BSI

BS 5122 : 1975

UDC 621.643.33.023 : 678.066–462 : 621.186.3.013.1

Specification for

Rubber hose for saturated steam

Gr 5

British Standards Institution

This British Standard, having been approved by the Rubber Industry Standards Committee, was published under the authority of the Executive Board on 30 June 1975.

ISBN: 0 580 08850 2

Contract requirements
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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In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

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The following BSI references relate to the work on this standard:
Committee reference RUC/9 Draft for comment 72/50922

Co-operating organizations

The Rubber Industry Standards Committee, under whose supervision 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 Ltd.
*Department of Trade
*Malaysian Rubber Producers' Research Association
*Ministry of Defence
*Rubber and Plastics Research Association of Great Britain
Rubber Growers' Association
*Society of Motor Manufacturers and Traders Ltd.

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
Canvas Hose Manufacturers' Association
Chemical Industries Association
Chief Fire Officers' Association
Department of the Environment
Fire Extinguisher Trades Association
Home Office
Institution of Fire Engineers
Institution of Mechanical Engineers
Liquefied Petroleum Gas Industry Technical Association
National Coal Board
Oil Companies Materials Association
Post Office

BSI

Amendment Slip No.1, published 28 April 1978
to BS 5122 : 1975
Rubber hose for saturated steam

Revised text

AMD 2520
April 1978

Foreword

After paragraph 3 insert the following new paragraph:

'Attention is drawn to the Health and Safety at Work etc. Act 1974 and the need for ensuring that hoses specified in this British Standard are installed in such a way that personnel are adequately protected.'

AMD 2520
April 1978

Clause 1. Scope

At the end of the existing text insert the following note:

'NOTE. THE END FITTINGS USED WITH THE HOSE SHOULD BE THOSE RECOMMENDED BY THE HOSE MANUFACTURER. IN ANY CASE, THEY MUST BE OF A TYPE WHICH PROVIDES FOR TIGHTENING UP DURING SERVICE, SUCH AS THE BOLTED CLAMP TYPE, TO COMPENSATE FOR CREEP OF THE RUBBER COMPOUNDS.'

AMD 2520
April 1978

Clause 3.2.2 Lining and cover thickness

After '(a) lining' delete '2.5 mm (0.098 in)' and substitute '2.0 mm (0.080 in)'.

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BSI

BS 5122 :1975

UDC 621.643.33.023 : 678.066–462 : 621.186.3.013.1

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Rubber hose for saturated steam

Amendments issued since publication

Amd. No.	Date of issue	Text affected

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Contents

Foreword

This British Standard has been prepared under the authority of the Rubber Industry Standards Committee. It covers steam hose for low and medium pressure service.

With the others in the series BS 5118–5122, this standard supersedes BS 796 'Hose of rubber with cotton or rayon braided reinforcement', and BS 924 'Hose of rubber with cotton or rayon woven reinforcement'. This standard replaces Parts 8 and 9 of BS 796 and Parts 10 and 11 of BS 924 covering 'Type L: Steam Hose - low pressure (for saturated steam pressures up to and including 30 lb/sq. in)' and 'Type M: Steam Hose - high pressure (for saturated steam pressures over 30 lb/sq. in and up to and including 75 lb/sq. in)'.

The standard is based on performance requirements. In order to take account of modern technological developments specific materials, constructions and manufacturing methods are not stipulated.

There is no equivalent International Standard to this British Standard.

NOTE. All dimensions are shown in millimetres which are the standard. Approximate inch equivalents are shown in parentheses.

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

British Standard Specification for

Rubber hose for saturated steam

1. Scope

This British Standard specifies the requirements for two types of rubber hose for low and medium pressure saturated steam as follows:

Type 1. Low pressure steam hose with maximum working pressure 2 bar*.

Type 2. Medium pressure steam hose with maximum working pressure 5 bar.

