INTERNATIONAL STANDARD

ISO 8029

Second edition
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Plastics hose — General-purpose collapsible water hose, textile-reinforced — Specification

Tuyaux plastiques — Tuyaux d'eau écrasables d'usage général renforcés textiles — Spécifications

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Foreword

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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 8029 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

This second edition cancels and replaces the first edition (ISO 8029:1985), which has been technically revised.

Introduction

This International Standard has been prepared to provide minimum requirements for the satisfactory performance of textile-reinforced thermoplastic collapsible water hose, for discharge applications, conveying water, aqueous sludge or slurries.

In view of such applications, requirements, and the corresponding tests, have been specified for exposure to laboratory light sources (see 8.2.5) and for abrasion resistance (see 8.2.6).

Plastics hose — General-purpose collapsible water hose, textile-reinforced — Specification

1 Scope

This International Standard specifies the requirements for four types of textile-reinforced thermoplastics collapsible water hoses for general applications for use in the temperature range of −10 °C to +55 °C.

Such hoses are classified into four types, as follows:

— low pressure, designed for a maximum working pressure of up to 4,0 bar at 23 °C and up to 2,0 bar at 55 °C;

— medium pressure, for a maximum working pressure of up to 7,0 bar at 23 °C and up to 3,6 bar at 55 °C;

— high pressure, for a maximum working pressure of up to 10,0 bar at 23 °C and up to 5,1 bar at 55 °C;

— extra-high pressure, for a maximum working pressure of up to 15,5 bar at 23 °C and up to 7,9 bar at 55 °C.

This standard does not apply to products used for fire-fighting or the conveyance of drinking water.

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

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

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ISO 4892-4, *Plastics — Methods of exposure to laboratory light sources — Part 4: Open-flame carbon-arc lamps*

1) To be published. (Revision of ISO 1746:1998)

ISO 8033, *Rubber and plastics hose — 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*

ISO 9352, *Plastics — Determination of resistance to wear by abrasive wheels*

ISO/TR 17784:2003, *Rubber and plastics hoses and hose assemblies — Guide for use by purchasers, assemblers, installers and operating personnel*

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

3 Terms and definitions

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

4 Classification

Hoses are designated as one of the following four types depending on their pressure rating at the specified temperatures:

— Type A: Low working pressure hose, designed for a maximum working pressure of up to 4,0 bar at 23 °C and up to 2,0 bar at 55 °C;

— Type B: Medium working pressure hose, designed for a maximum working pressure of up to 7,0 bar at 23 °C and up to 3,6 bar at 55 °C;

— Type C: High working pressure hose, designed for a maximum working pressure of up to 10,0 bar at 23 °C and up to 5,1 bar at 55 °C;

— Type D: Extra high working pressure hose, designed for a maximum working pressure of up to 15,5 bar at 23 °C and up to 7,9 bar at 55 °C.

5 Couplings and end fittings

Hoses may be fitted with the appropriate coupling type and the end fitting to form hose assemblies.

NOTE Guidance on coupling type is given in Annex D and ISO/TR 17784:2003, Clause 7: Couplings.

6 Materials and construction

The hose shall consist of

a) a flexible thermoplastic lining;

b) a reinforcement made of natural or synthetic textile material, applied by any suitable technique;

c) a flexible thermoplastic cover.

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

7 Dimensions and tolerances

7.1 Inside diameter and tolerance

The inside diameter of the hose and the tolerance on the inside diameter shall meet the requirements of Table 1.

Table 1 — Nominal bore, inside diameter and tolerance on inside diameter

Nominal bore	Inside diameter mm	Tolerance on I.D. mm
19	19	±1,5
25	25	±1,5
31,5	31,5	±1,5
40	40	±1,75
50	50	±1,75
63	63	±1,75
65	65	±2,0
75	75	±2,0
80	80	±2,25
100	100	±2,25
125	125	±2,25
150	150	±2,25
160	160	±2,25
200	200	±3,0
250	250	±3,0
300	300	±3,0
350	350	±4,0
400	400	±4,0

NOTE If special cases call for extra sizes:

— for smaller or larger dimensions, further numbers shall be chosen from the R10 series of preferred numbers (see ISO 3), with tolerances as given in ISO 1307;

— for intermediate dimensions, numbers shall be chosen from the R20 series of preferred numbers (see ISO 3), with the tolerances as given for the next-larger size in the table above.

