



**International
Standard**

ISO 2398

**Rubber hoses, textile-reinforced, for
compressed air — Specification**

*Tuyaux en caoutchouc renforcés textile pour l'air comprimé —
Spécifications*

**Seventh edition
2024-04**

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Published in Switzerland

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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 document 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 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 seventh edition cancels and replaces the sixth edition (ISO 2398:2016), which has been technically revised.

The main changes are as follows:

- [Table A.1](#), test requirements have been revised;
- Annex B has been deleted.

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.

Rubber hoses, textile-reinforced, for compressed air — Specification

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

1 Scope

This document specifies the requirements for three types, three classes and two categories of textile-reinforced rubber hose for compressed air, up to a maximum working pressure of 2,5 MPa (25 bar) with an operating-temperature range of $-40\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$, depending on the type and category.

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

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

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

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

ISO 10619-2, *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 terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Classification

Hoses are designated as one of the following types, depending on their pressure rating.

- Type 1:** Low pressure — designed for a maximum working pressure of 1 MPa (10 bar);
- Type 2:** Medium pressure — designed for a maximum working pressure of 1,6 MPa (16 bar);
- Type 3:** High pressure — designed for a maximum working pressure of 2,5 MPa (25 bar).

These types can be subdivided into three classes depending on their oil resistance.

- Class A:** Non-oil-resistant;
- Class B:** Normal oil resistance;
- Class C:** Good oil resistance.

The types and classes above can also be further subdivided into two categories, depending on their operating-temperature range.

- Category N-T** (normal temperature): –25 °C to +70 °C;
- Category L-T** (low temperature): –40 °C to +70 °C.

5 Materials and construction

The hose shall consist of:

- a rubber lining;
- a reinforcement of natural or synthetic textile, applied by any suitable technique; and
- a rubber cover.

The lining and cover shall be of uniform thickness, concentric to comply with the minimum thickness specified, and free from holes, porosity and other defects. The cover finish may be smooth or fabric-marked.

6 Dimensions

6.1 Inside diameters 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 — Minimum and maximum inside diameters

Hose size	Minimum inside diameter mm	Maximum inside diameter mm
4	3,25	4,75
5	4,25	5,75
6,3	5,55	7,05
8	7,25	8,75
10	9,25	10,75
12,5	11,75	13,25
16	15,25	16,75

Table 1 (continued)

Hose size	Minimum inside diameter mm	Maximum inside diameter mm
19	18,25	19,75
20	19,25	20,75
25	23,75	26,25
31,5	30,25	32,75
38	36,50	39,50
40	38,50	41,50
51	49,50	52,50
63	61,50	64,50
76	74,50	77,50
80	78,00	82,00
100	98,00	102,00
102	100,00	104,00

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 for hoses of inside diameter up to and including 76 mm, and no greater than 1,5 mm for hoses of inside diameter greater than 76 mm.

6.3 Tolerance on length

The tolerance on cut lengths shall be as specified in ISO 4307, the length being measured in accordance with ISO 4671.

6.4 Minimum thickness of lining and cover

When measured in accordance with ISO 4671, the minimum thickness of the lining and cover shall be as follows.

Type 1: lining 1,0 mm;

cover 1,5 mm;

Type 2: lining 1,5 mm;

cover 2,0 mm;

Type 3: lining 2,0 mm;

cover 2,5 mm.

7 Physical properties

7.1 Rubber compounds

When determined 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 in thickness and vulcanized to the same cure state as the production hoses.

Table 2 — Physical properties of rubber compounds

Property	Requirement		Test method
	Lining	Cover	
Minimum tensile strength	7,0 MPa	7,0 MPa	ISO 37 (dumb-bell test piece)
Minimum elongation at break	250 %	250 %	ISO 37 (dumb-bell test piece)
Resistance to ageing			
Change in tensile strength from original value (max.)	±25 %	±25 %	ISO 188 (3 days at 100 °C ± 1 °C), air-oven method ISO 37 (dumb-bell test piece)
Change in elongation at break from original value (max.)	±50 %	±50 %	
Resistance to liquids			
Increase in volume (class A)	N/A	N/A	—
Increase in volume (max.) (class B only)	115 % No shrinkage allowed	N/A	ISO 1817 (72 h at 70 °C ± 2 °C in oil No. 3), gravimetric method
Increase in volume (max.) (class C only)	30 % No shrinkage allowed	75 % No shrinkage allowed	ISO 1817 (72 h at 70 °C ± 2 °C in oil No. 3), gravimetric method

7.2 Finished hose

When determined by the methods listed in [Table 3](#), the physical properties of the finished hose shall conform to the values specified in [Table 3](#).

Table 3 — Physical properties of finished hose

Property	Requirement			Test method
Proof pressure		MPa	bar	ISO 1402
	type 1	2	20	
	type 2	3,2	32	
	type 3	5	50	
Change in length at maximum working pressure	±5 %			ISO 1402
Change in diameter at maximum working pressure	±5 %			ISO 1402
Minimum burst pressure		MPa	bar	ISO 1402
	type 1	4	40	
	type 2	6,4	64	
	type 3	10	100	
Adhesion between components	2,0 kN/m (min.)			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 not less than 0,8			ISO 10619-1
Low-temperature flexibility	No cracks and shall pass the proof pressure test specified above			ISO 10619-2 Category N-T at -25 °C ± 2 °C Category L-T at -40 °C ± 2 °C

8 Frequency of testing

Type testing and routine testing shall be carried out 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 tests required to be carried out on each length of finished hose or hose assembly prior to dispatch.

9 Test report or certificate

Upon the purchaser's request, the manufacturer shall supply a test report or certificate, positively identifying the hoses supplied to the purchaser.

10 Marking

The hose shall be continuously and durably marked with at least the following information:

- a) the manufacturer's name or identification (XXXX);
- b) a reference to this document, i.e. ISO 2398;
- c) the hose type and class;
- d) the category, if low-temperature (L-T);
- e) the inside diameter, in mm;
- f) the maximum working pressure, in MPa and bar, or in either, with units stated;
- g) the date of manufacture, by giving the quarter and year of manufacture or using another suitable date code.

EXAMPLE XXXX/ISO 2398/2B/L-T/25 mm/1,6 MPa (16 bar)/2Q23.

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