INTERNATIONAL STANDARD

ISO 1823-1

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Rubber hoses and hose assemblies —

Part 1:
On-shore oil suction and discharge — Specification

Tuyaux et flexibles en caoutchouc —

Partie 1: Aspiration et refoulement à quai d'hydrocarbures — Spécification

Reference number
ISO 1823-1:1997(E)

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.

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.

International Standard ISO 1823-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

Together with part 2, this part of ISO 1823 cancels and replaces ISO 1823:1975 which has been technically revised.

ISO 1823 consists of the following parts, under the general title *Rubber hoses and hose assemblies*:

— *Part 1: On-shore oil suction and discharge — Specification*

— *Part 2: Ship/dockside discharge — Specification*

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Rubber hoses and hose assemblies —

Part 1:
On-shore oil suction and discharge — Specification

1 Scope

This part of ISO 1823 specifies requirements for cargo hose suitable for dockside loading and unloading of vessels transporting petroleum-based products that are liquid at ambient temperatures and atmospheric pressure. The hoses are suitable for use in the temperature range - 20 °C to + 80 °C.

Hose assemblies made with an inner lining of flexible metal and hoses designed for off-shore applications are not included.

2 Normative references

The following standards contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 471 : 1995, *Rubber - Temperatures, humidities and times for conditioning and testing.*

ISO 1307 : 1992, *Rubber and plastics hoses for general-purpose industrial applications - Bore diameters and tolerances, and tolerances on length.*

ISO 1402 : 1994, *Rubber and plastics hoses and hose assemblies -Hydrostatic testing.*

ISO 1817 : 1985, *Rubber, vulcanized - Determination of the effect of liquids.*

ISO 4649 : 1985, *Rubber - Determination of abrasion resistance using a rotating cylindrical drum device.*

ISO 4661-1 : 1993, *Rubber, vulcanized or thermoplastic - Preparation of samples and test pieces - Part 1: Physical tests.*

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

ISO 7233 : 1991, *Rubber and plastics hoses and hose assemblies – Determination of suction resistance.*

ISO 7326 : 1991, *Rubber and plastics hoses – Assessment of ozone resistance under static conditions.*

ISO 8031 : 1993, *Rubber and plastics hoses and hose assemblies – Determination of electrical resistance.*

ISO 8033 : 1991, *Rubber and plastics hose – Determination of adhesion between components.*

3 Types, classes and grades

Two types of hose are specified, each type being divided into two classes depending on the type of service. Each class is further divided into four grades depending on the working pressure:

- **Types**

  Type S – Smooth bore

  Type R – Rough bore

- **Classes**

  Class 1 – For oil and gasoline service (up to and including 50 % aromatics content)

  Class 2 – For aromatics service (suitable for 100 % aromatics content)

- **Grades**

The grades are given in table 1.

Table 1 - Grades corresponding to different maximum working pressures

Grade	Maximum working pressure
	MPa
A	0,7
B	1,0
C	1,5
D	2,0

4 Dimensions

4.1 Bore

The bore shall be one of the following:

50 mm; 75 mm; 80 mm; 100 mm; 125 mm; 150 mm; 160 mm;

200 mm; 205 mm; 250 mm; 255 mm; 315 mm; 400 mm; 500 mm.

The tolerances on bore diameters shall be in accordance with ISO 1307.

For the purposes of this International Standard, the bore is numerically the same as the nominal bore (undimensioned) referred to in table 3, table 4, clause 6 and clause 7.

4.2 Length

The length of hose shall be specified by the purchaser and shall be subject to the tolerances given in table 2.

Table 2 - Tolerances on length

Hose length	Tolerance
m	
Up to 5	+- 50 mm
Over 5,0	+- 1 %

Hose assembly lengths are overall measurements, including the fittings. Measurements shall be made at a hydrostatic pressure of 0,07 Mpa.

5 Physical properties

5.1 Non-destructive tests

5.1.1 Hydrostatic requirements

Carry out the hydrostatic tests essentially in accordance with ISO 1402, as follows.

Lay out the hose as straight as possible.

Fill with water or another suitable liquid (see note 1), venting to remove all air, and apply a pressure of 0,07 MPa.

NOTE 1 The test medium may be water, kerosene or any other generally approved low-viscosity fluid.

Measure the overall length of the hose (L_0).

Raise the pressure from 0,07 MPa above atmospheric to the maximum working pressure specified in clause 3. Hold this pressure for 10 min. Check that there is no evidence of weeping or leakage and no failure.

Before releasing the test pressure, measure the overall length of the hose (L_1).

Reduce the pressure to zero.

After an interval of at least 15 min, raise the pressure again to 0,07 MPa above atmospheric and measure the overall length of the hose (L_2).

The temporary elongation determined by the formula

$$\frac{L_1 - L_0}{L_0} \times 100$$

shall not exceed 7,5 %.

The permanent elongation determined by the formula

$$\frac{L_2 - L_0}{L_0} \times 100$$

shall not exceed 2,5 %.

5.1.2 Suction resistance

When tested in accordance with ISO 7233, at an internal pressure of 0,07 MPa below atmospheric, held for 5 min. only, there shall be no blisters within the bore of the hose.

5.1.3 Flexibility

This test shall not be considered to be a routine test.

Bend the hose, both unpressurized and at maximum working pressure, to the radii specified in tables 3 and 4, measured to the innermost surface of the curved portion of the hose. On inspection, there shall be no damage or kinking of the hose.

