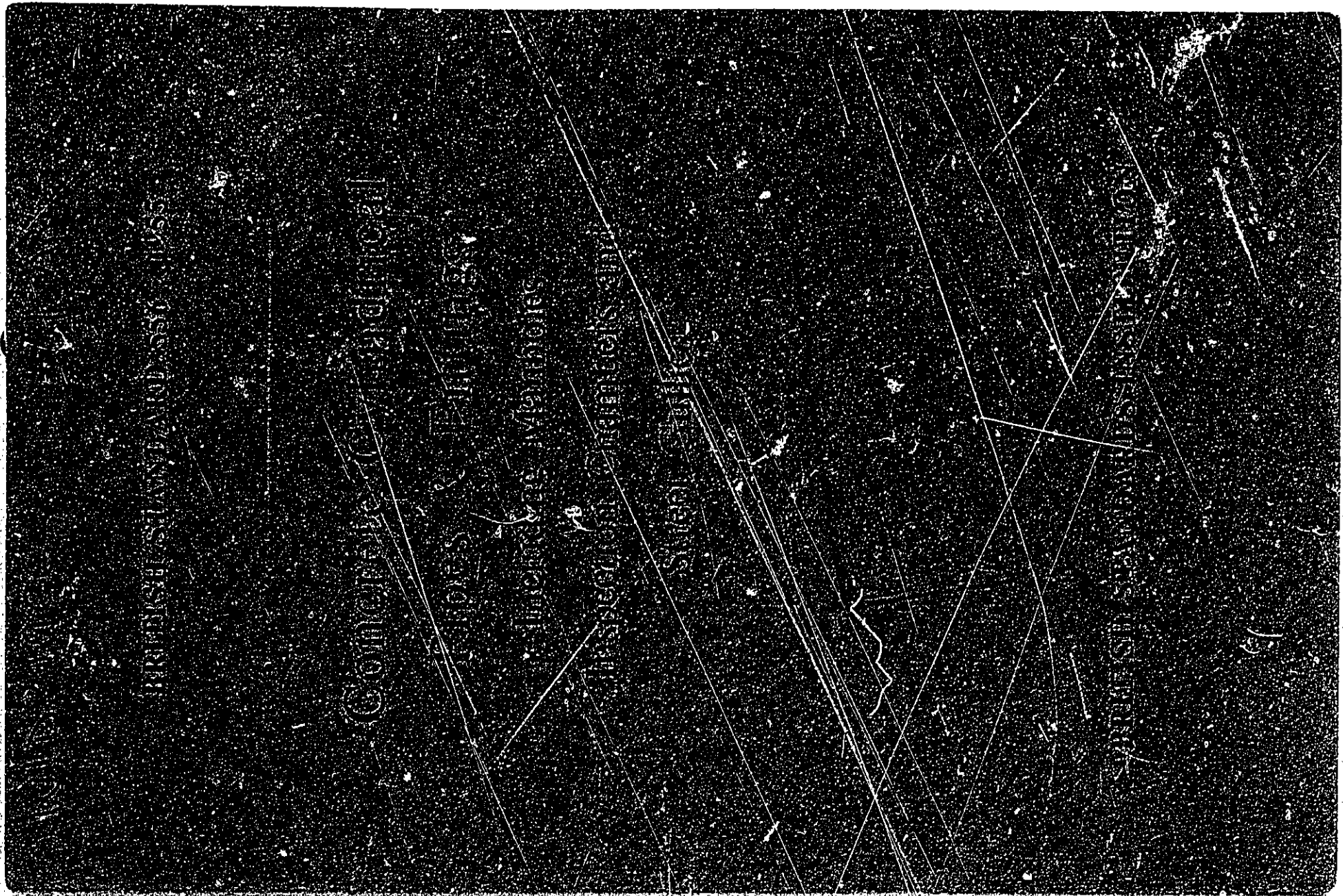




BRITISH STANDARD SPECIFICATION

CONCRETE CYLINDRICAL

PIPES & FITTINGS

INCLUDING MANHOLES

INSPECTION CHAMBERS AND

STREET GULLIES

B.S. 556 : 1955

Price ~~2s~~ net

6/-

BRITISH STANDARDS INSTITUTION

INCORPORATED BY ROYAL CHARTER

BRITISH STANDARDS HOUSE, 2 PARK ST., LONDON, W.1

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THIS BRITISH STANDARD, having been approved by the Cement, Lime and Gypsum Industry Standards Committee and endorsed by the Chairman of the Building Divisional Council, was published under the authority of the General Council on 3rd October, 1955.

