
Rubber and plastics hoses and hose assemblies, wire- or textile-reinforced, for water jetting or water blasting applications — Specification

Tuyaux et flexibles en caoutchouc et en plastique, à armature textile ou métallique, pour applications à jet d'eau à haute et ultra haute pression — 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.

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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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html (standards.iteh.ai)

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

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Rubber and plastics hoses and hose assemblies, wire- or textile-reinforced, for water jetting or water blasting applications — Specification

1 Scope

This document specifies requirements for nine classes of reinforced hydraulic hoses and hose assemblies of nominal sizes ranging from 5 to 25. Each class has a single maximum working pressure. Such hoses and hose assemblies are intended to be used with very high-pressure water jetting and water blasting machines.

This document also reviews all the significant hazards, hazardous situations and events relevant to the equipment in the scope, when it is used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

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 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

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, *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*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

3 Terms and definitions

For the purpose 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 reviews some of the significant hazards, hazardous situations and events, identified by risk assessment as significant for hoses and hose assemblies, as far as they are dealt with in this document, 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. See [Figure 1](#).



Figure 1 — Hazards due to bursting or leaking of hoses

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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). See [Figure 2](#).

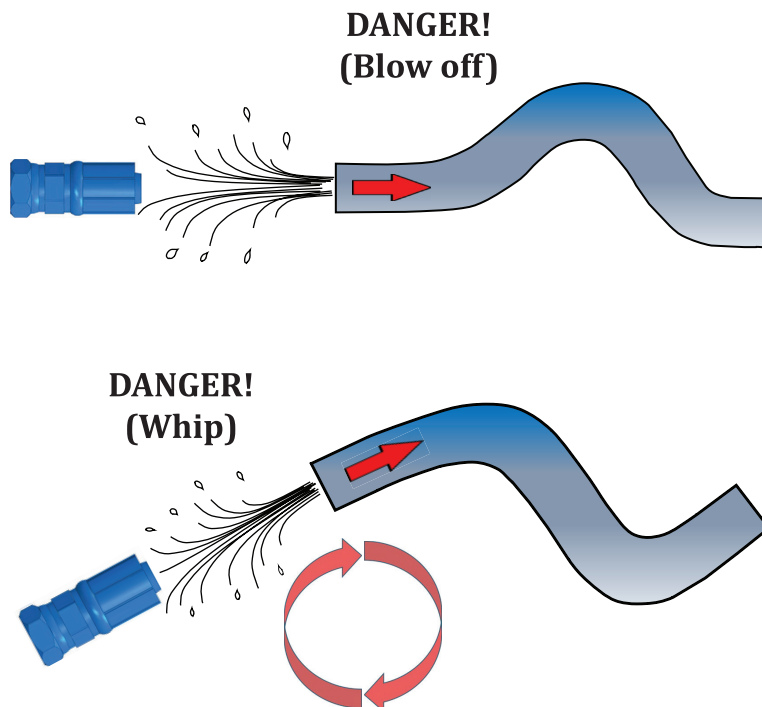


Figure 2 — Hazards due to failure of connectors

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 may result in a significant injury. See [Figure 3](#).

