British Standard

BRITISH STANDARD

BS 5842:1980

CONFIRMED
DECEMBER 1986

Specification for

Thermoplastic hose assemblies for dock, road and tanker use

UDC 662.75:621.643.33.06:678.5:629.1/.4

Cooperating organizations

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

Association of Consulting Engineers
British Chemical Engineering Contractors' Association
British Gas Corporation
British Rubber Manufacturers' Association*
British Steel Industry
Cbmpe*
Chemical Industries Association
Coke Oven Managers' Association
Department of Energy
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Department of Trade (Marine Division)
Engineering Equipment Users' Association
Glass Manufacturers' Federation
Health and Safety Executive

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 Association of Synthetic Rubber Manufacturers
Ministry of Defence
Petrol Pump Manufacturers' Association
Individual experts
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Institution of Gas Engineers
Institution of Structural Engineers
Oil Companies Materials Association*
Process Plant Association

This British Standard, having been prepared under the direction of the Chemical and Petroleum Engineering Standards Committee, was published under the authority of the Executive Board and comes into effect on 29 August 1980

The following BSI references relate to the work on this standard:
Committee reference CPE/5
Draft for comment 79/70223 DC

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Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

Foreword

This British Standard has been prepared under the direction of the Chemical and Petroleum Engineering Standards Committee in order to lay down the requirements for the design, manufacture, performance, testing and marking of hoses made from thermoplastic materials such as polypropylene.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the requirements for the design, construction and testing of mandrel-built rough bore thermoplastic hose assemblies suitable for hydrocarbon products and aromatic hydrocarbons.

2 References

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

3 Design

3.1 General. The assemblies shall be suitable for a working pressure of 10 bar[1)] and a burst pressure of not less than 40 bar, throughout the temperature range – 20 °C to 80 °C.

3.2 Chemical resistance. The wall of the hose shall be constructed throughout of material resistant to hydrocarbon products and aromatic hydrocarbons.

The terminations shall be of material suitable for the specific requirements of the purchaser.

3.3 Construction. The assembly shall consist of the following.

a) An inner spiral of wire which shall be evenly pitched and tightly wound on to a mandrel. The wire may be of stainless steel or carbon steel, as agreed between the purchaser and the manufacturer. Where carbon steel is used it shall be galvanized or otherwise sheathed in material resistant to hydrocarbon products and aromatic hydrocarbons.

b) A multi-ply wall of thermoplastic films and reinforcing fabrics in suitable proportions to give the required physical properties. The film content may be built up of tubular films but shall in any case provide a complete seal. The wall shall be designed to minimize twisting under pressure.

c) An outer cover resistant to abrasion and weathering.

d) A spiral outer armouring wire, of stainless steel or galvanized carbon steel, which shall be mid-pitch to the inner wire and tensioned into position.

e) Factory-fitted terminations which shall be secured in the hose by swaging, whipping or bolt clips.

Additional reinforcement shall be built into each end and shall extend for a distance of at least 1 m into all hose of 100 mm size and above.

Both spiral wires shall be taken out and electrically bonded to the end fittings, unless otherwise specified by the purchaser.

3.4 Materials

3.4.1 *Wire.* Stainless steel wire shall comply with the requirements of BS 1554, Grade En 58J (17Cr 10Ni 3Mo) in the drawn condition. Carbon steel wire shall have a tensile strength of 650 N/mm^2 to 850 N/mm^2 and comply with the requirements of BS 3592-1 or BS 3592-2. Carbon steel wire for external armour shall be galvanized. All wire shall be free from defects likely to puncture the fabrics. If the inner wire is made of carbon steel it shall be galvanized or sheathed in thermoplastic or other material as agreed between the purchaser and the manufacturer and the sheath shall be free from perforations and impurities.

3.4.2 *Hose wall.* The hose wall shall be of polypropylene, or other thermoplastic material, as agreed between the purchaser and the manufacturer, in the form of a flat film, extruded tube or fabric, all of which shall be free from tears and perforations that would affect the quality of the finished hose.

3.5 Dimensions. The hose assemblies shall be supplied in the nominal sizes listed in Table 1.

Table 1 — Nominal sizes and bend radii of hose assemblies

Nominal size	Min. bend radius
mm	mm
25	100
40	140
50	180
65	200
75	280
100	400
150	500
200	740
250	920

The length of hose ordered shall be the overall length used, including end connections. The tolerance on this length shall be ± 2 %, – 1 %.

