ประกาศกระทรวงอุตสาหกรรม

ฉบับที่ ๔๗๖๔ (พ.ศ. ๒๕๕๙)
ออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม
พ.ศ. ๒๕๑๑
เรื่อง ยกเลิกมาตรฐานผลิตภัณฑ์อุตสาหกรรม
ท่อยางไฮดรอลิกเสริมสิ่งทอ
และกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม
ท่อยางและท่อยางพร้อมอุปกรณ์ประกอบ - ท่อยางไฮดรอลิกเสริมแรงด้วยสิ่งทอ
ใช้กับของไหลที่มีน้ำมันหรือน้ำเป็นองค์ประกอบหลัก - ข้อกำหนด

โดยที่เป็นการสมควรปรับปรุงมาตรฐานผลิตภัณฑ์อุตสาหกรรม ท่อยางไฮดรอลิกเสริมสิ่งทอ มาตรฐานเลขที่ มอก. 1184 - 2552

อาศัยอำนาจตามความในมาตรา ๑๕ แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. ๒๕๑๑ ซึ่งแก้ไขเพิ่มเติมโดยพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม (ฉบับที่ ๗) พ.ศ. ๒๕๕๘ รัฐมนตรีว่าการกระทรวงอุตสาหกรรมออกประกาศยกเลิกประกาศกระทรวงอุตสาหกรรม ฉบับที่ ๔๑๗๕ (พ.ศ. ๒๕๕๓) ออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. ๒๕๑๑ เรื่อง ยกเลิกและกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ท่อยางไฮดรอลิกเสริมสิ่งทอ ลงวันที่ ๒ มีนาคม พ.ศ. ๒๕๕๓ และออกประกาศกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ท่อยางและท่อยางพร้อมอุปกรณ์ประกอบ - ท่อยางไฮดรอลิกเสริมแรงด้วยสิ่งทอใช้กับของไหลที่มีน้ำมันหรือน้ำเป็นองค์ประกอบหลัก - ข้อกำหนด มาตรฐานเลขที่ มอก. 1184 - 2558 ขึ้นใหม่ ดังมีรายละเอียดต่อท้ายประกาศนี้

ทั้งนี้ ให้มีผลตั้งแต่วันที่ประกาศในราชกิจจานุเบกษาเป็นต้นไป

ประกาศ ณ วันที่ ๑๔ มกราคม พ.ศ. ๒๕๕๙
อรรชกา สีบุญเรือง
รัฐมนตรีว่าการกระทรวงอุตสาหกรรม

มาตรฐานผลิตภัณฑ์อุตสาหกรรม
ท่อยางและท่อยางพร้อมอุปกรณ์ประกอบ – ท่อยางไฮดรอลิกเสริมแรงด้วยสิ่งทอใช้กับของไหลที่มีน้ำมันหรือน้ำเป็นองค์ประกอบหลัก – ข้อกำหนด

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ กำหนดขึ้นโดยรับ ISO 4079:2015 Rubber hoses and hose assemblies – Textile-reinforced hydraulic types for oil-based or water-based fluids – Specification มาใช้โดยวิธีพิมพ์ซ้ำ (reprinting) ในระดับเหมือนกันทุกประการ (identical) โดยใช้ ISO ฉบับภาษาอังกฤษเป็นหลัก

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ กำหนดคุณลักษณะที่ต้องการของท่อยางไฮดรอลิกเสริมแรงด้วยสิ่งทอและท่อยางไฮดรอลิกเสริมแรงด้วยสิ่งทอพร้อมอุปกรณ์ประกอบ ที่มีขนาดระบุ 5 ถึง 100 ใช้กับของไหลไฮดรอลิกที่มีน้ำเป็นองค์ประกอบหลัก (water-based hydraulic fluid) ได้แก่ HFC HFAE HFAS และ HFB (ตามที่ระบุใน ISO 6743-4) ที่อุณหภูมิ -40°C ถึง +60°C หรือใช้กับของไหลไฮดรอลิกที่มีน้ำมันเป็นองค์ประกอบหลัก (oil-based hydraulic fluid) ได้แก่ HH HL HM HR และ HV (ตามที่ระบุใน ISO 6743-4) ที่อุณหภูมิ -40°C ถึง +100°C

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ ไม่ครอบคลุมถึงคุณลักษณะที่ต้องการสำหรับข้อต่อปลาย (end fitting)

หมายเหตุ *ผู้ใช้ต้องปรึกษากับผู้ทำท่อยางถึงการใช้งานกับของไหลที่เหมาะจะนำมาใช้งาน*

รายละเอียดให้เป็นไปตาม ISO 4079:2015

ISO copyright office

Case postale 56 ● CH-1211 Geneva 20

Tel. + 41 22 749 01 11

Fax + 41 22 749 09 47

E-mail copyright@iso.org

Web www.iso.org

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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. 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. www.iso.org/patents

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

This fourth edition cancels and replaces the third edition (ISO 4079:2009), of which it constitutes a minor revision.

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 °C to +60 °C or 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.

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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 7326:2006, *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*

ISO 10619-1, *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.