7.2 Tolerance on length

If the cut length of the hose is less than or equal to 1 800 mm, the tolerance on length shall be as specified in ISO 1307.

If the cut length of the hose is over 1 800 mm, the tolerance shall be ±2 % of the length specified.

8 Physical properties

8.1 Plastic compounds

The physical properties of compounds used for the lining and the cover shall conform to the values in Table 2, when determined by the methods listed in the table.

Tests shall be carried out either on test pieces taken from the hose or on test pieces taken from sheet made, using a laboratory press, under the same conditions as used in the manufacture of the hose.

Table 2 — Physical properties of compounds

Property	Requirements		Test method
	Lining	Cover	
Tensile strength (min.), MPa	10,0	10,0	ISO 37 (dumb-bell test piece)
Elongation at break (min.), %	160	160	ISO 37 (dumb-bell test piece)
Ageing Max. change in tensile strength from original value, %	±20	±20	ISO 188 (48 h at +70 °C, air-oven method) ISO 37 (dumb-bell test piece)

8.2 Performance requirements for finished hose

8.2.1 Hydrostatic requirements at standard laboratory temperature

When tested at standard laboratory temperature as specified in ISO 23529, by the method described in ISO 1402, hoses shall withstand the appropriate proof and minimum burst pressures specified in Table 3.

At the maximum working pressure appropriate to the type and size of hose as specified, the change in length of the hose shall not exceed ±7 % and the change in diameter of the hose shall be no greater than ±20 % when measured by the method described in ISO 1402.

During and after the proof pressure hold test described in ISO 1402, the hose shall be examined for evidence of leakage, cracking, abrupt distortion or other signs of failure indicating irregularities in material or manufacture. No such defects shall be observed.

Table 3 — Hydrostatic-pressure requirements at 23 °C

I.D. mm	Pressure bar [a]											
	Type A			Type B			Type C			Type D		
	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure
19	—	—	—	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
25	—	—	—	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
31,5	—	—	—	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
40	4,0	6,0	12,0	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
50	4,0	6,0	12,0	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
63	4,0	6,0	12,0	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
65	4,0	6,0	12,0	7,0	10,5	21,0	10,0	15,0	30,0	15,5	23,2	46,5
75	3,0	4,5	9,0	7,0	10,5	21,0	9,0	13,5	27,0	11,5	17,2	34,5
80	3,0	4,5	9,0	7,0	10,5	21,0	9,0	13,5	27,0	11,5	17,2	34,5
100	3,0	4,5	9,0	7,0	10,5	21,0	9,0	13,5	27,0	—	—	—
125	2,5	3,7	7,5	5,0	7,5	15,0	7,0	10,5	21,0	—	—	—
150	2,5	3,7	7,5	5,0	7,5	15,0	7,0	10,5	21,0	—	—	—
160	2,5	3,7	7,5	5,0	7,5	15,0	7,0	10,5	21,0	—	—	—
200	2,5	3,7	7,5	4,0	6,0	12,0	5,0	7,5	15,0	—	—	—
250	2,0	3,0	6,0	4,0	6,0	12,0	5,0	7,5	15,0	—	—	—
300	2,0	3,0	6,0	—	—	—	—	—	—	—	—	—
350	2,0	3,0	6,0	—	—	—	—	—	—	—	—	—
400	2,0	3,0	6,0	—	—	—	—	—	—	—	—	—

[a] 1 bar = 0,1 MPa.

8.2.2 Hydrostatic-pressure requirements at 55 °C

When tested by the method specified in ISO 1402 at (55 ± 2) °C, hoses shall withstand the appropriate proof and minimum burst pressures specified in Table 4.

8.2.3 Adhesion test

When determined in accordance with ISO 8033 (using type 1 test pieces for inside diameters of less than 32 mm and type 2 test pieces for inside diameters of 32 mm and greater) at standard laboratory temperature as specified in ISO 23529, the adhesion between the lining and the reinforcement, between the layers of reinforcement and between the reinforcement and the cover shall not be less than 1,5 kN/m.

