

BRITISH STANDARD 1972 : 1967

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SPECIFICATION FOR
POLYTHENE PIPE
(TYPE 32)
FOR COLD WATER
SERVICES

BRITISH STANDARDS INSTITUTION



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SPECIFICATION FOR
POLYTHENE PIPE
(TYPE 32)
FOR COLD WATER SERVICES

BS 1972 : 1967

Incorporating amendments issued January, 1969 (AMD 190)
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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 1953.

First revision, October 1961.

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 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook. The BS Yearbook 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 2782. Methods of testing plastics.
- BS 3284. Polythene pipe (Type 50) for cold water services.
- BS 3867. Dimensions of pipes of plastics materials (outside diameters).
- BS 3978. Water for laboratory use.
- BS 4159. Colour marking of plastics pipes to indicate pressure ratings.

*As altered
Feb., 1977*

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 66/29260

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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 and 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 Civil 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

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BRITISH STANDARD SPECIFICATION FOR
POLYTHENE PIPE (TYPE 32)
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 1961, 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 classification of pipe by gauge has been abandoned and classification by pressure ratings is adopted instead.

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.

Attention is drawn to the recommendations contained in CP . . . † which is being prepared to assist users in assessing the suitability of plastics pipes for particular purposes and to ensure their proper application.

The type designation (32) 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 thicknesses. A specification for polythene pipe (Type 50) for cold water services is provided in BS 3284‡.

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 32) for use in cold water services, and in flush, overflow, warning and waste pipe applications.

2. COMPOSITION

*As altered
Feb., 1977*

2.1 Materials. The materials used for the manufacture of pipe shall be the following:

*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 3284, 'Polythene pipe (Type 50) for cold water services'.

2.1.1 Polythene with a density not greater than 0.93 g/ml at 20°C.

2.1.2 Carbon black equivalent to a content of 2.5 ± 0.5 % and complying 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 as to be equivalent to a content not greater than 0.30% by mass when determined by the appropriate method.

The antioxidant used shall be one of the following:



(1) 4,4'-thiodi-(6-*tert*-butyl-*m*-cresol) (see Appendix B);

(1) di-[2-hydroxy-5-methyl-3-(1-methylcyclohexyl) phenyl]methane (see Appendix C).

(2) 2,6-di-*tert*-butyl-*p*-cresol (see Appendix D).

(3) 1,1,3-tri-(5-*tert*-butyl-4-hydroxy-2-methylphenyl)butane (see Appendix E).

(4) octadecyl 3-(3,5-di-*tert*-butyl-4-hydroxyphenyl) propionate (see Appendix J).

(5) Pentaerythritol tetra-3-(3,5-di-*tert*-butyl-4-hydroxyphenyl) propionate (see Appendix K).

(6) 1,1-di-(3-*tert*-butyl-4-hydroxy-6-methylphenyl) butane (see Appendix L).

Not more than 0.5% by mass of either didodecyl-3,3'-thiodipropionate or dioctadecyl-3,3'-thiodipropionate as determined by the method described in Appendix M may be present.

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 2.6.

2.2 Pipe material. The extruded pipe shall contain 2.5 ± 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.

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

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

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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 B, 6.1 kgf/cm² : 0.60 MN/m² : 200 ft hd : 86.7 lbf/in².

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 1 in to 3 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 Table 1 of BS 1972 : 1961 (as amended by the issue of Amendment No. 1, PD 4963) 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.

As altered Sept., 1973 7.2 Heat reversion. When tested by the method described in Appendix F, at no point round the pipe shall the length change by more than 3%.

*BS 2782, 'Methods of testing plastics.'

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

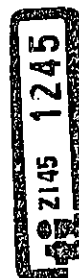
‡BS 21, 'Pipe threads'.

