BSI

BS 5120 : 1975

UDC 621.643.33.02 : 678.066–462 : 621.791.5

Specification for

Rubber hose for gas welding and allied processes

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 May 1975.

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Contract requirements

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

Revision of British Standards

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 72/50933

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

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BSI

Amendment Slip No.1, published 31 May 1978
to BS 5120 : 1975
Rubber hose for gas welding and allied processes

Revised text

AMD 2607
May 1978

Contents

Under 'Appendices' against 'A' delete the existing text and substitute 'text deleted'.

Also against 'F' delete the existing text and substitute 'text deleted'.

After 'F' insert the following new material:

'G. Method of test for resistance to liquids'.

AMD 2607
May 1978

Foreword

In the first paragraph delete the existing second sentence and substitute the following:

'It covers two classes, each with two types, of flexible hoses for gas welding and allied processes'.

AMD 2607
May 1978

Clause 1. Scope

Delete the existing text and substitute the following:

'This British Standard specifies the requirements for two classes of flexible hoses, each with two types, made from rubber materials for gas welding and allied processes. 'Allied processes' comprise mainly gas cutting, brazing and metallization.

The classes of hoses specified are as follows:

Class A For acetylene, oxygen and non-combustible gases (e.g. argon).
Class B For liquefied petroleum gases (e.g. propane).

The types of hoses specified are as follows:

Type 1 Maximum working pressure 10 bar (1 MPa).
Type 2 Maximum working pressure 20 bar (2 MPa).

Different colours are specified for the identification of the gas for which the hose is to be used.

Note: Hoses that conform to class B as specified in this standard are specifically intended for gas cutting and welding applications using liquefied petroleum gases (LPG). Hoses that comply with the requirements of BS 3212 are not suitable for this purpose.'

AMD 2607
May 1978

Clause 3 Definitions

After '3.2 **combustion**' delete the existing text and substitute the following:

'Destruction by oxidation with the production of heat, usually with incandescence, or flame, or both.'

AMD 2607
May 1978

Table 1. Nominal bores and tolerances

Delete the existing table and substitute the following:

'Dimensions in millimetres.

Nominal bore	Tolerance
6.3	± 0.60
8	± 0.60
10	± 0.60
12.5	± 0.75
16	± 0.75
(19)	± 0.75
20	± 0.75

NOTE. ( ) indicates a non-preferred size.'

AMD 2607
May 1978

Clause 5.2 Lining and cover thickness

Delete 'When measured as described in appendix A,' and substitute 'When measured as described in BS 5173 : Part 1'.

AMD 2607
May 1978

New clause 6.4 Resistance to pentane (class B only)

Insert the following new clause:

'**6.4 Resistance to pentane (class B only).** When tested as described in appendix G the pentane absorbed shall not exceed 15 % of the initial mass of the lining and the amount of pentane-extractable matter shall not exceed 10 % of the initial mass of the lining.'

AMD 2607
May 1978

Clause 7.2 Pressure requirements

Delete 'When tested as described in appendix F' and substitute 'When tested as described in BS 5173 : Part 2'.

AMD 2607
May 1978

Clause 8. Colour indentification

In the clause title delete 'indentification' and substitute 'identification'.

Delete the existing tabulation and the associated note, and substitute the following:

Class	Permitted gas	Colour of cover
A	Acetylene	Red
A	Oxygen	Blue
A	Non-combustible gases (for example argon)	Black
B	Liquefied petroleum gas (for example propane)	Orange

AMD 2607
May 1978

Clause 9. Marking

Against (b) (1), after 'British Standard' delete the rest of the existing line and substitute 'with the class letter and type number as suffix, e.g. BS 5120/A1'.

Against (b) (4) delete '1975' and substitute '1978'.

Delete the existing last line and substitute: 'BS 5120/A1/16/10/1978'.

AMD 2607
May 1978

Appendix A. Measurement of thickness

Delete the entire existing text.

AMD 2607
May 1978

Appendix F. Hydrostatic test

Delete the entire existing text.

