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Rubber and plastics hoses and hose assemblies, wire- or textile-reinforced, for manually operated hydraulic jacks — Specification

Tuyaux et flexibles en caoutchouc et en plastique, à armature textile ou métallique, pour vérin hydrauliques — Spécifications

Reference number
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Foreword

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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).

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

Rubber and plastics hoses and hose assemblies, wire- or textile-reinforced, for manually operated hydraulic jacks — Specification

1 Scope

This document specifies the requirements for three classes of wire- or textile-reinforced hydraulic hoses and hose assemblies of nominal sizes ranging from 5 to 25. The hoses and hose assemblies are used in hydraulic jack applications with manually operated hand pumps. They are suitable for use with hydraulic fluids HH, HL, HM, HR and HV at temperature ranging from −40 °C to +55 °C. For tools that require heavy duty services such as a rescue tool, ISO 19718[3] applies.

This document does not include requirements for the connection ends. It is limited to the performance of hoses and hose assemblies. The maximum working pressure of hose assemblies is regulated by the lowest maximum working pressure of the components.

NOTE 1 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.

NOTE 2 There are two International Standards for hoses for hydraulic jacks and tool applications, i.e. ISO 16301 and ISO 19718. The comparison table is given in Annex A.

NOTE 3 The classification of HH, HL, HM, HR and HV is found in ISO 6743-4[2].

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

ISO 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

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:

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

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

4 List of significant hazards

4.1 General

This clause contains some of the significant hazards, hazardous situations and events, as far as they are dealt with in this document, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

4.2 Hazards due to bursting or leaking of hoses

Hazards can occur when a hose bursts or leaks. The escaping stream of liquid can cause personal injury or property damage.

Figure 1 — Hazards due to bursting or leaking of hoses

4.3 Hazards due to failure of connectors

Hazards can occur when a connector fails. The escaping stream of liquid can cause physical damage and also a sudden repositioning of the hose assembly in a dangerous manner (whip).

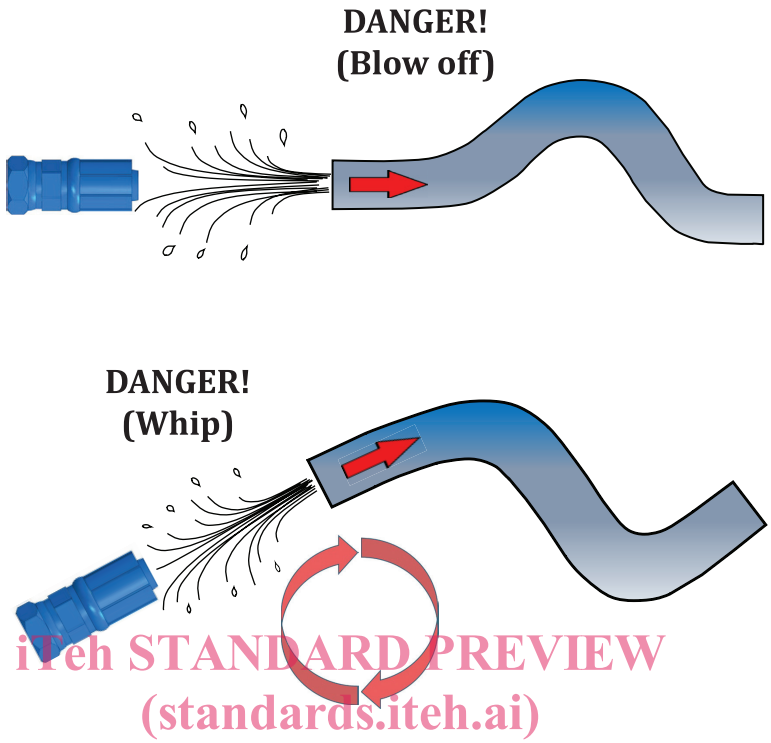

Figure 2 — Hazards due to failure of connectors

4.4 Hazards due to errors by the operator

Hazards can occur if the operator uses incompatible substances or incompatible components. Hazards can also occur if the operator exceeds the limits of use specified by the manufacturer (e.g. too high pressure, too high tensile stress), also pinhole caused by kink might result in a significant injury.