First published, May, 1945

First revision, September, 1955.

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 2500, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 12s. 6d.

This standard makes reference to the following British Standards:—

B.S. 12. Portland cement (ordinary or rapid-hardening).

B.S. 146. Portland-blastfurnace cement.

B.S. 410. Test sieves.

B.S. 882. Concrete aggregates from natural sources.

~~B.S. 903. Part 10. Methods of testing vulcanized rubber.~~

B.S. 915. High alumina cement.

B.S. 1247. Manhole step irons.

B.S. 1831. Methods of testing concrete.

~~B.S. 963. Methods of testing vulcanized rubber, Part A.1.~~
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 B.S.I. references relate to the work on this standard:—
 Committee reference CEB/6/3 Draft for comment CV(CEB)3717

CO-OPERATING ORGANIZATIONS

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

Admiralty

Air Ministry

*Association of Consulting Engineers (Incorporated)

*Ballast Sand & Allied Trades Association

*British Cast Concrete Federation

*British Granite and Whinstone Federation

*British Railways, The British Transport Commission
 London Transport Executive, The British Transport Commission

*Cast Stone & Concrete Federation

Cement & Concrete Association

*Cement Makers' Federation

Chalk Quarrying Association

*D.S.I.R.—Building Research Station

*Federation of Civil Engineering Contractors

Gypsum Building Products Association

*Institution of Civil Engineers

*Institution of Municipal Engineers

*Institution of Structural Engineers

Institution of Water Engineers

*Limestone Federation

London County Council

*Ministry of Housing and Local Government

*Ministry of Transport and Civil Aviation

*Ministry of Works

National Federation of Building Trades Employers

Reinforced Concrete Association

*Royal Institute of British Architects

Royal Institution of Chartered Surveyors

Southern Lime 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 Whiting Federation

County Surveyors' Society

General Post Office

London Chamber of Commerce

Royal Society for the Promotion of Health

Society of Chemical Industry

War Office

BRITISH STANDARD SPECIFICATION FOR CONCRETE CYLINDRICAL PIPES AND FITTINGS INCLUDING MANHOLES, INSPECTION CHAMBERS AND STREET GULLIES

NOTE. For cast iron manhole covers and gully frames, see B.S. 497.

FOREWORD

This British Standard has been revised under the authority of the Cement, Lime and Gypsum Industry Standards Committee, in order to bring it into line with current practice and to introduce improvements in the specification resulting from experience gained since the last edition was published in May, 1945.

This revision introduces the use of sulphate resisting Portland cement. Limits for the hardness of the rubber pad used in the crushing test have been introduced as a help in the reduction of variations in the bearing surface transmitting the load to the pipe during the test, as it has been found that variations have arisen from the use of rubber pads of widely varying degrees of hardness.

The axial length of each ogee or rebated end of a pipe has been revised so that the length is now related to the diameter of the pipe. This change provides a joint of a length which depends upon the bore of the pipe and not on the thickness of the wall of the pipe. This change also reduces the possibility of unnecessarily long and frail tips.

An appendix is included listing information to be given by the purchaser in his enquiry.

SPECIFICATION

SCOPE

1. This British Standard covers concrete cylindrical pipes and fittings, which include concrete collars, bends and concrete junctions. The standard also includes manholes and concrete inspection chambers for drainage purposes together with unreinforced concrete street gullies.

DEFINITIONS

2. For the purposes of this British Standard the following definitions shall apply:—

a. Pipe. A hollow cylinder made of cement concrete of uniform internal diameter and thickness of wall throughout its length, except for

the joint. Joints may be spigot and socket, ogee, rebated, plain butt ends, or any other approved type.