AMD 2607
May 1978

New appendix G. Method of test for resistance to liquids

Insert a new appendix G as follows:

'Appendix G

Method of test for resistance to liquids

G.1 Weigh a portion of the hose lining and immerse it in liquid pentane at room temperature for 72 h. The volume of the pentane shall be at least 50 times the volume of the test piece.

G.2 Following immersion, remove the test piece from the pentane and reweigh after 5 min conditioning in air at room temperature.

G.3 Reweigh again after further conditioning for 24 h at room temperature.

G.4 Calculate the pentane absorbed and the pentane-extractable matter using the following expressions:

(a) percentage pentane absorbed $= \frac{(M_1 - M_2)}{M_0} \times 100$

(b) percentage extractable matter $= \frac{(M_0 - M_2)}{M_0} \times 100$

where

M_0 is the initial mass of the test piece

M_1 is the mass of the test piece after immersion and 5 min conditioning

M_2 is the mass of the test piece after 24 h further conditioning'

AMD 2607
May 1978

Inside back cover

Under 'BSI publications referred to in this standard' insert the following in the correct numerical sequence:

'BS 3212 Flexible rubber tubing and hose (including connections where fitted and safety recommendations) for use in LPG vapour phase and LPG/air installations

BS 5173 Methods of test for hoses
Part 1 Measurement of dimensions
Part 2 Hydraulic pressure tests'

BSI

BS 5120 : 1975

UDC 621.643.33.02 : 678.066–462 : 621.79

Specification for

Rubber hose for gas welding and allied processes

Amendments issued since publication

Amd. No.	Date of issue	Text affected

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If special cases call for hoses of other nominal bores these shall be selected as follows:

(a) for smaller or larger sizes further numbers shall be chosen from the R 10 series of preferred numbers as given in BS 2045;

(b) for intermediate dimensions numbers shall be chosen from the R 20 series of preferred numbers as given in BS 2045.

For hose of nominal bores smaller than 6.3 mm the tolerance shall not be greater than ± 0.55 mm. For hose of additional intermediate sizes and hose of nominal bores greater than 20 mm the tolerance shall be as agreed between the purchaser and the supplier.

5.2 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 1.5 mm (0.059 in)
(b) cover 0.75 mm (0.03 in)

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

5.3 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 purchaser and the manufacturer.

Table 2. 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

6. Physical properties of lining and cover

6.1 Tensile strength and elongation at break. When tested as described in appendix B, 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 3.

Table 3. Tensile strength and elongation at break

	Tensile strength, min.	Elongation at break, min.
	MPa*	%
Lining	5.0	200
Cover	7.0	250

* 1 MPa is approximately 145 lbf/in²

6.2 Accelerated ageing. After ageing as described in appendix C, the tensile strength and elongation at break of the lining and cover shall not vary from the corresponding unaged values by more than ± 25 %.

6.3 Non-ignition requirement. When tested by the method described in appendix D, three samples of the lining shall remain in the apparatus at a constant temperature of 360 °C to 365 °C for 2 min without ignition.

If more than one of the samples show evidence of ignition in less than 2 min, the hose shall be considered not to comply with the requirements of this British Standard. If only one sample shows evidence of ignition in less than 2 min, three further samples shall be prepared and tested. If any of the three samples in this second series shows evidence of ignition in less than 2 min the hose shall be deemed not to comply with the requirements of this British Standard.

* 1 MPa is approximately 145 lbf/in²

7. Performance requirements

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

7.2 **Pressure requirements.** When tested as described in appendix F, the hose shall comply with the requirements given in table 4 and shall show no cracks or leaks at proof pressure.

Table 4. Hydrostatic pressure requirements

	Type 1	Type 2
Design working pressure, bar*	10	20
Proof pressure, bar	15	30
Change in diameter at proof pressure, %	+ 15, - 5	+ 15, - 5
Change in length at proof pressure, %	± 12	± 12
Minimum burst pressure, bar	30	60

* 1 bar is approximately 14.5 lbf/in²

8. Colour indentification

The hose cover shall be coloured as follows in order to identify the gas for which the hose is to be used.