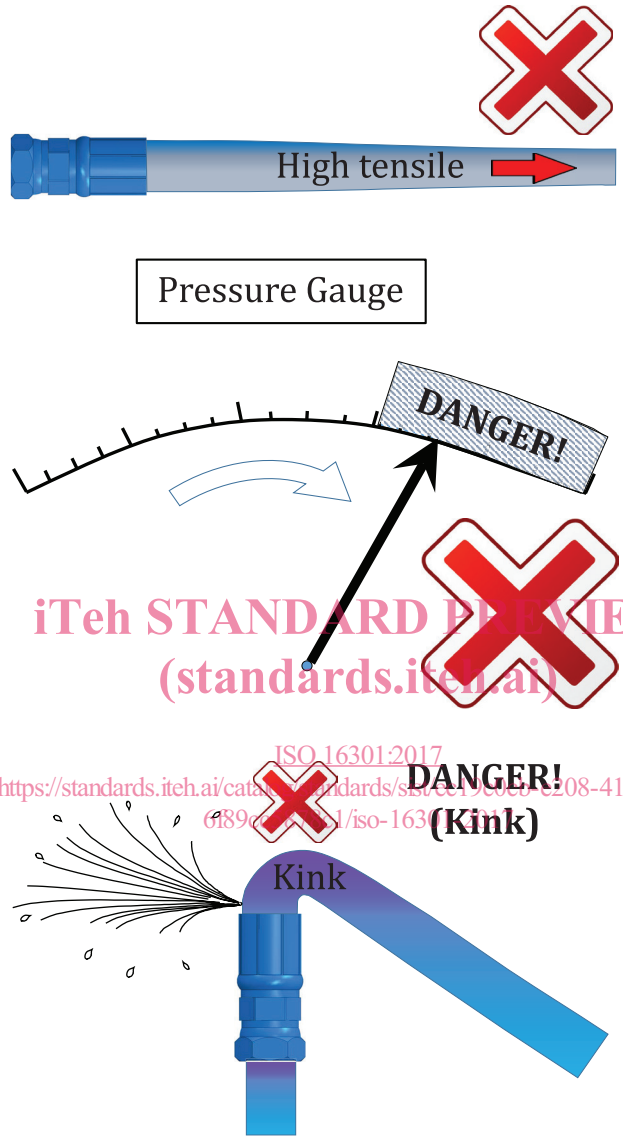

Figure 3 — Hazards due to errors by the operator

4.5 Hazards due to change in length of hose assembly

Hazardous situations occur when there is a sudden change of pressure in the hose assembly causing a change in length resulting in the operators losing their firm hold.

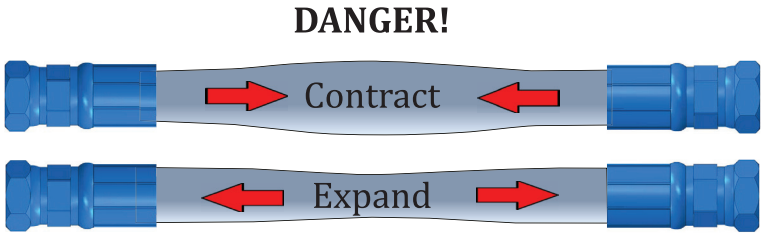

Figure 4 — Hazards due to change in length of hose assembly

5 Classification

5.1 Classes

Three classes of hose are specified, distinguished by their maximum working pressure and six sizes specified by nominal size as shown in Table 1.