Table 4 — Hydrostatic-pressure requirements at 55 °C

I.D. mm	Pressure bar [a]											
	Type A			Type B			Type C			Type D		
	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure	Max. working pressure	Proof pressure	Min. burst pressure
19	—	—	—	3,6	5,4	10,8	5,1	7,6	15,3	7,9	11,8	23,7
25	—	—	—	3,6	5,4	10,8	5,1	7,6	15,3	7,9	11,8	23,7
31,5	—	—	—	3,6	5,4	10,8	5,1	7,6	15,3	7,9	11,8	23,7
40	2,0	3,0	6,0	3,6	5,4	10,8	5,1	7,6	15,3	7,9	11,8	23,7
50	2,0	3,0	6,0	3,6	5,4	10,8	5,1	7,6	15,3	7,9	11,8	23,7
63	2,0	3,0	6,0	3,5	5,2	10,5	5,1	7,6	15,3	7,7	11,6	23,1
65	2,0	3,0	6,0	3,5	5,2	10,5	5,0	7,5	15,0	7,7	11,6	23,1
75	1,5	2,2	4,5	3,5	5,2	10,5	4,5	6,8	13,5	5,7	8,6	17,1
80	1,5	2,2	4,5	3,5	5,2	10,5	4,5	6,8	13,5	5,7	8,6	17,1
100	1,5	2,2	4,5	3,5	5,2	10,5	4,5	6,8	13,5	—	—	—
125	1,3	2,0	3,9	2,4	3,6	7,2	3,5	5,2	10,5	—	—	—
150	1,3	2,0	3,9	2,4	3,6	7,2	3,5	5,2	10,5	—	—	—
160	1,3	2,0	3,9	2,4	3,6	7,2	3,5	5,2	10,5	—	—	—
200	1,3	2,0	3,9	1,9	2,8	5,7	2,4	3,6	7,2	—	—	—
250	1,0	1,5	3,0	1,9	2,8	5,7	2,4	3,6	7,2	—	—	—
300	1,0	1,5	3,0	—	—	—	—	—	—	—	—	—
350	1,0	1,5	3,0	—	—	—	—	—	—	—	—	—
400	1,0	1,5	3,0	—	—	—	—	—	—	—	—	—

[a] 1 bar = 0,1 MPa.

8.2.4 Bending test

When tested, after conditioning for 24 h at standard laboratory temperature as specified in ISO 23529, in accordance with ISO 1746:—, method C, using an internal hydraulic pressure equal to the maximum working pressure and a minimum radius of curvature of 8 times the inside diameter of the hose, the hose shall show no signs of leakage or cracks.

When tested, after conditioning for 5 h at (-10 ± 2) °C, in accordance with ISO 1746:— using an internal hydraulic pressure equal to the maximum working pressure and a minimum radius of curvature of 16 times the inside diameter of the hose, the hose shall show no signs of leakage or cracks.

8.2.5 Exposure to laboratory light sources

When tested in accordance with the relevant part of ISO 4892 for 600 h, using a cycle including water spray, the cover shall show no signs of cracks or other defects causing the hose to be unserviceable.

Any of the laboratory light sources specified in ISO 4892-2, ISO 4892-3 and ISO 4892-4 can be used. The exposure conditions shall be selected by agreement between the interested parties and be within the capabilities of the type of apparatus used.

8.2.6 Abrasion test

When tested in accordance with ISO 9352, using H22 abrasive wheels to which a load of 9,8 N is applied, the loss in mass of the cover shall not be greater than 2,5 g and there shall be no signs of exposure of the reinforcement after 4 000 revolutions have been completed.

Basic details of the test procedure are given in Annex A.

9 Frequency of testing

Type approval and routine testing shall be as specified in Annex B.

Type approval tests are those tests required to confirm that a particular hose design, manufactured by a particular method, meets all the requirements of this International Standard. The tests shall be repeated at a maximum of five-year intervals, or whenever a change in the method of manufacture or materials used occurs. They shall be performed on the largest-diameter hose of each design and each type in the manufacturer's range.

Routine tests are those tests required to be carried out on each length of finished hose prior to dispatch.

