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**Thermoplastics hoses, textile-reinforced,  
for general-purpose water applications —  
Specification**

*Tuyaux en matières thermoplastiques à armature textile d'usage  
général pour l'eau — 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 6224 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This third edition cancels and replaces the second edition (ISO 6224:1995), which has been technically revised.

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# Thermoplastics hoses, textile-reinforced, for general-purpose water applications — Specification

**WARNING —** Persons using this International Standard should be familiar with normal laboratory practice. This standard 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 International Standard specifies the requirements for three types of general-purpose textile-reinforced thermoplastic water-discharge hose with an operating temperature range of  $-10\text{ }^{\circ}\text{C}$  to  $+60\text{ }^{\circ}\text{C}$  and a maximum working pressure of 25 bar <sup>1)</sup>.

NOTE At temperatures above  $23\text{ }^{\circ}\text{C}$  and particularly above  $40\text{ }^{\circ}\text{C}$ , the maximum working pressure will be reduced.

These hoses are not intended to be used for conveyance of potable (drinking) water, for washing-machine inlets, as firefighting hoses, for special agricultural machines or as gardening hoses for the consumer market.

These hoses may be used with additives which lower the freezing point of water to  $-10\text{ }^{\circ}\text{C}$ .

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## 2 Normative references

The following referenced documents are indispensable for the application 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 3, *Preferred numbers — Series of preferred numbers*

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 188:1998, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 1307, *Rubber and plastics hoses for general-purpose industrial applications — Bore diameters and tolerances, and tolerances on length*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1746:1998, *Rubber or plastics hoses and tubing — Bending tests*

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

ISO 4672:1997, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests*

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1) 1 bar = 0,1 MPa

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

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

ISO 11758, *Rubber and plastics hoses — Exposure to a xenon arc lamp — Determination of changes in colour and appearance*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 8330 apply.

### 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 6 bar.
- Type 2:** Medium pressure — Designed for a maximum working pressure of 10 bar.
- Type 3:** High pressure — Designed for a maximum working pressure of 25 bar.

### 5 Materials and construction

The hose shall consist of:

- a flexible thermoplastic lining; [ISO 6224:2005](https://standards.iteh.ai/catalog/standards/sist/3d5929c9-c172-49f1-ab8e-544c08650716-iso-6224-2005)
- a reinforcement of natural or synthetic textile, applied by any suitable technique; <https://standards.iteh.ai/catalog/standards/sist/3d5929c9-c172-49f1-ab8e-544c08650716-iso-6224-2005>
- a flexible thermoplastic cover.

The lining and the cover shall be of uniform thickness, concentric, fully gelled and free from visible cracks, porosity, foreign inclusions and other defects. The cover may have a smooth or fluted finish.

### 6 Dimensions

#### 6.1 Internal diameters, tolerances and minimum wall thickness

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

For smaller or larger dimensions, further numbers shall be chosen from the R10 series of preferred numbers (see ISO 3) with tolerances as specified in ISO 1307.

Table 1 — Internal diameters, tolerances and minimum wall thicknesses

Internal diameter mm	Tolerance on internal diameter mm	Minimum wall thickness mm		
		Type 1	Type 2	Type 3
10	± 0,75	2,00	2,00	2,80
12,5	± 0,75	2,00	2,50	3,00
16	± 0,75	2,00	2,80	3,00
19	± 0,75	2,20	3,00	3,50
25	± 1,25	2,70	3,50	4,00
32	± 1,25	3,40	4,00	—
38	± 1,50	4,00	4,50	—
50	± 1,50	5,00	5,50	—

## 6.2 Concentricity

When determined in accordance with ISO 4671, the concentricity, based on a total indicator reading between the internal 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 lining plus cover shall be 1,0 mm and of the cover 0,8 mm. If the cover is fluted, the depth of the flutes shall not be greater than 50 % of the cover thickness.

## 7 Physical properties

### 7.1 Thermoplastic materials

When measured by the methods listed in Table 2, the physical properties of the materials 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 gelled sheets, 2 mm in thickness.

**Table 2 — Physical properties of thermoplastic materials**

Property	Requirements		Test method
	Lining	Cover	
Minimum tensile strength	10,0 MPa	10,0 MPa	ISO 37 (dumb-bell test piece)
Minimum elongation at break	250 %	250 %	ISO 37 (dumb-bell test piece)
Resistance to ageing:			} ISO 188:1998 (3 days at 70 °C ± 1 °C), air-oven method; ISO 37 (dumb-bell test piece)
Change in tensile strength from original value (max.)	± 15 %	± 15 %	
Change in elongation at break from original value (max.)	± 25 %	± 25 %	
Loss in mass on heating (max.)	4 %	4 %	ISO 176:2005, method B

**7.2 Finished hoses**

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

**Table 3 — Physical properties of finished hoses**

Property	Requirements	Test method
Proof pressure at 23 °C	9 bar (type 1) 15 bar (type 2) 50 bar (type 3)	ISO 1402
Change in length at proof pressure (at 23 °C)	± 8 %	ISO 1402
Minimum burst pressure at 23 °C	18 bar (type 1) 30 bar (type 2) 100 bar (type 3)	ISO 1402
Proof pressure at 60 °C	5,5 bar (type 1) 9,75 bar (type 2) 25 bar (type 3)	ISO 1402
Minimum burst pressure at 60 °C	11 bar (type 1) 19,5 bar (type 2) 50 bar (type 3)	ISO 1402
Adhesion between components	1,5 kN/m (min.)	ISO 8033
UV resistance (xenon arc lamp)	The cover shall show no evidence of cracking or change of colour. After testing, when comparing the test pieces with the grey scale, the minimum acceptable contrast shall be grade 4.	ISO 11758
Flexibility at 23 °C	<i>T/D</i> not less than 0,8	ISO 1746:1998, method A
Low-temperature flexibility	No cracks shall be detected and the hose shall pass the proof test specified above at 23 °C.	ISO 4672:1997, method B, at -10 °C ± 2 °C



## 8 Marking

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

- a) the manufacturer's name or identification;
- b) the number and year of publication of this International Standard;
- c) the hose type number;
- d) the internal diameter, in millimetres;
- e) the maximum working pressure, in bars, at 23 °C;
- f) the quarter and year of manufacture.

EXAMPLE      MAN/ISO 6224:2005/Type 1/25/6 bar/1Q05

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