BRITISH STANDARD

BS 1102 : 1991

Specification for

Rubber hose for water suction and discharge with smooth bore and smooth or corrugated exterior

Tuyaux en caoutchouc pour aspiration et refoulement d'eau, à alésage lisse et extérieur lisse ou ondulé — Spécifications

Glattläufige Saug- und Entleerungsschläuche aus Gummi, mit glatter oder gewellter Oberfläche

BSI STANDARDS

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics and Rubber Standards Policy Committee (PRM/-) to Technical Committee PRM/66, upon which the following bodies were represented:

Association of Metropolitan Authorities
British Coal Corporation
British Compressed Gases Association
British Gas plc
British Rubber Manufacturers' Association
Chief and Assistant Chief Fire Officers' Association
Energy Industries Council
Fire Extinguishing Trades Association
Home Office
Institution of Fire Engineers
Liquefied Petroleum Gas Industry Technical Association (UK)
London Fire and Civil Defence Authority
London Regional Transport
Malaysian Rubber Producers' Research Association
Ministry of Defence
Society of Motor Manufacturers and Traders Limited

The following bodies were also represented in the drafting of the standard, through sub-committees and panels:

British Fluid Power Association
Engineering Equipment and Materials users' Association

This British Standard, having been prepared under the direction of the Plastics and Rubber Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 28 February 1991

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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Contents

Foreword

This British Standard has been prepared under the direction of the Plastics and Rubber Standards Policy Committee and is a revision of BS 1102 : 1977, which is withdrawn.

Changes from BS 1102 : 1977 include the following.

(a) Additional tests have been incorporated for flexibility, resistance to ozone and resistance to abrasion;

(b) Inclusion of an embedded wire helix in the construction.

For methods of test attention is drawn to Parts of BS 903 and Sections of BS 5173 which have replaced Parts of BS 5173 (1976/1977).

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Specification

1 Scope

This British Standard specifies the requirements for smooth bore rubber hoses working under the suction and discharge conditions specified and capable of withstanding crushing under normal operating conditions. The hose cover may be smooth or corrugated and may also be wire armoured to give additional protection.

The hose can have either a wire-free end, an enlarged-end to accommodate a full bore fitting or a wired-to end (that is where the embedding wire continues, at the same pitch, throughout the full length of the hose).

The hose is intended for general purpose operations, within the temperature range of −10 °C to +70 °C and is not intended for fire fighting applications which are covered in BS 3165.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Construction

2.1 The hose shall consist of:

(a) an inner rubber lining;

(b) a textile reinforcement;

(c) an embedded wire helix of hard steel complying with BS 3592 : Part 1;

(d) an abrasion-resistant outer rubber cover;

(e) if required, an externally applied steel armouring wire to BS 3592 : Part 1 and shall have a galvanized finish complying with BS 443.

2.2 The lining and cover shall be of uniform thickness, free from air holes, porosity and other defects.

3 Dimensions and tolerances

3.1 Bore

When measured in accordance with BS 5173 : Section 101.1 the bore of the hose shall be in accordance with the nominal dimensions and tolerances given in table 1.

3.2 Lining and cover thicknesses

When measured in accordance with BS 5173 : Section 101.1 the minimum thickness of the lining and cover shall be in accordance with table 1.

3.3 Length

The tolerance on the length of the hose shall be ± 1 % of nominal length.

3.4 Hose ends

The tolerance for the nominal bore of the hose, given in table 1, shall apply to the ends for enlarged or free of wire ends.

NOTE. The length and/or diameter of the ends should be specified by the purchaser.

Table 1. Dimensions of hose bore and components

Nominal bore	Tolerance	Lining thickness minimum	Cover thickness minimum
mm	mm	mm	mm
25	± 1.25	1.6	1.2
31.5	± 1.25	1.6	1.2
38	± 1.50	1.6	1.2
44	± 1.50	1.6	1.2
51	± 1.50	1.6	1.2
57	± 1.50	1.6	1.2
63	± 1.50	1.6	1.2
76	± 1.50	2.4	1.6
89	± 1.50	2.4	1.6
102	± 2.0	2.4	1.6
127	± 2.0	2.4	1.6
152	± 2.0	2.4	2.4
178	± 2.0	2.4	2.4
203	± 2.0	2.4	2.4

4 Physical properties of rubber lining and cover compounds

4.1 Test sheets

These tests shall be carried out on test sheets of the appropriate rubber compounds, vulcanized nominally under the same conditions as the hose.

