—	—	—	—	—	—	—	—	47,6	51,6
51	49,8	51,8	—	—	—	—	—	—	—	—	60,3	64,3
60	58,8	61,2	—	—	—	—	—	—	—	—	70,0	74,0
80	78,8	81,2	—	—	—	—	—	—	—	—	91,5	96,5
100	98,6	101,4	—	—	—	—	—	—	—	—	113,5	118,5

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

^b Inside dimensions apply to type 3TE only for nominal sizes larger than 25.

Table 2 — Concentricity of hoses

Nominal size	Maximum variation in wall thickness between internal diameter and outside diameter
	mm
Up to and including 6,3	0,8
Greater than 6,3 and up to and including 19	1,0
Greater than 19	1,3

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 periodic 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 3 and the relevant minimum burst pressure given in Table 4, 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 5) shall not exceed +2 % or –4 % for hoses up to and including nominal size 31,5 and +5 % or 0 % for hoses above nominal size 31,5.

Table 3 — Proof pressure

Nominal size	Type 1TE MPa (bar)	Type 2TE MPa (bar)	Type 3TE MPa (bar)	Type R6 MPa (bar)	Type R3 MPa (bar)
5	5,0 (50)	16,0 (160)	32,0 (320)	7,0 (70)	21,0 (210)
6,3	5,0 (50)	15,0 (150)	29,0 (290)	6,0 (60)	17,6 (176)
8	4,0 (40)	13,6 (136)	26,0 (260)	6,0 (60)	16,8 (168)
10	4,0 (40)	12,6 (126)	22,0 (220)	6,0 (60)	15,6 (156)
12,5	3,2 (32)	11,6 (116)	18,6 (186)	6,0 (60)	14,0 (140)
16	3,2 (32)	10,0 (100)	16,0 (160)	5,2 (52)	12,2 (122)
19	—	9,0 (90)	14,0 (140)	4,4 (44)	10,4 (104)
25	—	8,0 (80)	11,0 (110)	—	7,8 (78)
31,5	—	—	9,0 (90)	—	5,2 (52)
38	—	—	8,0 (80)	—	—
51	—	—	6,6 (66)	—	—
60	—	—	5,0 (50)	—	—
80	—	—	3,6 (36)	—	—
100	—	—	2,0 (20)	—	—

Table 4 — Minimum burst pressure

Nominal size	Type 1TE MPa (bar)	Type 2TE MPa (bar)	Type 3TE MPa (bar)	Type R6 MPa (bar)	Type R3 MPa (bar)
5	10,0 (100)	32,0 (320)	64,0 (640)	14,0 (140)	42,0 (420)
6,3	10,0 (100)	30,0 (300)	58,0 (580)	12,0 (120)	35,2 (352)
8	8,0 (80)	27,2 (272)	52,0 (520)	12,0 (120)	33,6 (336)
10	8,0 (80)	25,2 (252)	44,0 (440)	12,0 (120)	31,2 (312)
12,5	6,4 (64)	23,2 (232)	37,2 (372)	12,0 (120)	28,0 (280)
16	6,4 (64)	20,0 (200)	32,0 (320)	10,4 (104)	24,4 (244)
19	—	18,0 (180)	28,0 (280)	8,8 (88)	20,8 (208)
25	—	16,0 (160)	22,0 (220)	—	15,6 (156)
31,5	—	—	18,0 (180)	—	10,4 (104)
38	—	—	16,0 (160)	—	—
51	—	—	13,2 (132)	—	—
60	—	—	10,0 (100)	—	—
80	—	—	7,2 (72)	—	—
100	—	—	4,0 (40)	—	—

Table 5 — Maximum working pressure

Nominal size	Type 1TE MPa (bar)	Type 2TE MPa (bar)	Type 3TE MPa (bar)	Type R6 MPa (bar)	Type R3 MPa (bar)
5	2,5 (25)	8,0 (80)	16,0 (160)	3,5 (35)	10,5 (105)
6,3	2,5 (25)	7,5 (75)	14,5 (145)	3,0 (30)	8,8 (88)
8	2,0 (20)	6,8 (68)	13,0 (130)	3,0 (30)	8,4 (84)
10	2,0 (20)	6,3 (63)	11,0 (110)	3,0 (30)	7,8 (78)
12,5	1,6 (16)	5,8 (58)	9,3 (93)	3,0 (30)	7,0 (70)
16	1,6 (16)	5,0 (50)	8,0 (80)	2,6 (26)	6,1 (61)
19	—	4,5 (45)	7,0 (70)	2,2 (22)	5,2 (52)
25	—	4,0 (40)	5,5 (55)	—	3,9 (39)
31,5	—		4,5 (45)	—	2,6 (26)
38	—		4,0 (40)	—	—
51	—		3,3 (33)	—	—
60	—		2,5 (25)	—	—
80	—		1,8 (18)	—	—
100	—		1,0 (10)	—	—