Table 3 - Bend radii for type S (smooth bore) hoses

Nominal bore	Inside radius of bend mm				
	Woven textile reinforcement				Wire cord or textile cord reinforcement
	Grade				All grades
	A	B	C	D	
50	500	600	700	750	350
75	700	800	850	900	450
80	750	850	900	950	500
100	950	1 100	1 200	1 300	600
125	1 150	1 300	1 500	1 750	750
150	1 400	1 600	1 900	2 300	850
160	1 500	1 700	2 100	2 600	900
200	1 850	2 150	2 800	3 500	1 100
205	1 900	2 200	2 850	3 600	1 150
250	-	2 700	3 500	4 350	1 350
255	-	2 750	3 550	4 400	1 400
315	-	3 450	4 500	5 100	1 650
400	-	-	5 000	5 900	2 100
500	-	-	5 900	6 900	2 700

Table 4 - Bend radii for type R (rough bore) hoses

Nominal bore	Inside radius of bend mm				
	Woven textile reinforcement				Wire cord or textile cord reinforcement
	Grade				All grades
	A	B	C	D	
50	600	700	800	-	500
75	800	1 000	1 100	-	600
80	900	1 050	1 150	-	650
100	1 100	1 250	1 450	-	750
125	1 350	1 550	1 800	2 100	900
150	1 600	1 850	2 150	2 550	1 000
160	1 700	1 950	2 300	2 750	1 050
200	2 150	2 500	2 850	3 250	1 250
205	2 200	2 600	2 900	3 350	1 300
250	2 600	3 100	3 550	4 100	1 500
255	2 650	3 150	3 600	4 150	1 550
315	3 250	3 850	4 500	5 000	1 800

5.1.4 Electrical conductivity

Unless otherwise specified, an electrical continuity shall be provided between the fittings. This electrical continuity shall remain intact between the fittings of each length of hose during and after subjection to the hydrostatic test (see 5.1.1). The continuity shall be ascertained by using an ohmmeter as described in ISO 8031. The maximum allowable resistance shall be 2×10^6 Ω/m.

5.2 Destructive tests

5.2.1 Testing

A sample hose typical of the finished product shall be used for the destructive tests, unless the test method specifies moulded test pieces. Destructive tests shall be carried out whenever there is a significant change in method of manufacture, materials or construction.

NOTE 2 If a solid body wire is included in the production design, this component may be omitted from the destructive-test sample.

5.2.2 Burst pressure requirement

Carry out the burst pressure test essentially in accordance with ISO 1402, as follows.

Submit the hose to the maximum working pressure as described in 5.1.1, then reduce to zero. Reapply pressure this time to four times the maximum working pressure, over a period of 15 min, and then maintain this pressure for a further 15 min. Check that there is no evidence of failure. Raise the pressure until the hose bursts, and record this as the burst pressure in MPa.

5.2.3 Cover requirements

The covers of both classes of hose shall meet the requirements specified in table 5.

Table 5 - Requirements for covers of all classes of hose

Property	Requirement	Test method
Volume swell after immersion for 70 h at standard temperature in liquid B	80 % max.	ISO 1817
Volume swell after immersion for 70 h at 100 °C in oil No. 3	100 % max.	ISO 1817
Ozone resistance after exposure for 72 h at 40 °C to an ozone concentration of 50 pphm	No cracks	ISO 7326
Abrasion resistance	200 mm^3 max. loss*	ISO 4649 Method A

* An absolute volume loss is specified rather than the relative volume loss required by ISO 4649

5.2.4 Lining requirements

5.2.4.1 Procedure

A test sheet of lining compound used in the manufacture of the production hose shall be prepared in accordance with ISO 4661-1, with the cure time and temperature equivalent to the production hose cure conditions.

5.2.4.2 Class 1 hoses

The linings of class 1 hoses shall meet the requirements specified in table 6.

Table 6 - Requirements for linings of class 1 hoses

Property	Requirement	Test method
Volume swell after immersion for 70 h at standard temperature in liquid C	50 % max.	ISO 1817

5.2.4.3 Class 2 hoses

The linings of class 2 hoses shall meet the requirements specified in table 7.

Table 7 - Requirements for linings of class 2 hoses

Property	Requirement	Test method
Volume swell after immersion for 70 h at standard temperature in liquid E	50 % max	ISO 1817

5.2.5 Adhesion

5.2.5.1 Procedure

A 300 mm +- 5 mm length of sample hose manufactured with materials used in the manufacture of the production length shall be stoppered and filled with test liquid. After 48 h at standard temperature (see ISO 471), the sample shall be emptied and adhesion tests carried out in accordance with ISO 8033.

5.2.5.2 Requirements

Adhesion between hose components shall meet the requirements specified in table 8.

Table 8 - Requirements of adhesion between components

Property	Requirement
Adhesion (both classes) between lining, plies and cover	4 kN/m min.
Adhesion (class 1 hoses) between lining, plies and cover after filling with liquid C (see ISO 1817)	2 kN/m min.
Adhesion (class 2 hoses) between lining, plies and cover after filling with liquid E (see ISO 1817)	1,1 kN/m min.

5.2.6 Low-temperature flexibility

Hoses of all types and classes shall meet the low-temperature flexibility requirements specified in table 9.

Table 9 - Requirement for low-temperature flexibility

Property	Requirement	Test method
Flex specimens from lining and cover after conditioning for 5 h at - 25 °C +- 3 °C	No cracks	ISO 4672 Method B

6 Ordering

The user shall specify the following information on the purchase order:

a) nominal bore;

b) length (overall, unless otherwise specified);

c) type, class and grade;

d) style of fitting;

e) tests required.

7 Marking

Each hose assembly shall be identified with permanent markings as follows:

a) manufacturer's name or other identification;

b) the number of this part of ISO 1823;

c) type, class and grade;

d) nominal bore;

e) year and month of manufacture;

f) maximum working pressure in megapascals.

Example

MN/ISO 1823-1/R2C/80/95-03/1,5