2. References

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

3. Type 1 hose

3.1 Construction

3.1.1 The hose shall consist of:

(a) an inner rubber tube or lining;
(b) a reinforcement applied by any suitable technique;
(c) an abrasion resistant outer rubber cover.

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

3.1.2 As required by the purchaser, the hose may be mandrel or non-mandrel made and the finish may be smooth or fabric marked.

3.2 Dimensions and tolerances

3.2.1 *Bore.* The bore of the hose shall be in accordance with the nominal dimensions and tolerances given in table 1.

Table 1. Type 1 hose: nominal bores and tolerances

Nominal bore		Tolerance			
		Mandrel made hose		Non-mandrel made hose	
mm	(in)	mm	(in)	mm	(in)
12.5	(½)	± 0.75	(0.030)	± 0.75	(0.030)
16	(⅝)				
19	(¾)				
25	(1)			± 1.25	(0.049)
31.5	(1¼)				
38	(1½)			± 1.50	(0.059)
45	(1¾)				
50	(2)				

* 1 bar = 10^5 N/m² = 100 kPa

3.2.2 *Lining and cover thickness.* When measured as described in appendix A, the thickness of the lining and the cover shall be not less than the following:

(a) lining 2.5 mm (0.098 in)
(b) cover 0.75 mm (0.03 in)

3.2.3 *Tolerance on cut lengths of hose.* The tolerance on cut lengths of hose shall be as given in table 2 unless otherwise agreed between the manufacturer and the purchaser.

Table 2. Type 1 hose: tolerance on length

Length of hose	Tolerance
Up to and including 300 mm	± 3 mm
Over 300 mm and up to and including 600 mm	± 4.5 mm
Over 600 mm and up to and including 900 mm	± 6 mm
Over 900 mm and up to and including 1200 mm	± 9 mm
Over 1200 mm and up to and including 1800 mm	± 12 mm
Over 1800 mm	± 1 % of nominal length

3.3 Performance requirements

3.3.1 *Adhesion.* When tested as described in appendix B the adhesion between lining and reinforcement, between layers of reinforcement and between cover and reinforcement shall be not less than 1.5 kN/m (8.55 lbf/in).

3.3.2 *Pressure requirements.*

3.3.2.1 When tested as described in appendix C, the hose shall comply with the requirements of table 3 and shall show no cracks or leaks at proof pressure.

3.3.2.2 All manufactured lengths of hose shall be tested to proof pressure. The frequency of testing to burst pressure shall be as agreed between the purchaser and the supplier.

Table 3. Type 1 hose: hydrostatic pressure requirements

Pressure	Requirement
Design working pressure	2 bar*
Proof pressure	10 bar
Change in diameter at proof pressure	+ 15 %, - 5 %
Change in length at proof pressure	± 12 %
Maximum twist at proof pressure	30°/m
Minimum burst pressure	20 bar

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

3.3.3 *Steam resistance.* After having been exposed to steam pressure as described in appendix D, the hose shall comply with the requirements of table 4.

Table 4. Type 1 hose: steam resistance

Property	Minimum requirement
Mean burst pressure	50 % of mean value of hose not exposed to steam
Mean elongation at break of lining	60 % of mean value of hose not exposed to steam and not less than 150 % of unstrained length (see note)

NOTE. The unstrained length is the initial distance between the reference lines on the dumb-bell test piece.

3.4 Marking. Each manufactured length of hose shall be labelled with a tag tied at each end of the hose, marked with the following information:

(a) hose supplier's name or identification;
(b) details of the hose as given below:

(1) the number of this British Standard, with the type number as suffix, i.e. BS 5122/1;

(2) the nominal bore, e.g. 16;
(3) the year of manufacture, e.g. 1975.

This information shall be stated in the following form:

e.g. BS 5122/1/16/1975.

4. Type 2 hose

4.1 Construction

4.1.1 The hose shall consist of:

(a) an inner rubber lining;
(b) a reinforcement applied by any suitable technique;
(c) an abrasion resistant outer rubber cover.

