International Standard

ISO 3994

Plastics hoses — Helical-thermoplastic-reinforced thermoplastics hoses for suction and discharge of aqueous materials — Specification

Tuyaux en plastiques — Tuyaux thermoplastiques à renforcement thermoplastique en spirale pour aspiration et refoulement de matières aqueuses — Spécifications

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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 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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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 fifth edition cancels and replaces the fourth edition (ISO 3994:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

— addition of nominal size 19 in Table 6;

— changes to Table D.1;

— deletion of the production test in Annex E.

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.

Plastics hoses — Helical-thermoplastic-reinforced thermoplastics hoses for suction and discharge of aqueous materials — 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 of this document to establish appropriate health and safety practices and to determine the applicability of regulatory conditions prior to use.

1 Scope

This document specifies requirements for three types of helical-thermoplastic-reinforced thermoplastics hoses for suction and discharge of water, weak aqueous chemical solutions and abrasive solids and slurries, for use in the ambient temperature range from –10 °C to 55 °C.

This document does not specify requirements for use with flammable or combustible materials, nor with aromatic solvents.

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 176:2005, *Plastics — Determination of loss of plasticizers — Activated carbon method*

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

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, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

ISO 30013:2011, *Rubber and plastics hoses — Methods of exposure to laboratory light sources — Determination of changes in colour, appearance and other physical properties*

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

Three types of hoses are specified, related to the maximum working pressure and suction pressure (see Tables 2 and 5):

— type 1: light-duty service;

— type 2: medium-duty service;

— type 3: heavy-duty service.

All types are designed to operate in the ambient temperature range –10 °C to 55 °C.

5 Materials and construction

The hoses shall be as uniform as commercially practicable in colour and other physical properties. They shall consist of a flexible thermoplastics material supported within the material by a helix of thermoplastic material of a similar compatible property. The reinforcing and flexible components of the wall shall be fused together and free from visible cracks, porosity, foreign inclusions or other defects such as are liable to cause failure of the hose in service.

NOTE Hoses of a similar construction for suction and discharge for fire-fighting are specified in ISO 14557.

6 Dimensions and tolerances

6.1 Nominal sizes, inside diameters and tolerances

The test shall be carried in accordance with ISO 4671. The inside diameters and tolerances of hoses of different nominal sizes shall meet the requirements given in Table 1.

Table 1 — Nominal sizes, inside diameters and tolerances

Nominal size	Inside diameter mm	Tolerances for types 1 and 2 mm	Tolerances for type 3 mm
12,5	12,5	±0,75	N/A
16	16	±0,75	N/A
19	19	±0,75	N/A
20	20	±0,75	N/A
25	25	±1,25	±1,25
32	32	±1,25	±1,25
38	38	±1,25	±1,50
40	40	±1,25	±1,50
50	50	±1,50	±1,50
63	63	±1,50	±1,50
76	76	±1,50	±2,00
80	80	±1,50	±2,00
90	90	±2,00	±2,00

Table 1 *(continued)*

Nominal size	Inside diameter mm	Tolerances for types 1 and 2 mm	Tolerances for type 3 mm
100	100	±2,00	±2,00
102	102	±2,00	±2,00
125	125	±2,00	±2,00
127	127	±2,00	±2,00
152	152	±2,00	±2,00
160	160	±2,00	±2,00
200	200	N/A	±2,00
250	250	N/A	±3,00
300	300	N/A	±3,00
315	315	N/A	±3,00

6.2 Length tolerances

The tolerances on cut lengths shall be in accordance with ISO 1307.

7 Maximum working pressure

The maximum working pressure shall be as specified in Table 2.

Table 2 — Maximum working pressures

Nominal size	Maximum working pressure											
	23 °C ± 2 °C						55 °C ± 2 °C					
	Type 1		Type 2		Type 3		Type 1		Type 2		Type 3	
	MPa	bar	MPa	bar	MPa	bar	MPa	bar	MPa	bar	MPa	bar
12,5 up to and including 25	0,56	5,6	0,73	7,3	0,93	9,3	0,16	1,6	0,21	2,1	0,26	2,6
32 up to and including 63	0,4	4	0,5	5	0,6	6	0,13	1,3	0,15	1,5	0,2	2
76 up to and including 90	0,3	3	0,4	4	0,5	5	0,1	1	0,13	1,3	0,16	1,6
100 up to and including 127	0,23	2,3	0,3	3	0,4	4	0,08	0,8	0,1	1	0,13	1,3
152 up to and including 250	0,2	2	0,26	2,6	0,3	3	0,06	0,6	0,08	0,8	0,1	1
300 up to and including 315	N/A	N/A	N/A	N/A	0,26	2,6	N/A	N/A	N/A	N/A	0,08	0,8

8 Performance requirements

8.1 Hydrostatic testing at 23 °C ± 2 °C

The test shall be carried out in accordance with ISO 1402 at room temperature and at media temperature of 23 °C ± 2 °C. Hoses shall meet the following requirements:

— At the proof pressure specified in Table 3 (i.e. 40 % of the minimum burst pressure), the hoses shall show no evidence of leakage, cracking, abrupt distortion (indicating irregularity in materials or manufacture) or other signs of failure.

— The minimum burst pressure shall be as specified in Table 3.