
**Thermoplastics hoses and hose
assemblies — Wire or synthetic yarn
reinforced single-pressure types for
hydraulic applications — Specification**

*Tuyaux et flexibles en matière thermoplastique — Types hydrauliques à
pression unique, avec armature de fils métalliques ou synthétiques —
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 23297 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

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Introduction

Based on the information received from plastics experts from the Netherlands and the UK, it was decided to exclude, for the time being, the abrasion resistance tests for compounds and hose cover from this International Standard.

However, the manufacturers of this product recognize the need for determining the abrasion resistance of the hose cover, as the users require it. ISO 6945 is being revised to include a special test for this property and an amendment to 7.2, setting standards of acceptability for performance of hoses, is planned.

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Thermoplastics hoses and hose assemblies — Wire or synthetic yarn reinforced single-pressure types for hydraulic applications — Specification

1 Scope

This International Standard specifies requirements for eight classes and two types (construction with adhesive bond between layers and construction without adhesive bond between layers) of wire or synthetic yarn reinforced hydraulic hoses and hose assemblies of nominal size from 3,2 to 31,5. Each class has a single maximum working pressure for all sizes. Such hoses are suitable for use with hydraulic fluids HH, HL, HM, HR, and HV as defined in ISO 6743-4 at temperatures ranging from –40 °C to +100 °C for grades A and B and –40 °C to +120 °C for grades C and D.

This International Standard does not include requirements for end fittings. It is limited to the performance of hoses and hose assemblies. The hose assembly maximum working pressure is governed by the lowest maximum working pressure of the components.

NOTE It is the responsibility of the user, in consultation with the hose manufacturer, to establish compatibility of the hose with the fluid to be used.

2 Normative references

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

ISO 1746, *Rubber or plastics hoses and tubing — Bending test*

ISO 1817, *Rubber, vulcanized — 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 4672:1997, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests*

ISO 4892 (all parts), *Plastics — Methods of exposure to laboratory light sources*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*

ISO 7233, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

ISO 7326:2006, *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 8331, *Rubber and plastics hoses and hose assemblies — Guidelines for selection, storage, use and maintenance*

3 Terms and definitions

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

4 Classification

4.1 Classes

Eight classes of hose are specified, distinguished by their maximum working pressure, as shown in Table 1. Each class may be manufactured in up to 10 nominal sizes.

Table 1 — Classes, nominal size and maximum working pressure

Class	35	70	140	210	280	350	420	560
MWP ^a (bar)	35	70	140	210	280	350	420	560
MWP ^a (MPa)	3,5	7	14	21	28	35	42	56
Nominal size								
3,2	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X
6,3	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X
12,5	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X
19	X	X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X
31,5	X	X	X	X	X	X	X	X

^a Maximum working pressure.

4.2 Types

Two types are specified according to their construction: type 1 with adhesion between the layers; and type 2 without adhesion between the layers. In type 1 hoses, the lining and cover are adhesively bonded (i.e. only separable by force) to the reinforcement; in type 2 hoses, these layers are not attached to the reinforcement.

4.3 Grades

Hoses are classified according to their resistance to impulse into four grades: A, B, C and D, as shown in Table 2.

Table 2 — Grades

Grade	Resistance to impulse		
	Temperature °C	Impulse pressure (% of MWP ^a)	Minimum number of cycles
A	100	133 %	200 000
B	100	133 %	500 000
C	120	133 % (classes 35, 70, 140, 210)	500 000
		120 % (classes 280, 350, 420, 560)	
D	120	133 % (classes 35, 70, 140, 210)	1 000 000
		120 % (classes 280, 350, 420, 560)	

^a Maximum working pressure.

The maximum working pressure by class is shown in Table 3.

Table 3 — Maximum working pressure

Class	35	70	140	210	280	350	420	560
MWP ^a (bar)	35	70	140	210	280	350	420	560
MWP ^a (MPa)	3,5	7	14	21	28	35	42	56
Grade								
A	X	X	X	X	X	X	X	X
B	X	X	X	X	X	X	X	X
C	X	X	X	X	X	X	X	X
D	X	X	X	X	X	X	X	X
NOTE X = Applicable.								
^a Maximum working pressure.								

5 Materials and construction

5.1 Hoses

Hoses shall consist of a hydraulic-fluid-resistant thermoplastic lining, one or multiple layers of steel wire or synthetic yarn and an oil- and weather-resistant thermoplastic cover. Other protective materials over the thermoplastic cover are allowed for improved abrasion or other resistance.

5.2 Hose assemblies

Hose assemblies shall only be manufactured with those hose fittings which conform to the requirements of 7.2.1, 7.2.4 and 7.2.5 of this International Standard.

Follow the manufacturer's instructions for proper preparation and fabrication of hose assemblies.

6 Dimensions and tolerances

6.1 Diameters

When measured in accordance with ISO 4671, the diameters of the hoses shall conform to the values given in Table 4.

Table 4 — Diameters of hoses

Nominal size	Inside diameter (all classes) mm		Maximum outside diameter of hose mm									
	min.	max.	Class 35	Class 70	Class 140	Class 210	Class 280	Class 350	Class 420	Class 560		
3,2	3,1	4,0	8	8	9	9,5	9,5	9,5	10,5	10,5		
5	4,6	5,4	10	10	11	12	12	12	14	15		
6,3	6,1	7,0	12	12	14	14	14	14	16	16		
8	7,7	8,5	13	13	15,5	15,5 (16,6 ^a)	16	16	17	17		
10	9,3	10,3	16	16	17,5	18,5	19	19	20	21		
12,5	12,3	13,5	20	20	21	23	23	23	24	25		
16	15,5	16,8	23	23	25	27 (28 ^a)	28	28	28	29		
19	18,6	19,8	27	28	29	32	32	33	33	34		
25	25,0	26,4	34	36	36	39 (40,4 ^a)	39	40,5	40,5	43,5		
31,5	31,4	33,0	45	45	46	48	49	50	50	51,5		

^a These dimensions are allowable for textile yarn braided reinforcement only; for metal wire braided reinforcement of other classes and sizes, the standard dimensions apply.

6.2 Outer cover thickness

When measured in accordance with ISO 4671, the outer cover thickness of the hoses shall conform to the values given in Table 5.

Table 5 — Outer cover thickness

Nominal size	Outer cover thickness	
	mm	
	min.	max.
3,2	0,1	1,4
5	0,1	1,4
6,3	0,1	1,4
8	0,1	1,4
10	0,1	1,4
12,5	0,2	1,5
16	0,2	1,5
19	0,2	1,5
25	0,2	1,5
31,5	0,4	1,7

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6.3 Concentricity

When measured in accordance with ISO 4671, the concentricity of the hoses shall conform to the values given in Table 6.

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Table 6 — Concentricity of hoses

Nominal size	Maximum variation in wall thickness		
	Between internal diameter and outside diameter		Between internal diameter and outside diameter of the tubing
	mm		
	Wire	Textile	
3,2, 5 and 6,3	0,5	0,8	0,2
over 6,3 and up to and including 19	0,8	1,0	0,5
25	1,1	1,3	0,6
31,5	1,2	1,3	0,7