Permitted gases	*Colour of cover*
Acetylene	Red
Oxygen	Blue
Non-combustible gases (for example argon)	Black

NOTE. It is intended to specify hoses for propane and other hydrocarbon gases in a separate standard providing for an *orange* cover.

9. Marking

Each manufactured length of hose shall be labelled with a tag tied at each end of the hose 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, e.g. BS 5120/1;
  (2) the nominal bore, e.g. 16;
  (3) the design working pressure, e.g. 10;
  (4) the year of manufacture, e.g. 1975.

This information shall be stated in the following form:

BS 5120/1/16/10/1975.

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 then 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 scale graduated in 0.1 mm.

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

A.5 If the cover is fluted the measurements shall be made at a point where the thickness of such fluting is included.

Appendix B
Method of test for tensile strength and elongation at break

Carry out the test in accordance with the method described in BS 903 : Part A2 using dumb-bell test pieces of type 1 dimensions. The test shall be carried out on test sheets of the appropriate rubber compound processed under the same conditions as the hose.

Appendix C
Accelerated ageing test

Prepare test pieces for tensile strength and elongation at break as described in appendix B and age them in accordance with method A or method B of BS 903 : Part A19 for 96 h at 70 ± 1 °C.

Appendix D
Method of test for non-ignition requirement

D.1 Apparatus. The apparatus shown in figure 1 is required, together with the following.

D.1.1 *Heating furnace,* 350 W, internal dimensions 150 mm deep by 50 mm diameter.

D.1.2 *Tubular sliding resistance,* 190 Ω to 200 Ω with screw movement or an auto-transformer with continuously variable output voltage.

D.1.3 *Calibrated flowmeter for oxygen,* 0 to 5 litres/min at 15 °C and atmospheric pressure.

D.1.4 *Nitrogen-filled mercury-in-glass thermometer* suitable for use at 150 mm immersion, graduated from approximately 300 ° C to 400 ° C in intervals of not more than 5 °C, the graduations to start not less than 200 mm above the bulb.

D.2 Procedure. Insert the ignition test apparatus, in its aluminium foil wrapping, into the electric furnace. The purpose of the aluminium foil is (a) to minimize radiant heat and (b) to obtain more uniform temperature distribution. Adjust the energy supply to the electric furnace with the variable resistance or auto-transformer so that a constant temperature of 360 °C to 365 °C is maintained with the oxygen flowing at 2 ± 0.1 litres/min.

Cut the sample of lining rubber for test, after cleaning by buffing, into blocks of 8 mm^3 to 10 mm^3 in which no side shall be less than 1.5 mm nor greater than 2.5 mm.

