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Rubber hoses and hose assemblies for sand and grit blasting — Specification

Tuyaux et flexibles en caoutchouc pour sablage et grenaillage — 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).

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 (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 218 *Rubber and plastics hoses and hose assemblies,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 3861:2005), which has been technically revised. The main changes compared to the previous edition are as follows:

— MPa units have been added throughout the document;

— Clause 2 has been updated;

— inside diameters of 20 mm and 40 mm have been deleted;

— Clause 8 on frequency of testing, and Annexes A and B have been added;

— Clause 9 on marking has been updated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document specifies rubber hoses for sand and grit blasting. When hoses are fitted with couplings, the document also contains requirements for hose assemblies.

Rubber hoses and hose assemblies for sand and grit blasting — Specification

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory conditions.

1 Scope

This document specifies the requirements for rubber hoses and hose assemblies for wet and dry sand and grit blasting, suitable for use up to a maximum working pressure of 0,63 MPa (6,3 bar) and over an operating temperature range of –25 °C to +70 °C.

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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188:2011, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

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 4649:2017, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*

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

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8031, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity*

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

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

ISO 10619-1:2017, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature*

ISO 10619-2:2017, *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 https://www.iso.org/obp

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

4 Classification

Hoses and hose assemblies are designated as one of the following grades depending on their electrical properties:

— electrically bonded — designated and marked “M” grade.

— electrically conductive, using a conductive rubber layer — designated and marked “Ω” grade.

5 Materials and construction

The hose shall consist of:

— a rubber lining;

— a reinforcement of natural or synthetic textile, applied by any suitable technique;

— a rubber cover.

Depending on the grade, the construction may contain a conductive rubber layer or a bonding wire or wires consisting of at least nine strands of a metal having a high resistance to fatigue.

The lining and cover shall be of uniform thickness, concentric to comply with the minimum thickness specified in 6.2 and 6.4.

The lining and cover shall be free from holes, porosity and other defects. The cover finish may be smooth or fabric-marked.

6 Dimensions

6.1 Inside diameter and tolerances

When measured in accordance with ISO 4671, the inside diameters and their tolerances shall conform to the values specified in Table 1.

Table 1 — Inside diameters and tolerances

Inside diameter mm	Tolerance mm
12,5	±0,75
16	±0,75
19	±0,75
25	±1,25
31,5	±1,25
38	±1,50
45	±1,50
50	±1,50

6.2 Concentricity

When determined in accordance with ISO 4671, the concentricity, based on a total indicator reading between the inside diameter and the outside surface of the cover, shall be no greater than 1,0 mm.

6.3 Tolerance on length

When measured in accordance with ISO 4671, the tolerance on cut lengths shall be as specified in ISO 1307.

6.4 Minimum thickness of lining and cover

When measured in accordance with ISO 4671, the minimum thickness of the rubber lining shall be 5,0 mm and that of the cover 1,0 mm.

7 Physical properties

7.1 Rubber compounds

When tested by the methods listed in Table 2, the physical properties of the compounds used for the lining and cover shall conform to the values specified in Table 2.

Tests shall be carried out either on samples taken from the hose or from separately vulcanized sheets 2 mm thick for the tensile/elongation tests and thicker for the abrasion test. These shall be vulcanized to the same state of cure as production hoses.

Table 2 — Physical properties of rubber compounds

Property	Requirements		Test method
	Lining	Cover	
Minimum tensile strength	14,0 MPa (140 bar)	10,0 MPa (100 bar)	ISO 37 (dumb-bell test piece)
Minimum elongation at break	400 %	300 %	ISO 37 (dumb-bell test piece)
Resistance to ageing: Change in tensile strength from original value (maximum) Change in elongation at break from original value (maximum)	 ±25 % Between +10 % and −30 %	 ±25 % Between +10 % and −30 %	ISO 188:2011 (3 days at 70 °C ± 1 °C), air-oven method; ISO 37 (dumb-bell test piece)
Abrasion resistance (maximum loss)	140 mm^3	N/A	ISO 4649:2017, method A

7.2 Finished hoses and hose assemblies

When measured by the methods listed in Table 3, the physical properties of finished hoses and hose assemblies shall conform to the values specified in Table 3.

Table 3 — Physical properties of finished hoses and hose assemblies

Property	Requirements	Test method
Proof pressure	1,25 MPa (12,5 bar)	ISO 1402
Change in length at proof pressure	±8 %	ISO 1402
Change in diameter at proof pressure	±10 %	ISO 1402
Twist at proof pressure	20°/m (maximum)	ISO 1402

Table 3 *(continued)*

Property	Requirements	Test method
Minimum burst pressure	2,5 MPa (25 bar)	ISO 1402
Adhesion between components	2,0 kN/m (minimun)	ISO 8033
Ozone resistance	No cracking observed under × 2 magnification	ISO 7326:2016, method 1 up to 25 mm ID method 2 or 3 for other sizes
Flexibility at 23 °C	$T/D \geq 0{,}8$	ISO 10619-1:2017, method A1
Low-temperature flexibility	No cracks shall be detected and the hose shall pass the proof test specified above.	ISO 10619-2:2017, method B at –25 °C ± 2 °C
Electrical resistance (maximum)	"M" grade: 10^2 Ω/length "Ω" grade: 10^6 Ω/length	ISO 8031

8 Frequency of testing

Type testing and routine testing shall be as specified in Annex A.

Type tests are those tests required to confirm that a particular hose design, manufactured by a particular method, meets all the requirements of this document. The tests shall be repeated at a maximum of five-year intervals, or whenever a change in the method of manufacture or materials used occurs. They shall be performed on all sizes, and on all classes and types except those of the same size and construction.

Routine tests are those tests required to be carried out on each length of finished hose prior to dispatch.

Production acceptance tests are those tests, specified in Annex B, which should preferably be carried out to control the quality of manufacture. The frequencies specified in Annex B are given as a guide only.

9 Marking

9.1 Hoses

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

a) the manufacturer's name or identification, e.g. XXX;

b) a reference to this document, i.e. ISO 3861;

c) the hose grade e.g. M or Ω;

d) the inside diameter, in millimetres, e.g. 25;

e) the maximum working pressure, in megapascals and in bars, or in either, with the unit indicated, e.g. 0,63 MPa (6,3 bar);

f) the quarter and year of manufacture, e.g. 4Q21.

EXAMPLE XXX/ISO 3861/Grade "M"/25/0,63 MPa (6,3 bar)/4Q21

For item b), the hose manufacturer shall use the latest edition of this document; otherwise, the year of publication shall be included in the marking.

9.2 Hose assemblies

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

a) the manufacturer's name or identification, e.g. XXX;

b) the maximum working pressure of the assembly, in megapascals and in bars, or in either, with the units indicated, e.g. 0,63 MPa (6,3 bar);

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

c) the four digits of the year of assembly followed by a slash and the two digits indicating the month of assembly, e.g. 2021/12 (monthly, daily and other date-coding methods are allowed as long as they are clear to the user).

EXAMPLE XXX/0,63 MPa (6,3 bar)/2021/12.

NOTE Typical markings include but are not limited to stamping the fitting socket, embossing on a metal or plastic ring.

The sequence of the elements is optional and they do not need to be in one row.