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

4.1.2 As required by the purchaser, the hose may be mandrel or non-mandrel made and the finish may be smooth or fabric marked.

4.2 Dimensions and tolerances

4.2.1 *Bore.* The bore of the hose shall be in accordance with the nominal dimensions and tolerances given in table 5.

Table 5. Type 2 hose: nominal bores and tolerances

Nominal bore		Tolerance			
		Mandrel made hose		Non-mandrel made hose	
mm	(in)	mm	(in)	mm	(in)
12.5	(½)				
16	($^5/_8$)			± 0.75	(0.030)
19	(¾)				
25	(1)	± 0.75	(0.030)	± 1.25	(0.049)
31.5	(1¼)				
38	(1½)				
45	(1¾)			± 1.50	(0.059)
50	(2)				

4.2.2 *Lining and cover thickness.* When measured as described in appendix A, the thickness of the lining and the cover for hose of all nominal bores shall be not less than the following:

(a) lining 2.00 mm (0.079 in)
(b) cover 1.50 mm (0.059 in)

4.2.3 *Tolerance on cut lengths of hose.* The tolerance on cut lengths of hose shall be as shown in table 6 unless otherwise agreed between the manufacturer and the purchaser.

Table 6. Type 2 hose: tolerance on length

Length of hose	Tolerance
Up to and including 300 mm	± 3 mm
Over 300 mm and up to and including 600 mm	± 4.5 mm
Over 600 mm and up to and including 900 mm	± 6 mm
Over 900 mm and up to and including 1200 mm	± 9 mm
Over 1200 mm and up to and including 1800 mm	± 12 mm
Over 1800 mm	± 1 % of nominal length

4.3 Performance requirements

4.3.1 *Adhesion.* When tested as described in appendix B, the adhesion between lining and reinforcement, between layers of reinforcement and between cover and reinforcement shall be not less than 2.0 kN/m (11.4 lbf/in).

4.3.2 *Pressure requirements.*

4.3.2.1 When tested as described in appendix C, the hose shall comply with the requirements of table 7, and shall show no cracks or leaks at proof pressure.

4.3.2.2 All manufactured lengths of hose shall be tested to proof pressure. The frequency of testing to burst pressure shall be as agreed between the purchaser and the supplier.

Table 7. Type 2 hose: hydrostatic pressure requirements

Pressure	Requirement
Design working pressure	5 bar*
Proof pressure	25 bar
Change in diameter at proof pressure	+ 15 %, - 5 %
Change in length at proof pressure	± 12 %
Maximum twist at proof pressure	30°/m
Minimum burst pressure	50 bar

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

4.3.3 *Steam resistance.* After having been exposed to steam pressure as described in appendix D, the hose shall comply with the requirements of table 8.

Table 8. Type 2 hose: steam resistance

Property	Minimum requirement
Mean burst pressure	50 % of mean value of hose not exposed to steam
Mean elongation at break of lining	60 % of mean value of hose not exposed to steam and not less than 150 % of unstrained length (see note)

NOTE. The unstrained length is the initial distance between the reference lines on the dumb-bell test piece.

4.4 Marking. Each manufactured length of hose shall be labelled with a tag tied at each end of the hose, marked with the following information:

(a) hose supplier's name or identification;
(b) details of the hose as given below:
  (1) the number of this British Standard, with the type number as suffix, i.e. BS 5122/2;
  (2) the nominal bore, e.g. 31.5;
  (3) the year of manufacture, e.g. 1975.

This information shall be stated in the following form:

e.g. BS 5122/2/31.5/1975.

Appendix A

Measurement of thickness

A.1 Take a sample piece of hose, approximately 50 mm in length, and mark a diameter on each end, these diameters being at right angles to one another.

A.2 Cut the sample into two equal portions by cutting at right angles to the longitudinal axis and bisect each portion by cutting longitudinally along the marked diameters.

