BS 5118 :1980

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British Standard Specification for

Rubber hoses for compressed air

Spécification des tuyaux d'air comprimé en caoutchouc

Spezifikation für Druckluftschläuche aus Kautschuk

Foreword

This revision of this British Standard has been prepared under the direction of the Rubber Standards Committee.

This standard was first published in 1975, and together with others in the series BS 5118 to BS 5122, superseded BS 796 'Hose of rubber with cotton or rayon braided reinforcement' and BS 924 'Hose of rubber with cotton or rayon woven reinforcement'. It was based on the requirements for Type A and Type C specified in ISO 2398 'Industrial rubber hose for compressed air (up to 2.5 MPa)', prepared by Technical Committee TC 45, Rubber and rubber products, of the International Organization for Standardization (ISO).

This revision now includes requirements for heavy duty hose based on Type D of ISO 2398.

Further changes from the 1975 edition are as follows:

(a) the cover and lining thicknesses are the same for mandrel made and non-mandrel made hoses;

(b) the ageing requirements are more stringent;

(c) the test methods of BS 5173 are referred to instead of being included in appendices;

(d) the marking requirement now includes the quarter of the year of manufacture;

(e) the imperial equivalents of metric values are omitted.

This standard differs from ISO 2398 in the following respects:

(1) there is no equivalent to Type B of ISO 2398;

(2) two tolerance ranges for nominal bore are specified for type 1 and type 2 hoses;

(3) a ratio for working pressure : proof pressure : minimum burst pressure of 1 : 2 : 4 is given for types 2 and 3 in place of 1 : 2.5 : 5 specified for Types C and D of ISO 2398;

(4) a nominal bore of 19 mm is included in place of 20 mm specified in ISO 2398;

(5) different tensile properties of the lining and cover are specified.

This standard is based primarily on performance requirements. In order to take account of technological developments, no requirements are included for specific materials, constructions and manufacturing methods although minimum physical properties are specified for the lining and cover compounds.

Certification. Attention is drawn to the certification facilities described on the inside back cover of this standard.

1. Scope

This British Standard specifies the requirements for three types of rubber hoses for compressed air as follows:

Type 1: light duty industrial air hoses for design working pressures up to and including 10 bar*;

Type 2: medium duty air hoses for design working pressures up to and including 16 bar;

Type 3: heavy duty air hoses, for mining and construction work, for design working pressures up to and including 25 bar.

2. References

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

3. Construction

3.1 The hoses shall consist of:

(a) an elastomeric lining resistant to oil mist;

(b) a reinforcement;

(c) an abrasion resistant elastomeric cover.

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

3.2 The hoses may be mandrel made or non-mandrel made and the cover finish may be smooth, fluted or fabric marked.

*1 bar = 10^5 N/m^2 = 100 kPa.

4. Dimensions and tolerances

4.1 Bore. When measured in accordance with the method described in BS 5173 : Part 1, the bore of the hoses shall comply with the appropriate values given in table 1.

Table 1. Nominal bores and tolerances

Nominal bore			Tolerances	
Type 1	Type 2	Type 3	Mandrel made hoses	Non-mandrel made hoses
mm	mm	mm	mm	mm
5	–	–	± 0.75	± 0.75
6.3	–	–		
8	–	–		
10	–	–		
11.2	–	–		
12.5	12.5	12.5		
16	16	16		
19	19	19		
25	25	25		Types 1 and 2 only* ± 1.25
31.5	31.5	31.5		
38	38	38		Types 1 and 2 only* ± 1.50
45	45	–		
50	50	50		
56	56	–		
63	63	63		
–	76	–	± 1.50	–
–	100	–		

*Type 3 hoses are not available in these bore sizes for this method of manufacture.

4.2 Lining and cover thicknesses. When measured in accordance with the method described in BS 5173 : Part 1, the thickness of the lining and the cover shall be not less than the values given in table 2.

Table 2. Minimum thicknesses of lining and cover

	Type 1	Type 2	Type 3
	mm	mm	mm
Lining	1.5	2.0	2.0
Cover	1.5	2.0	2.5

If the cover is fluted, the depth of the flute shall be not greater than 50 % of the cover thickness.

4.3 Tolerance on cut lengths of hoses. The tolerance on cut lengths of hoses shall be as given in table 3.

Table 3. Tolerances on cut lengths

Nominal length of hoses	Tolerances
mm	mm
Up to and including 300	± 3
Over 300 and up to and including 600	± 4.5
Over 600 and up to and including 900	± 6
Over 900 and up to and including 1200	± 9
Over 1200 and up to and including 1800	± 12
Over 1800	± 1 % of nominal length

5. Physical properties of lining and cover

5.1 Tensile strength and elongation at break of lining and cover. When tested in accordance with the method described in BS 903 : Part A2, using dumb-bell test pieces of type 1 dimensions, the elastomeric mix used for the lining and cover shall have a tensile strength and elongation at break not less than the values given in table 4. The test shall be carried out on test sheets of the appropriate elastomeric mix vulcanized to the same degree as the hose.