TABLE 1. PIPE DIMENSIONS

As altered Nov., 1969

Nominal size	Outside diameter		Wall thickness					
			Class B 5.1 kgf/cm ² (0.60 MN/m ² ; 200 ft hd; 86.7 lbf/in ²)		Class C 9.1 kgf/cm ² (0.89 MN/m ² ; 300 ft hd; 130 lbf/in ²)		Class D 12.2 kgf/cm ² (1.23 MN/m ² ; 400 ft hd; 173 lbf/in ²)	
			Min.	Max.	Min.	Max.	Min.	Max.
in	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
3/8	17.0 (0.669)	17.3 (0.681)	—	—	2.2 (0.087)	2.5 (0.098)	2.8 (0.110)	3.1 (0.122)
1/2	21.2 (0.835)	21.5 (0.847)	—	—	2.7 (0.106)	3.0 (0.118)	3.4 (0.134)	3.7 (0.146)
3/4	26.6 (1.047)	26.9 (1.059)	—	—	3.4 (0.134)	3.7 (0.146)	4.3 (0.169)	4.7 (0.185)
1	33.4 (1.315)	33.7 (1.327)	2.3 (0.091)	2.6 (0.102)	4.2 (0.165)	4.6 (0.181)	5.4 (0.213)	5.9 (0.232)
1 1/4	42.1 (1.657)	42.5 (1.673)	3.0 (0.118)	3.3 (0.130)	5.3 (0.209)	5.8 (0.228)	6.8 (0.268)	7.5 (0.295)
1 1/2	48.1 (1.894)	48.5 (1.910)	3.7 (0.146)	4.1 (0.161)	6.1 (0.240)	6.7 (0.264)	7.8 (0.307)	8.6 (0.338)
2	60.1 (2.366)	60.6 (2.386)	4.3 (0.169)	4.7 (0.185)	7.6 (0.299)	8.4 (0.331)	—	—
3	88.6 (3.488)	89.3 (3.516)	5.3 (0.209)	5.8 (0.228)	11.2 (0.441)	12.3 (0.484)	—	—
4	113.9 (4.484)	114.7 (4.516)	7.8 (0.307)	8.6 (0.339)	—	—	—	—

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8. MECHANICAL CHARACTERISTICS

8.1 Hydraulic pressure resistance

8.1.1 General test. When tested by the method described in G.1 the pipes shall show no signs of localized swelling, leakage or weeping.

8.1.2 Batch test. When tested by the method described in G.2, samples of pipe shall withstand a pressure equivalent to a stress of 80 kgf/cm² (7.84 MN/m²: 1140 lbf/in²) for a period of 1 h without localized swelling, leakage or weeping.

8.2 Tensile strength. The tensile strength of the pipes shall be not less than 112 kgf/cm² (10.98 MN/m²: 1600 lbf/in²) and the elongation at break not less than 350%, when tested by the method described in Appendix H.

9. SAMPLING

9.1 Physical characteristics

9.1.1 Appearance. Every coil or length shall be inspected.

9.1.2 Heat reversion. Three representative samples shall be taken at random from each extrusion run, at intervals not exceeding 8 h. Should any test piece fail, the batch shall be retested using a further six samples selected at random. All six of these samples shall satisfy the requirements of the standard otherwise the batch shall be deemed not to comply with the standard.

A batch is defined as a continuous extrusion run of one size and class of pipe from one extrusion compound up to a maximum of 8 hours duration.

9.2 Mechanical characteristics

9.2.1 Hydraulic pressure resistance

9.2.1.1 General test. Each coil shall comply with the requirements of the standard.

9.2.1.2 Batch test. One representative sample shall be taken at random from each extrusion run, at intervals not exceeding 8 h. Should any test piece fail, a further two samples shall be taken at random from the same batch. Both these samples shall satisfy the requirements of the standard, otherwise the batch shall be deemed not to comply with the standard.

9.2.2 Tensile strength. One representative sample shall be taken at random from each extrusion run, at intervals not exceeding 8 h. Should any test piece fail, a further two samples shall be taken at random from the same batch. Both these samples shall satisfy the requirements of the standard, otherwise the batch shall be deemed not to comply with the standard.

9.3 Notwithstanding the requirements of 9.1 and 9.2 in respect of sampling for testing by the manufacturer, pipe tested by the purchaser or otherwise, subsequent to manufacture, shall comply with all the requirements of this standard.