INTERNATIONAL STANDARD

ISO 28017

First edition
2009-07-15

Rubber hoses and hose assemblies, wire or textile reinforced, for dredging applications — Specification

Tuyaux et flexibles en caoutchouc, à armature textile ou métallique, pour des applications de dragage — Spécifications

Reference number
ISO 28017:2009(E)

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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.

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 28017 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

Rubber hoses and hose assemblies, wire or textile reinforced, for dredging applications — Specification

1 Scope

This International Standard specifies requirements for two types, seven classes and three grades of wire- or textile-reinforced dredging hoses with nominal sizes ranging from 100 to 1 200. Within each class, all grades and sizes have the same maximum working pressure. Such hoses are suitable for the delivery or suction of seawater, freshwater, silt, sand, coral and small stones with a specific gravity in the range from 1,0 to 2,3 at ambient temperatures ranging from −10 °C to +40 °C.

This International Standard covers two types of hose, as follows:

— type 1: floating type, for delivery only, which includes flotation material to give the hose buoyancy;

— type 2: submarine type for delivery and suction.

This International Standard does not specify requirements concerning the service life of hoses or hose assemblies. Specifying such requirements is the responsibility of the customer, in consultation with the hose manufacturer.

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

ISO 1431-1, *Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

ISO 1746, *Rubber or plastics hoses and tubing — Bending tests* [1)]

ISO 4649:2002, *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 7233:2006, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum*

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*

1) Under revision as ISO 10619-1.

3 Terms and definitions

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

4 Classification

4.1 Classes

Seven classes of hose are specified, distinguished by their maximum working pressure, of nominal sizes from 100 to 1 200, as shown in Table 1.

Table 1 — Classes and corresponding maximum working pressures and nominal sizes

Nominal size	Class						
	5	10	15	20	25	30	40
	Maximum working pressure, MWP MPa (bar)						
	0,5 (5)	1,0 (10)	1,5 (15)	2,0 (20)	2,5 (25)	3,0 (30)	4,0 (40)
100	X	X	X	X	X	X	X
150	X	X	X	X	X	X	X
200	X	X	X	X	X	X	X
250	X	X	X	X	X	X	N/A
300	X	X	X	X	X	X	N/A
350	X	X	X	X	X	X	N/A
400	X	X	X	X	X	X	N/A
450	X	X	X	X	X	X	N/A
500	X	X	X	X	X	X	N/A
550	X	X	X	X	X	X	N/A
600	X	X	X	X	X	X	N/A
650	X	X	X	X	X	X	N/A
700	X	X	X	X	X	X	N/A
750	X	X	X	X	X	X	N/A
800	X	X	X	X	X	X	N/A
850	X	X	X	X	X	X	N/A
900	X	X	X	X	X	X	N/A
1 000	X	X	X	X	X	X	N/A
1 100	X	X	X	X	X	X	N/A
1 200	X	X	X	X	X	N/A	N/A
NOTE X = Applicable, N/A = Not applicable.							

4.2 Grades

Type 2 hoses are classified into three grades, A, B and C, according to their construction, as shown in Table 2.

Type 1 hoses are not divided into grades.

Table 2 — Grades

Type	Grade	Construction and purpose	
		Number of reinforcing wires	Purpose
1	—	0	Delivery only
2	A	2	Delivery or suction
	B	1	Delivery or suction
	C	0	Delivery only

The types and grades available in each class (i.e. for each maximum working pressure) are as shown in Table 3.

Table 3 — Types and grades available in each class

Type	Grade	Class						
		5	10	15	20	25	30	40
		Maximum working pressure, MWP MPa (bar)						
		0,5 (5)	1,0 (10)	1,5 (15)	2,0 (20)	2,5 (25)	3,0 (30)	4,0 (40)
1	—	X	X	X	X	X	X	X
2	A	X	X	X	N/A	N/A	N/A	N/A
	B	X	X	X	N/A	N/A	N/A	N/A
	C	X	X	X	X	X	X	X
NOTE X = Applicable, N/A = Not applicable.								