Table 1 — Classes and nominal sizes

Class	70	100	140
Maximum working pressure (MPa)	70	100	140
Maximum working pressure (bar)	700	1 000	1 400
Nominal size			
5	X	X	X
6,3	X	X	X
8	X	X	X
10	X	X	N/A
12,5	X	X	N/A
19	X	N/A	N/A
25	X	N/A	N/A
NOTE X = Applicable, N/A = Not applicable			

5.2 Grades

All grades are classified on their electrical properties:

a) Grade 1, no electrical requirements.

b) Grade 2, non-conductive.

Non-conductive means the current reading shall be no greater than 50 µA when tested in accordance with Annex E.

6 Materials and construction

6.1 Hoses

Hoses shall consist of a hydraulic fluid resistant rubber or plastic lining, one or multiple layers of steel wire or textile and an oil, abrasion and weather resistant rubber or plastic cover. A layer of other materials on the rubber cover are allowed for improved abrasion or other resistance. Grade 2 hoses shall not be perforated on the cover.

6.2 Hose assemblies

Hose assemblies shall only be manufactured with those hose fittings whose functionality conforms to the requirements of 8.2.1, 8.2.4 and 8.2.5.

The manufacturer's instructions should be followed for proper preparation and fabrication of hose assemblies.

It is highly recommended that hose assemblies be provided with an anti-kink protection at each end, e.g. spring guards or bend restrictors.

7 Dimensions and tolerances

7.1 Diameters

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

Table 2 — Diameters of hoses

Nominal size	Inside diameter mm		Maximum outside diameter of hose mm		
	All classes		Class		
	Minimum	Maximum	70	100	140
5	4,6	5,4	17	18	20
6,3	6,1	7,0	20	21	22
8	7,7	8,5	22	25	28
10	9,3	10,1	24	28	—
12,5	12,3	13,5	28	32	—
19	18,6	19,8	35	—	—
25	25,0	26,4	43	—	—

7.2 Cover thickness

When measured in accordance with ISO 4671, the outer cover thickness of the hoses shall be at least 0,5 mm.

7.3 Concentricity

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

Table 3 — Concentricity of hoses

Nominal size	Maximum variation in wall thickness	
	Between inside diameter and outside diameter mm	Between inside diameter and reinforcement diameter mm
5 and 6,3	0,8	0,5
over 6,3 and including 19	1,2	0,7
over 19	1,3	0,9

8 Physical properties

8.1 Fluid resistance

8.1.1 Test pieces

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

For plastic hoses, the fluid resistance tests shall be carried out on moulded sheets of lining and cover materials having minimum thickness 2 mm and of equivalent state to that of the hose.

8.1.2 Oil resistance

When tested in accordance with ISO 1817, by immersion in oil No. 3 for 168 h at a temperature of 70 °C, the percentage change in volume of the lining ΔV shall be between −10 % and +60 %.

When tested in accordance with ISO 1817, by immersion in oil No. 3 for 168 h at a temperature of 70 °C, the percentage change in volume of the cover ΔV shall be between −10 % and +100 %.

8.2 Performance requirements

8.2.1 Hydrostatic requirements

When tested in accordance with ISO 1402, the maximum working pressure, the proof pressure and minimum burst pressure of the hoses and hose assemblies shall conform to the values given in Table 4.

Table 4 — Maximum working pressure, proof pressure and minimum burst pressure

Class	Maximum working pressure		Proof pressure		Minimum burst pressure	
	MPa	bar	MPa	bar	MPa	bar
70	70	700	105	1 050	175	1 750
100	100	1 000	150	1 500	250	2 500
140	140	1 400	210	2 100	350	3 500

All hose assemblies shall be subjected to proof pressure test with a pressure hold time of 1 min.

All deviations to that shall be agreed between hose assembly manufacturer and purchaser.

8.2.2 Change in length

When tested in accordance with ISO 1402, the change in length of hose at the maximum working pressure shall not exceed +2 % to –4 % for rubber hoses, +3 % to –3 % for plastic hoses.