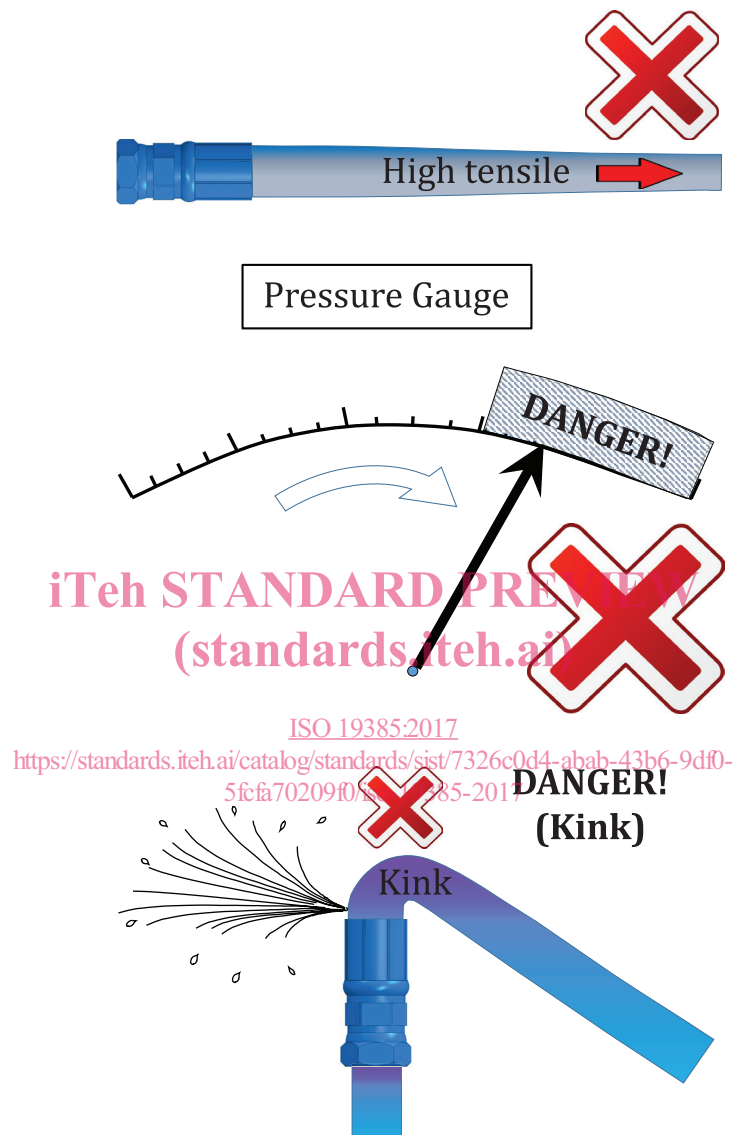


Figure 3 — Hazards due to errors by the operator

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. See [Figure 4](#).

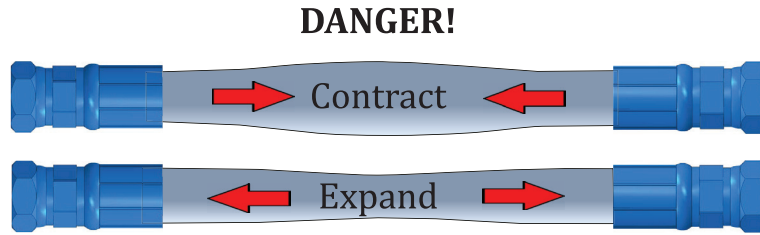


Figure 4 — Hazards due to change in length of hose assembly

5 Safety requirements and/or protective measures

5.1 General

Hoses, hose assemblies and their connectors shall comply with the safety requirements and/or protective measures of this clause. In addition, they shall be designed according to the principles of ISO 12100 for relevant but not significant hazards, which are not dealt with in this document.

Hoses, hose assemblies, and connectors shall feature a certain structure in order to guarantee safe operation when used properly. They must not bear any risks for the operator or for the workplace and its environment.

The design of any connector safety devices shall provide safe operational performance to eliminate any risk or hazard for the operator or their environment. However, improper use of a hose assembly or the connectors may result in hazardous situations and shall be avoided.

Correct assembly of hose assemblies requires specific knowledge and skills and also specific equipment.

5.2 Requirements for compatibility of components

The hoses and connectors combined to hose assemblies shall match each other in terms of structure, composition, and design.

NOTE Hoses of one manufacturer do not necessarily match connectors of another manufacturer.

5.3 Mechanical requirements

All components of a hose assembly as well as the connectors and the hose assembly itself shall not fail under the burst pressure specified by the manufacturer.

5.4 Requirements concerning the maximum working pressure for hose assemblies

For hose assemblies with maximum working pressure up to or equal to 3 000 bar the burst pressure shall be at least 2,5 times the maximum working pressure. For hose assemblies with maximum working pressure above 3 000 bar the burst pressure shall be at least two times the maximum working pressure (see also ISO 7751).

5.5 Thermal requirements

The hose assemblies shall be suitable for operating temperatures above -20 °C and below $+70\text{ °C}$.

5.6 Requirements for loosening connectors

Measures shall be taken against the hazards of unintentional loosening of connectors while the hose assembly is under pressure. One method is a design where the presence of pressure becomes apparent when starting loosening, for example by the use of swivel nuts with at least two axial relief bores.

If sufficient technical measures are not possible, the manufacturer shall provide appropriate warnings and instructions.

5.7 Requirements for connector safety devices

The need for connector safety devices to restrain movement of the hose assembly if the connector fails shall be defined on the basis of an assessment of the related risk, within the limits of the intended use of the machines the hose assemblies are intended for.

In particular, for applications with an input to the drive for the pressure generator exceeding 40 kW or a working pressure exceeding 500 bar the use of connector safety devices is mandatory for any place where significant presence of persons is foreseeable. Where technically not possible (e.g. pipe cleaning) alternative measures shall be considered and where necessary instructions shall be given in the information for use.

The fixing provisions of the connector safety devices shall be designed and constructed for withstanding the foreseeable mechanical constraints.

6 Classification

Nine classes of hose are specified, distinguished by their maximum working pressure, as shown in [Table 1](#). Other pressure classes are acceptable as long as all performance requirements are met.

Table 1 — Classes and nominal sizes

Class	MPa	70	100	110	125	140	200	250	300	400
	bar	700	1 000	1 100	1 250	1 400	2 000	2 500	3 000	4 000
Nominal size										
5	X	X	X	X	X	X	X	X	X	X
6,5	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	N/A	N/A	N/A
9,5	X	X	X	X	X	X	N/A	N/A	N/A	N/A
13	X	X	X	X	X	X	N/A	N/A	N/A	N/A
19	X	X	X	X	X	X	N/A	N/A	N/A	N/A
25	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

X = Applicable N/A = Not applicable
Other nominal sizes are acceptable as long as all performance requirements are met.

7 Materials and construction

7.1 Hoses

Hoses shall consist of a rubber or plastic lining, multiple layers of textile or steel wires and oil, abrasion and weather resistant rubber or plastic cover.

7.2 Hose assemblies

Hose assemblies shall only be manufactured using hose fittings which conform to the requirements of this document.