3.6 End connections. The type of end connections shall be as specified by the purchaser.

[1)] 1 bar = 10 ^{5} N/m^2 = 100 kPa.

3.6.1 For all types of end connections the tail shall be specially designed to have a scroll or protrusion on the surface which will engage the inner wire of the hose.

NOTE For hoses of 75 mm bore and below, hose tails complying with the requirements of BS 2464 may be used, provided that agreement be reached between the purchaser and the manufacturer.

3.6.2 Before securing the tail, the cut end of the hose shall be sealed with epoxy resin or other suitable sealant.

4 Manufacture

Manufacture shall be carried out in clean conditions to avoid the inclusion of foreign bodies that may damage the wall of the hose.

5 Prototype test

5.1 Hydrostatic test

5.1.1 *General.* The manufacturer shall carry out the test procedure detailed in **5.1.2** on each new prototype hose assembly. The test results, including the burst pressure, shall be stated on the certificate. A copy of the certificate shall be supplied to the purchaser, if required.

5.1.2 *Procedure.* The procedure stated below shall be followed.

a) The appropriate hydrostatic proof pressure test shall be carried out as described in **6.4**.

b) The hose assembly shall be bent to the appropriate radius specified in Table 1. Whilst in the bent position, the pressure test specified in a) shall be repeated.

c) The hose assembly shall then be released from the bent position and a hydrostatic pressure, equal to four times the design working pressure shall be applied.

d) This pressure shall be attained over a period of 15 min and then maintained for a further period of 15 min without failure of any kind.

e) The pressure shall then be raised until the hose assembly fails and the pressure at which it fails shall be recorded.

5.2 Chemical resistance test. After being subjected to the resistance test described in Appendix A, the ratio of burst pressure to design working pressure shall not fall below 4 : 1.

6 Performance requirements

6.1 Bend radius. Each assembly shall be capable of being bent, at working pressure, to the radii shown in Table 1, without resultant damage.

The bend radius is measured to the surface of the hose inside the bend.

6.2 Electrical continuity. The electrical resistance of each assembly, measured from end fitting to end fitting, shall not exceed 10 Ω and this value shall be maintained during and after proof pressure tests. The electrical continuity shall be established in accordance with the methods given in clause **5** of BS 5173-4:1977.

6.3 Vacuum test. Each assembly shall be capable of withstanding a vacuum of 0.9 bar gauge for 30 min without resultant damage when tested in accordance with clause **5** of BS 5173-3:1977.

6.4 Pressure requirements. When tested as described in **4.4** of BS 5173-2:1977, except that the rate of increase of pressure shall be not less than 1.7 bar/m, each assembly shall comply with the following requirements:

a) proof pressure: 15 bar;

b) maximum elongation at proof pressure: 12 %.

7 Marking and identification

Hose assemblies shall carry the following information:

a) the number of this British Standard, i.e. BS 5842[2)];

b) the manufacturer's name or trade mark and type number;

c) the hose serial number;

d) the month and year of manufacture (e.g. 6/1980);

e) nominal bore;

f) test pressure.

NOTE 1 This information may be stamped on the termination or printed on an attached metal tag.

NOTE 2 Hose may be identified by a coloured cover or other marking, as agreed between the purchaser and the manufacturer.

[2)] Marking BS 5842 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. Enquiries 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.

Appendix A Chemical resistance test

The procedure stated below should be followed.

a) Prepare two assemblies of minimum length 1 m.

b) Form the samples into a "U" bend and fill the hose with commercially pure toluene.

c) Seal the assemblies and maintain at room temperature for a minimum time of 7 days.

d) Remove the test fluid and flush out the hose with water.

e) Subject the assemblies to a burst pressure test as specified in BS 5173-2.

NOTE Attention is drawn to the Health and Safety at Work etc. Act 1974 and to the need for ensuring that these tests are carried out under suitable environmental conditions and that personnel are adequately protected.

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Publications referred to

BS 1554, *Rust, acid and heat resisting steel wire.*
BS 2464, *Hose couplings for petrol, oil and lubricants (¾ in to 4 in nominal size).*
BS 3592, *Steel wire for rubber hose reinforcement.*
BS 3592-1, *Coated round and flat mild steel wire.*
BS 3592-2, *Coated patented steel wire.*
BS 5173, *Methods of test for hoses.*
BS 5173-2, *Hydraulic pressure tests.*
BS 5173-3, *General physical tests.*
BS 5173-4, *Electrical tests.*

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