

BRITISH STANDARD 3284:1967

UDC 621.643.2:678.742.2—462:696.11

**SPECIFICATION FOR
POLYTHENE PIPE
(TYPE 50)
FOR COLD WATER
SERVICES**

BRITISH STANDARDS INSTITUTION

**SPECIFICATION FOR
POLYTHENE PIPE
(TYPE 50)
FOR COLD WATER SERVICES**

BS 3284 : 1967

Incorporating amendments issued September 1973 (AMD 1237) and
November 1974 (AMD 1615)

BRITISH STANDARDS INSTITUTION

Incorporated by Royal Charter

2 PARK STREET, LONDON, W1A 2BS

Telex: 266933

Telephone: 01-629 9000

THIS BRITISH STANDARD, having been approved by the Plastics Industry Standards Committee and endorsed by the Chairman of the Chemical Divisional Council, was published under the authority of the General Council on 29 September, 1967.

First published, May, 1961.

First revision, June, 1963.

Second revision, September, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

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.

A complete list of British Standards, numbering over 9,000, fully indexed and with a note of the contents of each, will be found in the BSI Catalogue which may be purchased from BSI Sales Department. The Catalogue may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

- BS 21. Pipe threads.
- BS 572. Interchangeable conical ground glass joints.
- BS 1710. Identification of pipelines.
- BS 1792. One-mark volumetric flasks.
- BS 1972. Polythene pipe (Type 32) for cold water services.
- BS 2782. Methods of testing plastics.
- BS 3412. Polythene materials for moulding and extrusion.
- BS 3867. Dimensions of pipes of plastics materials (outside diameters).
- BS 4159. Colour marking of plastics pipes to indicate pressure ratings.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee references PLC/9, PLC/9/2 Draft for comment 66/29261

CO-OPERATING ORGANIZATIONS

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

Board of Trade
 British Electrical and Allied Manufacturers' Association
 *British Plastics Federation
 Electrical Research Association
 *Engineering Equipment Users' Association
 *Ministry of Defence, Army Department
 *Ministry of Defence, Navy Department
 *Ministry of Public Building & Works, Building Research Station
 Ministry of Technology
 *Oil Companies Materials Association
 Plastics Institute
 Post Office
 *Royal Institute of British Architects
 Royal Institute of Public Health & Hygiene
 Rubber and Plastics Research Association of Great Britain
 Society of Motor Manufacturers and Traders Ltd.
 Surface Coating Synthetic Resin Manufacturers' Association

The Government departments and scientific and industrial 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 Chemical Plant Manufacturers' Association
 British Industrial Biological Research Association
 British Mechanical Rubber Manufacturers' Association
 British Waterworks Association
 Chemical Industries Association
 Copper Tube Fittings Manufacturers' Association
 Federation of British Rubber and Allied Manufacturers
 Gas Council
 Gas List Tube Association
 Institute of Brewing
 Institute of Plumbing
 Institution of Civic Engineers
 Institution of Municipal Engineers
 Institution of Public Health Engineers
 Institution of Water Engineers
 Lloyd's Register of Shipping
 Ministry of Agriculture, Fisheries and Food
 Ministry of Health
 Ministry of Housing and Local Government
 Ministry of Public Building and Works
 National Brassfoundry Association
 National Coal Board
 National Federation of Plumbers and Domestic Heating Engineers
 Plastic Pipe Manufacturers' Society
 Water Companies Association
 Water Research Association

BRITISH STANDARD SPECIFICATION FOR POLYTHENE PIPE (TYPE 50) FOR COLD WATER SERVICES

FOREWORD

This British Standard has been prepared under the authority of the Plastics Industry Standards Committee. The present issue incorporates the amendments made to the previous edition, published in 1963, in respect of composition requirements. In addition, certain innovations are included; among these changes is the table of dimensions which, whilst still classifying pipe according to pressure ratings, now specifies dimensions that are in accordance with BS 3867*.

The opportunity has been taken to express dimensional characteristics in metric units. However, it has been decided to continue to express the **nominal** size of pipes in inches because it is thought that considerable confusion would be caused if these were changed to metric units at this stage.

The appendix giving notes on the use of pipe dealt with in the standard is no longer included. This appendix has been withdrawn in view of the intended publication of CP . . . † which has been prepared to assist users in assessing the suitability of plastics pipes for particular purposes and to ensure their proper application.

The type designation (50) indicates the recommended maximum working stress for the material, in kilogrammes-force per square centimetre, at 20°C when in pipe form. This stress has been used as the basis for calculating the minimum wall thickness. A specification for polythene pipe (Type 32) for cold water services is provided in BS 1972‡.

Throughout this standard the name 'polythene' is used. It should be noted that this name is equivalent to the name 'polyethylene'.

SPECIFICATION

1. SCOPE

This British Standard applies to black polythene pipe (Type 50) for use in cold water services, and in flush, overflow, warning and waste pipe applications.

2. COMPOSITION

2.1 Extrusion compound. The compound shall be manufactured from a mixture of the following:

2.1.1 Polythene with a density greater than 0.93 g/ml at 20°C. This includes copolymers of ethylene and higher olefins in which the higher olefin consti-

*BS 3867, 'Dimensions of pipes of plastics materials (outside diameters)'.