7.3 Minimum bend radius

Use test pieces 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 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 1TE	Type 2TE	Type 3TE	Type R6	Type R3
5	35	25	40	50	75
6,3	45	40	45	65	75
8	65	50	55	75	100
10	75	60	70	75	100
12,5	90	70	85	100	125
16	115	90	105	125	140
19	—	110	130	150	150
25	—	150	150	—	205
31,5	—	—	190	—	250
38	—	—	240	—	—
51	—	—	300	—	—
60	—	—	400	—	—
80	—	—	500	—	—
100	—	—	600	—	—

7.4 Resistance to impulse

7.4.1 Water-based fluids

The impulse test shall be performed on hose types 2TE, 3TE and R3 in accordance with ISO 6803 or ISO 6605. The test fluid temperature shall be 60 °C. The test fluid shall be selected from HFC, HFAE, HFAS, and HFB as defined in ISO 6743-4.

NOTE The impulse test is not required for types 1TE and R6.

For type 2TE hoses, when tested at an impulse pressure equal to 125 % of the maximum working pressure, the hose shall withstand a minimum of 100 000 impulse cycles.

For type 3TE and R3 hoses, when tested at an impulse pressure equal to 133 % of the maximum working pressure for hoses of nominal bore up to and including 25 or at 100 % of the maximum working pressure for hoses of nominal bore greater than 25, the hose shall withstand a minimum of 200 000 impulse cycles.

There shall be no leakage or other evidence of failure before reaching the specified number of cycles.

This test shall be considered a destructive test and the test piece shall be discarded after the test.

7.4.2 Oil-based fluids

The impulse test shall be performed on hose types 2TE, 3TE and R3 in accordance with ISO 6803 or ISO 6605, using oil-based hydraulic fluid as required by ISO 6803 or ISO 6605 at a fluid temperature of 100 °C.

NOTE The impulse test is not required for types 1TE and R6.

For type 2TE hoses, when tested at an impulse pressure equal to 125 % of the maximum working pressure, the hose shall withstand a minimum of 100 000 impulse cycles.

For type 3TE and R3 hoses, when tested at an impulse pressure equal to 133 % of the maximum working pressure for hoses of nominal size up to and including 25 or at 100 % of the maximum working pressure for hoses of nominal size greater than 25, the hose shall withstand a minimum of 200 000 impulse cycles.

There shall be no leakage or other evidence of failure before reaching the specified number of cycles.

This test shall be considered a destructive test and the test piece shall be discarded after the test.

7.4.3 Optional impulse test

The following test may be used to maximize test efficiency:

- a) oven-age assemblies filled with one of the water-based fluids specified in 7.4.1 for 120 h at 60 °C;
- b) impulse-test the aged assemblies using an oil-based hydraulic fluid as specified in ISO 6803 or ISO 6605 at a temperature of 100 °C.

For type 2TE hoses, when tested at an impulse pressure equal to 125 % of the maximum working pressure, the hose shall withstand a minimum of 100 000 impulse cycles.

For type 3TE and R3 hoses, when tested at an impulse pressure equal to 133 % of the maximum working pressure for hoses of nominal bore up to and including 25 or at 100 % of the maximum working pressure for hoses of nominal bore greater than 25, the hose shall withstand a minimum of 200 000 impulse cycles.

There shall be no leakage or other evidence of failure before reaching the specified number of cycles.

This test shall be considered a destructive test and the test piece shall be discarded after the test.

7.5 Leakage of hose assemblies

When tested in accordance with ISO 1402 or ISO 6605, there shall be no leakage or other evidence of failure. This test shall be considered a destructive test and the test piece shall be discarded after the test.

7.6 Cold flexibility

When tested in accordance with method B of ISO 4672:1997 at a temperature of –40 °C, there shall be no cracking of the lining or cover. The test piece shall not leak or crack when subjected to a proof pressure test in accordance with ISO 1402 or ISO 6605 after regaining ambient temperature.