Table 4. Tensile strength and elongation at break

	Tensile strength		Elongation at break	
	Lining	Cover	Lining	Cover
	MPa	MPa	%	%
Type 1	6.0	6.0	250	300
Type 2	7.0	7.0	250	300
Type 3	7.0	10.0	250	300

5.2 Accelerated ageing test. After ageing test pieces prepared as described in **5.1** for 96 h at 70 ± 2 °C in accordance with method A or method B described in BS 903 : Part A19, the tensile strength and elongation at break shall not vary from the corresponding unaged values by more than +10 % or -30 % for all types of hoses.

5.3 Resistance of the lining to liquids (type 2 and type 3 only). When tested in accordance with the volumetric method described in BS 903 : Part A16, using Oil No. 1 and immersing for 72 h at 70 ± 2 °C, the lining shall have a volume change not greater than ± 15 %.

6. Performance requirements

6.1 Adhesion. When tested in accordance with the method described in BS 5173 : Part 3, the adhesion between lining and reinforcement, between layers of reinforcement and between cover and reinforcement shall be not less than 1.75 kN/m in the case of type 1 hoses or 2.0 kN/m in the case of type 2 and type 3 hoses.

6.2 Pressure requirements. When tested in accordance with the method described in BS 5173 : Part 2, the hose shall comply with the requirements given in table 5 and shall show no cracks or leak at proof pressure.

Table 5. Hydrostatic pressure requirements

	Type 1	Type 2	Type 3
Design working pressure	10 bar	16 bar	25 bar
Proof pressure	20 bar	32 bar	50 bar
Maximum change in diameter at proof pressure	+15 %, −5 %	+15 %, −5 %	+15 %, −5 %
Maximum change in length at proof pressure	± 12 %	± 12 %	± 12 %
Minimum burst pressure	40 bar	64 bar	100 bar

6.3 Resistance to bending. When tested in accordance with the method described in BS 5173 : Part 3, using the appropriate values for $C/2$ given in table 6, the value

of T/D, shall not be less than 0.8, where T is the minimum value of the hose outside dimension at any point in the curved portion of the hose under test and D the average outside diameter of the hose test piece before bending.

7. Marking

Each length of hose shall be labelled, with a tag tied on the hose, with the following information. In addition, hoses shall be continuously marked with the same information.

(a) Hose supplier's name or identification.

(b) Details of the hose as follows:

(1) the number of this British Standard* with the type figure as suffix, e.g. BS 5118/1;

(2) the nominal bore, e.g. 31.5;

(3) the quarter and year of manufacture, e.g. 4/80;

(4) the design working pressure, e.g. 10.

This information may be conveniently presented in the following manner:

Manufacturer/BS 5118/1/31.5/4/80/10

Table 6. Minimum bend radius ($C/2$)

Nominal bore	$C/2$		
	Type 1	*Type 2*	*Type 3*
mm	mm	mm	mm
5	60	–	–
6.3	75	–	–
8	95	–	–
10	120	–	–
11.2	135	–	–
12.5	150	150	150
16	190	190	190
19	230	230	230
25	300	300	300
31.5	380	380	380
38	455	455	455
45	540	540	–
50	600	600	600
56	690	690	–
63	755	755	755
76	–	910	–
100	–	1200	–

*Marking BS 5118 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore the manufacturer's sole responsibility. Enquires as to the availability of third party certification to support such claims should be addressed to the Director, British Standards Institution, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

Standards publications referred to

BS 903 Methods of testing vulcanized rubber
Part A2 Determination of tensile stress-strain properties
Part A16 The resistance of vulcanized rubber to liquids
Part A19 Heat resistance and accelerated air ageing tests

BS 5173 Methods of test for hoses
Part 1 Measurement of dimensions
Part 2 Hydraulic pressure tests
Part 3 General physical tests

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Attention is drawn to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

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The following BSI references relate to the work on this standard:
Committee reference RUC/9 Draft for comment 77/53653 DC

Cooperating organizations

The Rubber Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

*British Association of Synthetic Rubber Manufacturers
*British Rubber Manufacturers' Association
Department of Industry (Chemicals and Textiles)
Medical Sterile Products Association
*Ministry of Defence
Plastics and Rubber Institute
Rubber and Plastics Research Association of Great Britain
Rubber Growers' Association
*Society of Motor Manufacturers and Traders Limited
*The Malaysian Rubber Producers' Research Association

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

British Railways Board
Chief and Assistant Chief Fire Officers' Association
Fire Extinguishing Trades Association
Institution of Fire Engineers
Institution of Mechanical Engineers
Liquefied Petroleum Gas Industry Technical Association (UK)
London Transport Executive
National Coal Board

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