A.3 Measure the thickness of the lining and of the cover on each segment at one point on each of the longitudinal cut edges using an optical magnifier with a suitable graduated scale.

A.4 The average of the eight measurements shall be reported as the thickness of the lining or cover.

Appendix B

Method of test for adhesion

Determine the adhesion by the method described in BS 903 : Part A12. In the case of hose containing spiralled yarn or wire reinforcement, particular care is required in preparing the test pieces.

Appendix C

Hydrostatic test

C.1 **Test piece preparation.** Cut from the hose a test piece about 1 m long so as to give a minimum length clear of test fittings of 635 mm. Attach test fittings to the hose and ensure that the fitting at one end of the hose is fixed and that at the other end is capable of rotation about the longitudinal axis.

C.2 **Hose relaxation.** Pressurize the hose to the specified design working pressure given in table 3 or table 7, as appropriate, for 1 min then reduce the pressure to zero.

C.3 **Measurement of initial dimensions**

C.3.1 Measure the outside diameter of the hose at three points along the test length, two readings being taken at each point at right angles to each other. Calculate the average of these six measurements and record it as the initial hose diameter.

C.3.2 Place gauge marks on the test piece at a minimum distance from the end fittings of 50 mm. Measure the distance between the gauge marks and record this value.

C.3.3 Place a reference mark on the hose for establishing the amount of twist of the hose when under pressure.

C.4 **Measurement of dimensions at proof pressure.** Apply pressure at a rate of not less than 0.7 bar*/s and not more than 1.7 bar/s. When the proof pressure specified in table 3 or table 7, as appropriate, has been reached examine the hose for leaks or defects. Then, as quickly as possible, remeasure and record the hose diameter, the distance between the gauge marks and the amount of twist from the position of the reference mark.

C.5 **Determination of burst pressure.** Continue to apply pressure until the hose bursts. Record the burst pressure.

C.6 **Test report.** The following information shall be included in the test report:

(a) proof pressure;
(b) presence of cracks or leaks at proof pressure;
(c) change in diameter at proof pressure;
(d) change in length at proof pressure;
(e) burst pressure;
(f) amount of twist at proof pressure.

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

Appendix D

Test for resistance to steam

D.1 Test piece preparation. Cut from the hose four test pieces each about 1 m long so as to give minimum lengths clear of test fittings of 635 mm. Attach test fittings to each test piece.

D.2 Procedure

D.2.1 Select any two test pieces and subject them to flowing saturated steam at a pressure of 3.5 bar* for type 1 hose and 7.0 bar for type 2 hose for 48 + 0, -2 h. Allow the test pieces to cool and then bend them four times at room temperature over a mandrel of appropriate radius, as follows, rotating the test pieces 90° between bendings.

Hose nominal bore (mm)	12.5	16	19	25	31.5	38	45	50
Mandrel radius (mm)	80	100	135	170	240	290	340	375

D.2.2 Burst all four test pieces hydrostatically as described in **C.2** to **C.5**.

D.2.3 Cut open the four test pieces and on each, determine the elongation at break of the lining rubber as described in BS 903 : Part A2 using the type 2 dumb-bell. Record the elongation at break of the lining for the four test pieces.

D.3 Test report. The following information shall be included in the test report:

(a) individual burst pressures;
(b) mean burst pressure of the hose exposed to steam;
(c) mean burst pressure of the hose not exposed to steam;
(d) individual values for elongation at break of hose lining;
(e) mean elongation at break of the lining of the test pieces exposed to steam;
(f) mean elongation at break of the lining of the test pieces not exposed to steam.

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

BSI publications referred to in this standard

This standard makes reference to the following British Standards:

BS 903 Methods of testing vulcanized rubber
Part A2 Determination of tensile stress-strain properties.
Part A12 Determination of rubber-to-fabric adhesion (ply adhesion)

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ISBN: 0 580 08850 2

ISBN: 0 580 08850 2