4.2 Tensile strength and elongation at break

When tested in accordance with BS 903 : Part A2 (Dumb-bell test pieces) the rubber used for the lining and cover shall have a tensile strength and elongation at break not less than the values given in table 2.

Table 2. Tensile strength and elongation at break

Component	Tensile strength	Elongation at break
	MPa	%
Lining	6.0	250
Cover	6.0	300

4.3 Accelerated ageing requirements

After ageing in accordance with BS 903 : Part A19 for a period of 168 h at 70 °C the tensile strength and elongation at break shall not vary from the initial values by more than ± 25 %.

4.4 Abrasion resistance (cover only)

When tested in accordance with BS 903 : Part A9 the volume loss of the cover shall not exceed 500 mm^3.

5 Performance

5.1 Test samples

The tests shall be carried out on hose samples cut from fully manufactured lengths of hose.

NOTE. The frequency of the tests should be agreed between the manufacturer and the purchaser.

5.2 Hydrostatic pressure

When tested in accordance with BS 5173 : Section 102.1 the hose shall comply with the values given in table 3.

5.3 Vacuum resistance

When tested in accordance with BS 5173 : Section 102.9 the hose shall be capable of withstanding a vacuum of 0.7 bar[1)] below the atmopheric pressure for a period of 10 min without collapse or failure of any part.

5.4 Adhesion

When tested in accordance with BS 5173 : Section 103.1 the minimum adhesion between the lining and reinforcement, between layers of reinforcement and between reinforcement and cover shall each be not less than 2.0 kN/m.

5.5 Ozone resistance

When tested in accordance with method 3 of BS 5173 : Section 106.3 the hose cover shall not exhibit any cracks when examined under × 2 magnification.

5.6 Crush resistance

When tested in accordance with BS 5173 : Section 103.2 using the appropriate crushing force given in table 4, the diameter of the hose under the applied force shall be not less than 80 % of the original outside diameter, and after release of the force the diameter shall be not less than 90 % of the original outside diameter.

Table 4. Crush resistance

Nominal bore	Crushing force
mm	kN
25	0.9
31.5	0.9
38	1.0
44	1.0
51	1.1
57	1.1
63	1.45
76	1.45
89	1.45
102	1.45
127	1.75
152	1.75
178	1.75
203	1.75

Table 3. Hydrostatic pressure

Nominal bore of hose	25 to 44 mm	51 to 76 mm	89 to 127 mm	152 to 203 mm
	bar	bar	bar	bar
Maximum working pressure	7	5	3.5	3
Proof pressure	10.5	7.5	5.25	4.5
Minimum bursting pressure	22	16	11	10
Change in length at proof pressure	± 10 %	± 10 %	± 10 %	± 10 %
Change in diameter at proof pressure	± 5 %	± 10 %	± 10 %	± 10 %

[1)] 1 bar = 10^5 N/m^2 = 10^5 Pa.

5.7 Flexibility

When coiled to a bend radius of 6 times the hose bore, using a test drum of external diameter of 12 times the hose bore, the hose shall show no structural damage or permanent deformation when coiled.

6 Marking

Each manufactured length of hose shall be permanently and continuously marked on the outer cover at intervals of not more than 2 m with the following information:

(a) the manufacturer's name or identification;

(b) the number and year of this British Standard[1)];

(c) the nominal bore;

(d) the maximum working pressure;

(e) the month and year of manufacture.

NOTE. An example of the marking is as follows:

MN — BS 1102/1991 — 51 mm — 5 bar — 6/1991.

[1)] Marking BS 1102 : 1991 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Publications referred to

BS 443	Specification for testing zinc coatings on steel wire and for quality requirements
BS 903	Methods of testing vulcanized rubber Part A2 Determination of tensile stress-strain properties Part A9 Determination of abrasion resistance Part A19 Heat resistance and accelerated ageing tests
BS 3165	Specification for rubber and plastics suction hoses and hose assemblies for fire-fighting purposes
BS 3592	Steel wire for hose reinforcement Part 1 Specification for coated round and flat steel wire for rubber hose reinforcement
BS 5173	Methods of test for rubber and plastics hoses and hose assemblies Section 101.1 Measurement of dimensions (excluding length) Section 102.1 Hydrostatic tests Section 102.9 Determination of resistance to vacuum Section 103.1 Determination of adhesion between components Section 103.2 Determination of crush resistance Section 106.3 Determination of ozone resistance

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