Production acceptance tests are those tests, specified in Annex C, which should preferably be carried out to control the quality of manufacture. The tests specified in Annex C are given as a guide only.

10 Test report

A test report, if requested by the customer, shall be supplied.

11 Marking

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

a) the manufacturer's name or trademark, e.g. MAN;

b) the number and year of publication of this International Standard, i.e. ISO 8029:2007;

c) the type of hose, e.g. Type A;

d) the inside diameter, e.g. 40;

e) the maximum working pressure at 23 °C, e.g. 4,0 bar;

f) the quarter and last two digits of the year of manufacture, e.g. 2Q07.

EXAMPLE MAN/ISO 8029:2007/Type A/40/4,0 bar/2Q07.

12 Recommendations for packaging and storage

These are given in ISO 8331.

Annex A
(normative)

Abrasion test

A.1 General

This annex specifies a general method for determining the resistance to abrasive wear of plastics test pieces under the action of abrasive wheels. It is equally applicable to moulded test pieces, components and finished products.

A.2 Procedure

A test piece is placed on a motor-driven rotating disc. A pair of abrasive wheels which can turn freely on their axis are placed on the test piece at a specified position under a specified load (in this case 9,8 N). Figure 1 illustrates the relative positions of these different components.

A minimum of three test pieces shall be tested.

For hoses with a bore equal to or greater than 31,5 mm, the test pieces shall be discs of nominal diameter 100 mm cut from the hose wall.

For hoses with a bore equal to or less than 25 mm, the test pieces shall be octagons prepared from moulded sheet by cutting 100 mm squares from the sheet and cutting off the corners of the squares. The thickness of the sheets shall be uniform and between 0,5 mm and 10 mm.

The test piece surface shall be cleaned with the aid of a suitable neutral volatile solvent or mild soap solution that will not damage the surface.

The test shall be performed in an enclosure at (23 ± 2) °C and (50 ± 5) % relative humidity or in an environmentally controlled room under the same conditions.

Fit a weighed test piece to the test piece carrier disc. Fit the apparatus with H22 abrasive wheels. Adjust the loading of each abrasive wheel to 9,8 N, using the counterweights and additional weights provided.

Adjust the position of the dust-removal suction device.

Set the number of revolutions to 4 000.

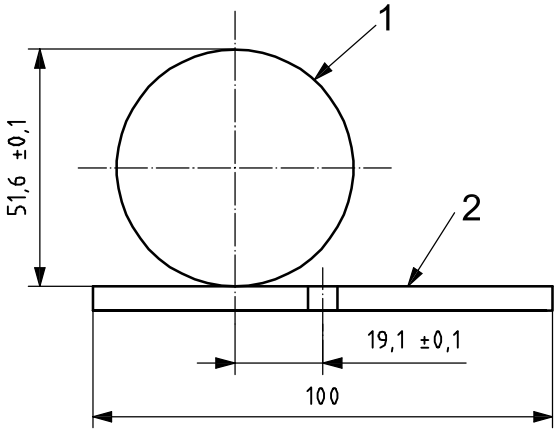
Start the motor driving the rotating disc and the suction system.

When 4 000 revolutions have been completed, stop the motor, remove the test piece and reweigh the test piece. In addition, examine it for any signs of exposure of the reinforcement.

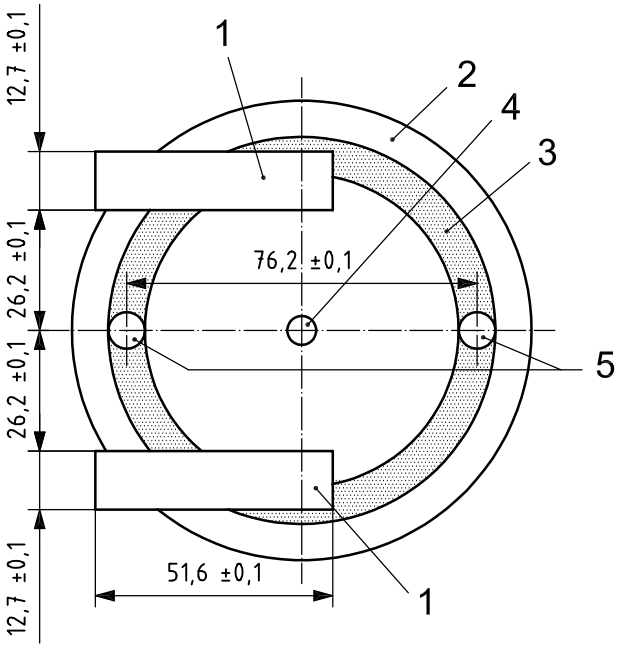
A.3 Assessment and calculation of results