5 Materials and construction

5.1 Hoses

Type 1 hose assemblies shall consist of an abrasion-resistant rubber lining, one or more layers of steel or textile reinforcement, a textile-reinforced rubber undercover, a flexible closed-cell flotation material integrally fitted round the hose body as described in 5.2, an abrasion- and weather-resistant rubber or thermoplastic outer cover, which may be textile-reinforced, and end fittings as described in 5.3 on both ends.

Type 2 hose assemblies shall consist of an abrasion-resistant rubber lining, one or more layers of steel or textile reinforcement, a textile-reinforced rubber, full rubber or thermoplastic cover at least 6 mm thick for hoses of nominal size less than 500, at least 10 mm thick for hoses of nominal size in the range from 500 to 850 inclusive and at least 12 mm thick for hoses of nominal size in the range from 900 to 1 200 inclusive, and end fittings as described in 5.3 on both ends.

5.2 Flotation material

The flotation material shall adhere firmly both to the hose body and to the outer cover so that it cannot move or tend to become detached in service. At the ends of the hose, a space shall be provided to facilitate the insertion of connection bolts and to allow the use of mechanical tools for tightening nuts on the bolts.

5.3 End fittings and end connections

End fittings shall be mechanically and chemically bonded to the hose body. With hoses intended for delivery use only, clamped-on and swaged-on nipples are not acceptable, but such nipples may be utilized with hoses intended for suction use. Alternatively, flanged end connections built up of hose reinforcement, lining and cover material are acceptable provided they are additionally reinforced by steel stiffening rings to avoid distortion when the connection bolts are tightened. All hose assemblies shall be fitted with either end fittings or flanged end connections unless otherwise required by the end user.

6 Dimension and tolerances

6.1 Diameters

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

When measured in accordance with ISO 4671, the outside diameters of hoses shall conform to the values specified by the customer.

Table 4 — Diameters of hoses

Nominal size	Actual inside diameter mm	
	min.	max.
100	90	110
150	140	160
200	190	210
250	240	260
300	290	310
350	340	360
400	390	410
450	440	460
500	490	510
550	540	560
600	590	610
650	640	660
700	690	710
750	740	760
800	790	810
850	840	860
900	890	910
1 000	990	1 010
1 100	1 090	1 110
1 200	1 190	1 210

6.2 Hose unit length

The hose unit length shall be determined according to the conditions of use. Unless otherwise agreed between the customer and the manufacturer, the tolerances on the unit length shall be +2 % and −2 %.

7 Physical properties

7.1 Rubber compounds

7.1.1 Abrasion resistance of lining

7.1.1.1 Test pieces

Test pieces shall be prepared from sheets of lining compound (of cure state equivalent to that of the hose) of thickness at least 6 mm. The method of preparation shall be as specifed in ISO 4649.

7.1.1.2 Abrasion resistance

When the test is carried out in accordance with ISO 4649:2002, method A, the relative volume loss ΔV_{rel} shall not be greater than 200 mm^3.

7.1.2 Ozone resistance of cover

7.1.2.1 Test pieces

Test pieces shall be prepared from sheets of cover compound (of cure state equivalent to that of the hose) of thickness at least 2 mm. The method of preparation shall be as specified in ISO 1431-1.

For type 1 hoses, it is the compound from which the outer cover (that surrounding the flotation material) is made which is tested.

7.1.2.2 Ozone resistance

When the test is carried out in accordance with ISO 1431-1, no cracking or other deterioration of the test pieces shall be visible under × 2 magnification after 72 h at 40 °C and 20 % strain in 50 pphm ozone.

7.2 Performance requirements

7.2.1 Hydrostatic requirements

When determined in accordance with ISO 1402, the proof pressure and the minimum burst pressure of hoses and hose assemblies shall conform to the values given in Table 5.

Burst testing shall be carried out on a mid-range nominal size of each design in the manufacturer's range. The minimum burst pressure of other sizes of the same design, construction (with a reinforcement type identical to that of the hose tested but not necessarily the same number of plies), materials and method of manufacture shall then be determined by calculation. Note, however, that this is an acceptable method only if the calculated burst pressure of the mid-range size hose is not more than 5 % lower than the measured burst pressure. If the calculated burst pressure is more than 5 % lower, the minimum burst pressure of all the sizes in the range shall be determined by testing.

For type 1 hoses, the burst test shall be carried out on a hose assembly without its flotation material.