7.7 Adhesion between components

When determined in accordance with ISO 8033, the adhesion for hose types 1TE, 2TE and 3TE shall be in accordance with Table 7. For hose types R3 and R6, the adhesion between lining and reinforcement, and between cover and reinforcement, shall not be less than 1,4 kN/m.

Table 7 — Minimum adhesion between components

Nominal size	Between lining and reinforcement	Between cover and reinforcement
	kN/m	kN/m
Up to and including 8	1,5	2,0
Greater than 8	2,5	2,5

Test pieces shall be type 5 for lining and reinforcement and type 2 or type 6 for cover and reinforcement as described in Subclauses 5.1 and 5.3 of ISO 8033:2006.

7.8 Vacuum resistance

When tested in accordance with ISO 7233, hoses and hose assemblies shall conform to the values given in Table 8.

Table 8 — Degree of vacuum

Type 2TE		Type 3TE	
Nominal size	Negative gauge pressure (max.) MPa (bar)	Nominal size	Negative gauge pressure (max.) MPa (bar)
5	0,060 (0,60)	5	0,080 (0,80)
6,3	0,060 (0,60)	6,3	0,080 (0,80)
8	0,060 (0,60)	8	0,080 (0,80)
10	0,060 (0,60)	10	0,080 (0,80)
12,5	0,060 (0,60)	12,5	0,080 (0,80)
		16	0,080 (0,80)
		19	0,060 (0,60)
		25	0,060 (0,60)
NOTE 1 There is no vacuum resistance requirement for sizes of types 2TE and 3TE not listed.			
NOTE 2 There is no vacuum resistance requirement for hoses of types 1TE, R6 and R3.			

7.9 Fluid resistance

7.9.1 Test pieces

The fluid resistance tests shall be carried out on moulded sheets of lining and cover compound having a minimum thickness of 2 mm and of cure state equivalent to that of the hose.

7.9.2 Oil resistance

When determined in accordance with ISO 1817 by immersion in IRM 903 oil for 168 h at a temperature of 100 °C, the percentage change in volume of the lining shall be between 0 % and +25 % for type 1TE, 2TE and 3TE hoses and between 0 % and +100 % for type R6 and R3 hoses (i.e. shrinkage is not permissible).

When determined in accordance with ISO 1817 by immersion in IRM 903 oil for 168 h at a temperature of 70 °C, the percentage change in volume of the cover shall be between 0 % and +100 % (i.e. shrinkage is not permissible).

7.9.3 Water resistance

For all types of hose, when tested in accordance with ISO 1817 by immersion in distilled water for 168 h at a temperature of 60 °C, the percentage change in volume of the lining shall be between 0 % and +30 % (i.e. shrinkage is not permissible).

7.10 Ozone resistance

When tested in accordance with method 1 or 2 of ISO 7326:2006, depending on the nominal bore of the hose, no cracking or other deterioration of the cover shall be visible under $\times 2$ magnification.

7.11 Visual examination

Hoses shall be examined for visible defects in the outer cover and to verify that the hose identification is correct and has been properly marked. Hose assemblies shall, in addition, be inspected to verify that the correct fittings are fitted.

8 Marking

8.1 Hoses

Hoses meeting the requirements of this International Standard shall be marked at least once every 760 mm with at least the following information:

- a) the manufacturer's name or identification, e.g. MAN;
- b) a reference to this International Standard, i.e. ISO 4079:2009;
- c) the type, e.g. 1TE;
- d) the nominal size, e.g. 16;
- e) the maximum working pressure, in megapascals, with the unit indicated, e.g. 1,6 MPa;
- f) the quarter and the last two digits of the year of manufacture, e.g. 2Q09 (other date-coding methods indicating, for instance, the month or day of manufacture are allowed as long as they are clear to the user).

EXAMPLE MAN/ISO 4079:2009/1TE/16/1,6 MPa/2Q09

8.2 Hose assemblies

Hose assemblies meeting the requirements of this International Standard shall be marked with at least the following information:

- a) the manufacturer's name or identification, e.g. MAN;
- b) the maximum working pressure of the assembly, in megapascals, with the unit indicated, e.g. 1,6 MPa²);
- c) two digits indicating the month of assembly followed by a slash and the last two digits of the year of assembly, e.g. 04/09 (monthly, daily and other code dating methods are allowed as long as they are clear to the user).

EXAMPLE MAN/25 MPa/04/09

2) The maximum working pressure of a hose assembly is equal to the maximum working pressure of the component having the lowest maximum working pressure.