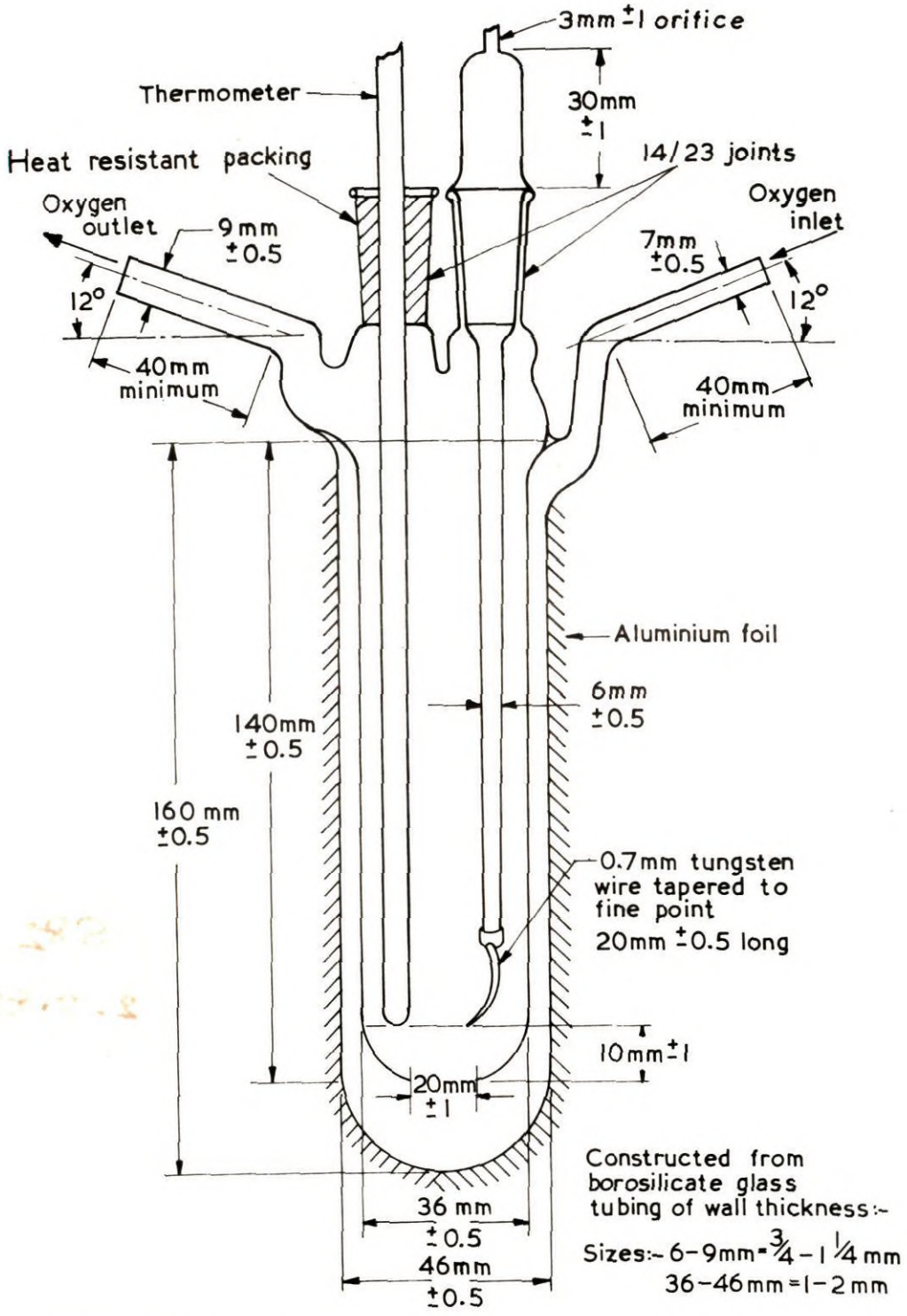
When the furnace is at constant temperature, remove the sample holder, impale a sample block of the lining rubber under test on the tungsten point and replace the sample holder in the apparatus. It is necessary for this operation to be carried out quickly, so that cooling is reduced to a minimum.

Retain the sample in the apparatus for at least 2 min and observe it carefully, during this period, for evidence of ignition. Fumes may be observed but this shall not constitute evidence of ignition, which is normally accompanied by a flash and sometimes by a small explosion.

Test three samples consecutively.

NOTE 1. When ignition of a sample occurs, the temperature of the apparatus may rise and then it is essential that lapse of time is allowed, to permit the temperature to return to the appropriate testing temperature.

NOTE 2. It is essential that the tungsten point is kept clean and sharp.



NOTE. Ground glass joints are specified in BS 572.

Figure 1. Apparatus for ignition tests on lining samples

Appendix E
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 F
Hydrostatic test

F.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 the other free to move.

F.2 Hose relaxation. Pressurize the hose to the specified design working pressure given in table 5 for 1 min then reduce the pressure to zero.

F.3 Measurement of initial dimensions

F.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.

F.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.

F.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 5 has been reached examine the hose for leaks or defects. Then, as quickly as possible, re-measure and record the hose diameter and the distance between the gauge marks.

F.5 Determination of burst pressure. Continue to apply pressure until the minimum burst pressure specified in table 5 has been reached.

F.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 or pressure attained without bursting.

* 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 572	Interchangeable conical ground glass joints
BS 903	Methods of test for vulcanized rubber
	Part A2 Determination of tensile stress-strain properties
	Part A12 Determination of rubber-to-fabric adhesion (ply adhesion)
	Part A19 Accelerated ageing tests
BS 2045	Preferred numbers

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