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 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 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		Type R6		Type R3	
	min.	max.	min.	max.	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	10,3	11,9	11,9	13,5
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	11,9	13,5	13,5	15,1
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	13,5	15,1	16,7	18,3
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	15,1	16,7	18,3	19,8
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	19,0	20,6	23,0	24,6
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	22,2	23,8	26,2	27,8
19	18,2	19,8	18,3	19,9	18,7	19,8	—	—	26,0	28,0	28,0	30,0	25,4	27,8	31,0	32,5
25	24,6	26,2	—	—	25,1	26,2	—	—	32,9	35,9	34,4	37,4	—	—	36,9	39,3
31,5	30,8	32,8	—	—	31,4	32,9	—	—	—	—	40,8	43,8	—	—	42,9	46,0
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 according to ISO 10619-1 method.

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 10619-2 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 kN/m	Between cover and reinforcement 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 ISO 8033:2006, 5.1 and 5.3.

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 × 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 4079:2015;

c) the type, e.g. 1TE;

d) the nominal size, e.g. 16;

e) the maximum working pressure, in megapascals and bar, with the unit indicated, e.g. 1,6 MPa (16 bar);

f) the quarter and the last two digits of the year of manufacture, e.g. 2Q15 (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 4079:2015/1TE/16/1,6 MPa (16 bar) /2Q15

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 and bar, with the unit indicated, e.g. 1,6 MPa (16 bar)[1].

c) two digits indicating the month of assembly followed by a slash and the last two digits of the year of assembly, e.g. 04/15 (monthly, daily and other code dating methods are allowed as long as they are clear to the user).

EXAMPLE MAN/2,5 MPa (25 bar)/04/15

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

Annex A
(normative)

Type and routine testing of production hoses

Property	Type tests Frequency (for each hose type and size): at initial product qualification, in the event of product changes after initial qualification and after 5 years	Routine tests Performed on each length of finished hose prior to warehousing or sale
Dimensions		
Measurement of inside diameter	X	X
Measurement of outside diameter	X	X
Measurement of concentricity	X	N/A
Hose tests		
Proof test	X	X
Burst test	X	N/A
Minimum bend radius test	X	N/A
Change in length test (see 7.2)	X	X
Impulse test	X	N/A
Leakage test (hose assemblies)	X	N/A
Cold flexibility test	X	N/A
Adhesion (cover)	X	N/A
Adhesion (lining)	X	N/A
Fluid resistance test for cover	X	N/A
Fluid resistance test for lining	X	N/A
Vacuum resistance test	X	N/A
Ozone resistance test	X	N/A
Visual examination	X	X
X Test shall be carried out. N/A Test not applicable.		

Annex B
(informative)

Periodic testing of production hose

Property	Production tests	
	Frequency: every 3 000 m produced of each hose type and size	Frequency: every 12 months of production for each hose type and size
Dimensions		
Measurement of inside diameter	X	X
Measurement of outside diameter	X	X
Measurement of concentricity	X	X
Hose tests		
Proof test	X	X
Burst test	X	X
Change in length test (see 7.2)	X	X
Minimum bend radius test	N/A	X
Impulse test	N/A	X
Leakage test (hose assemblies)	N/A	X
Cold flexibility test	N/A	X
Adhesion (cover)	N/A	X
Adhesion (lining)	N/A	X
Vacuum resistance test	N/A	X
Fluid resistance test for cover	N/A	X
Fluid resistance test for lining	N/A	X
Ozone resistance test	N/A	X
Visual examination	X	X
X Test shall be carried out.		
N/A Test not applicable.		

Annex C
(informative)

Recommendations for lengths of supplied hoses and tolerances on lengths of hose assemblies

C.1 Hoses

The lengths of hoses in the manufacturer's standard pack, with the lengths marked, should preferably be within ± 2 % of the lengths indicated.

When no specific hose lengths have been ordered, the percentages of different lengths in any given delivery or pack of at least 500 m should preferably be as indicated in Table C.1.

Table C.1 — Hose lengths in delivery when no lengths specified

Length of hose	Percentage of total length
Greater than or equal to 1 m but less than or equal to 10 m	5 % max.
Greater than 10 m but less than or equal to 15 m	25 % max.
Greater than 15 m	75 % min.

C.2 Hose assemblies

The tolerances on the lengths of hose assemblies should preferably conform to the values given in Table C.2.

Table C.2 — Tolerances on lengths of hose assemblies

Length of hose assembly mm	Nominal size		
	Up to and including 25	Over 25 and up to and including 50	Over 50
Up to and including 630	$^{+7}_{-3}$ mm	$^{+12}_{-4}$ mm	$^{+25}_{-6}$ mm
Over 630 and up to and including 1 250	$^{+12}_{-4}$ mm	$^{+20}_{-6}$ mm	
Over 1 250 and up to and including 2 500	$^{+20}_{-6}$ mm	$^{+25}_{-6}$ mm	
Over 2 500 and up to and including 8 000	$^{+1,5}_{-0,5}$ %		
Over 8 000	$^{+3}_{-1}$ %		