†CP . . . , 'Plastics pipework (thermoplastic material)', Part 1, 'General principles and choice of material', Part 3, 'Low-density and high-density polythene'. (In course of preparation.)

‡BS 1972, 'Polythene pipe (Type 32) for cold water services'.

tuent does not exceed 10% and the density falls between 0.946 g/ml and 0.955 g/ml at 20°C.

2.1.2 Carbon black, in such amount that when the compound is tested by Method 405A of BS 2782*, the carbon black content shall be $2.5 \pm 0.5\%$.

The carbon black shall comply with the following requirements:

Density; 1.5–2.0 g/ml.

Maximum volatile matter; 9.0% by mass.

Average particle size; 0.010–0.025 μm .

Toluene extract: not more than 0.10% by mass when determined by the method described in Appendix A.

2.1.3 Antioxidant, in such amount that when the compound is tested by Method 405B or 405D of BS 2782*, or by the method described in the appropriate appendix, the antioxidant content shall not be more than 0.30% by mass.

The antioxidant used shall be one of the following:

- (1) *NN'*-2-di-naphthyl-*p*-phenylenediamine. with melting range of 228–235°C (See Method 405B of BS 2782).
- (2) 4-aminophenol *N*-stearate (see Method 405D of BS 2782).
- (3) 4,4'-thiodi-(6-*tert*butyl-*m*-cresol) (see Appendix B).
- (4) 1,1,3-tri-(5-*tert*butyl-4-hydroxy-2-methylphenyl)butane (see Appendix C).
- (5) Octadecyl 3-(3,5-di-*tert*butyl-4-hydroxyphenyl) propionate (see Appendix G). *As added
Sept., 1973*
- (6) Pentaerythritol tetra-3-(3,5-di-*tert*butyl-4-hydroxyphenyl) propionate (see Appendix H).
- (7) 1,1-di(3-*tert*butyl-4-hydroxy-6-methylphenyl) butane (see Appendix J).

The addition of the manufacturer's own rework material produced during the manufacture and works testing of pipe complying with this standard, is permissible. No other rework material shall be used.

The compound, when tested by Method 105C of BS 2782*, shall have a melt flow index not exceeding 0.4.

NOTE. Extrusion compound conforming to Type WA of BS 3412, 'Polythene materials for moulding and extrusion', satisfies the requirements of this standard in respect of carbon black content and average particle size of the carbon black and content of permitted antioxidants.

2.2 Pipe material. The extruded pipe shall contain $2.5 \pm 0.5\%$ by mass of carbon black when tested by Method 405A of BS 2782*.

The carbon black dispersion shall be satisfactory when tested by the microtome technique described in Method 510A of BS 2782*. Figs. 1–6 illustrate satisfactory dispersion and Figs. 7–12 illustrate unsatisfactory dispersion.

*As amended
Sept., 1973*

*BS 2782, 'Methods of testing plastics'.

The antioxidant content of the pipe shall be not less than 0.02 % by mass when tested by Method 405B or 405D of BS 2782* or by the method described

The ingredients in 2.1.2 and 2.1.3 shall be evenly dispersed in the pipe material.

When tested, samples of the pipe shall conform to the requirements of E.3.

3. DESIGNATION OF DIMENSIONAL CHARACTERISTICS

Pipe dimensions shall be designated by the nominal size. Outside diameters comply with BS 3867*.

4. CLASSIFICATION OF PIPES

4.1 Pipes are classified by maximum sustained working pressures as follows:

Class C, 9.1 kgf/cm²; 0.89 MN/m²; 300 ft hd: 130 lbf/in².

Class D, 12.2 kgf/cm²; 1.20 MN/m²; 400 ft hd : 173 lbf/in².

The maximum sustained working pressures given above are based on water at a temperature of 20°C. These pressures are the respective maximum sustained working pressures for which the pipes are suitable for use.

4.2 Class C pipes of $\frac{3}{4}$ in to 4 in nominal size and Class D pipes may be threaded using taper pipe threads conforming to BS 21†.

NOTE. Care should be taken not to cut too long a thread.

5. DIMENSIONS

5.1 Pipes shall conform to the outside diameters and wall thicknesses given in Table 1.

5.2 As a temporary measure for the disposal of existing stocks, pipes complying with the sizes of Tables 1 and 2 of BS 3284: 1963 shall be deemed to comply with this standard until 31st March 1968, provided they comply with all the other requirements of this standard.

6. METHOD OF MEASURING DIMENSIONAL CHARACTERISTICS

The outside diameter shall be the average of two measurements taken at right angles round the pipe. The wall thickness shall be measured with a ball ended or barrel ended micrometer.

7. PHYSICAL CHARACTERISTICS

7.1 **Appearance.** The internal and external surfaces of the pipe shall be smooth, clean and reasonably free from grooves and other defects.

*BS 3867, 'Dimensions of pipes of plastics materials (outside diameters)'.

†BS 21, 'Pipe threads'.