In none of the at least three test pieces tested shall the hose wall reinforcement be visible at the surface of the test piece.

Report the result obtained for each individual test piece, and the mean value of these results.



a) Side view



b) Top view

Key

1 abrasive wheel
2 test piece
3 wear zone
4 hole (diam. 6,35 mm)
5 vacuum nozzles [diam. (8 ± 0,5) mm]

Figure A.1 — Diagrammatic arrangement of apparatus

Annex B
(normative)

Type approval and routine testing

Table B.1 gives the tests to be carried out for type approval and routine testing.

Table B.1

Dimension/property determined (with reference to relevant subclause)	**Type approval test**	**Routine test**
Inside diameter/tolerance (7.1)	X [a]	X
Tolerance on length (7.2)	X	X
Tensile strength and elongation at break of lining and cover (8.1)	X	N.A. [b]
Tensile strength after ageing (8.1)	X	N.A.
Burst pressure test at 23 °C (8.2.1) and 55 °C (8.2.2)	X	N.A.
Change in length and diameter at maximum working pressure (8.2.1)	X	N.A.
Proof pressure test at 23 °C (8.2.1) and 55 °C (8.2.2)	X	N.A.
Adhesion test (8.2.3)	X	N.A.
Bending test at (23 ± 2) °C and (−10 ± 2) °C (8.2.4)	X	N.A.
Exposure to laboratory light sources (8.2.5)	X	N.A.
Abrasion test (8.2.6)	X	N.A.

[a] X = Test required.

[b] N.A. = Not applicable.

Annex C
(informative)

Production tests

Table C.1 gives the recommended tests for production testing.

Production tests are those carried out on a hose or on a sample of hose from each batch manufactured.

A batch is defined as, at the most, 10 000 m of hose or 6 000 kg of lining and/or cover compound.

Table C.1

Dimension/property determined (with reference to relevant subclause)	**Production test**
Inside diameter/tolerance (7.1)	X [a]
Tolerance on length (7.2)	X
Tensile strength and elongation at break of lining and cover (8.1)	N.A. [b]
Tensile strength after ageing (8.1)	N.A.
Burst pressure test at 23 °C (8.2.1) and 55 °C (8.2.2)	N.A.
Change in length and diameter at maximum working pressure (8.2.1)	N.A.
Proof pressure test at 23 °C (8.2.1) and 55 °C (8.2.2)	X
Adhesion test (8.2.3)	N.A.
Bending test at (23 ± 2) °C and (−10 ± 2) °C (8.2.4)	N.A.
Exposure to laboratory light sources (8.2.5)	N.A.
Abrasion test (8.2.6)	N.A.

[a] X = Test required.

[b] N.A. = Not applicable.

Annex D
(informative)

Couplings and end fittings

Hoses may be fitted with the following coupling types to form hose assemblies:

— clamped;

— banded;

— wired on;

— swaged.

The shank shall be serrated to prevent it from slipping out of the hose. The serrations shall not have sharp edges that may damage the lining of the hose.

The end fitting may be of any suitable type, with a nationally standardized or currently used coupling system of one of the following kinds:

— quick-release/quick-acting;

— screw thread;

— flanged.

Quick-release/quick-acting fittings have two functions: firstly as a coupling and secondly as a valve. The fitting has a built-in spring-loaded valve that is opened on coupling.

Screw thread connections can be made through a loose, lug-type swivel. The materials from which such connections are made include steel, stainless steel and bronze.

Hoses may be fitted with flange connections. A flange connection is assembled with a hose by means of a hose nipple which is inserted into the hose. This hose nipple is ribbed to prevent it slipping from the hose.

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Price based on 12 pages