For socket or similar joints, the internal and external diameters at one end are enlarged to form a socket into which the spigot end of a similar pipe can enter to form a joint.

b. Barrel. That portion of a pipe throughout which the internal diameter and thickness of wall remain uniform.

c. Manhole. A chamber of not less than 36 in. internal diameter, with or without access shaft, constructed over a sewer or principal drain to permit of inspection and access for rodding.

d. Inspection chamber. A chamber constructed over a subsidiary sewer or drain of not more than 9 in. diameter to permit of inspection and access for rodding.

e. Loose collar. A loose hollow cylinder of sufficient diameter to embrace the ends of adjacent pipes.

SECTION ONE : PIPES

MATERIALS

3. The concrete shall consist of a mixture of any one of the cements and aggregates specified herein together with clean water such as will produce pipes or fittings to satisfy all the requirements of this standard.

CEMENT

4. The whole of the cement used in the manufacture of the pipes and fittings shall comply, except as hereinafter provided, in all respects with the provisions of B.S. 12, 'Portland cement (ordinary or rapid-hardening)' or B.S. 146, 'Portland-blastfurnace cement' in force at the date of the manufacture of the pipes and fittings.

High alumina cement complying with B.S. 915 and sulphate resisting Portland cement, complying with all the requirements of B.S. 12, may also be used with the approval of the purchaser.

AGGREGATE

5. The aggregate shall comply with the provisions of Clauses 3 and 3 *a.* of B.S. 882, 'Concrete aggregates from natural sources'. When required a sample of the aggregate shall be submitted to the purchaser for approval with the tender. For pipes and fittings up to and including 36 in. nominal internal diameter the whole of the aggregate shall pass through a sieve*

* B.S. 410, 'Test sieves'.

having meshes not exceeding $\frac{1}{2}$ in. square, and for pipes and fittings above that diameter through a sieve having meshes not exceeding $\frac{3}{4}$ in. square.

PROTECTION FROM FROST

6. No material that has been exposed to the action of frost shall be used until such material has been completely thawed. Pipes and fittings shall be protected from damage by frost.

MOULDS AND METHOD OF MANUFACTURE

7. The moulds and method of manufacture shall be such that the form and dimensions of the finished work are accurate within the limits hereinafter specified, the surfaces and edges clean and true, the ends square with the longitudinal axis, and the concrete dense and homogeneous.

Tamping, pressure, vibration, centrifugal action or other effective method shall be used to compact the concrete.

MARKING OF PIPES AND FITTINGS

8. Each pipe and fitting shall be impressed, while being moulded, with the day, month and year of manufacture (e.g. 5/7/55), or with other suitable means of identification of date. The characters shall be not less than $\frac{3}{4}$ in. high and approximately $\frac{1}{16}$ in. deep. Where sulphate resisting Portland cement or high alumina cement has been used, each pipe or fitting made from such material shall also be marked with the letter S or A as appropriate. Alternatively the marking may be done by indelible black paint applied by stencil or brush immediately after removal from the moulds, the lettering being of such a size as to be readily legible. The manufacturer shall, if required by the purchaser, furnish a certificate confirming the date of manufacture of the pipes or fittings comprising the order, the certificate being in the form set out in Appendix B.

LENGTHS

9. The normal effective length E (see Fig. 1) of a straight pipe shall be 3 ft, 4 ft, 6 ft, or 8 ft.

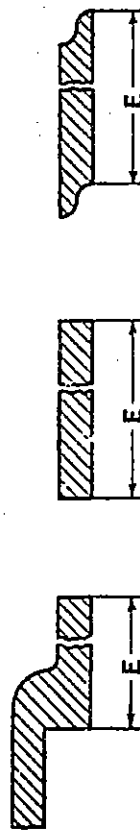


Fig. 1. Diagrams illustrating effective lengths of pipes

NOMINAL INTERNAL DIAMETER OF PIPES

10. The nominal internal diameters of pipes shall be in accordance with Column 1 of Table 1.

PERMISSIBLE DEVIATION FROM NOMINAL INTERNAL DIAMETER

11. The internal diameter of any pipe throughout the effective length shall nowhere deviate from the nominal internal diameter by more than the amount set out in Column 2 of Table 1 for the appropriate diameter of the pipe.

PERMISSIBLE VARIATION IN THICKNESS OF WALLS

12. The radial thickness of the wall of a pipe or fitting shall nowhere vary by more than the amount set out in Column 3 of Table 1 for the appropriate diameter of the pipe or fitting.

PERMISSIBLE DEVIATION FROM STRAIGHTNESS

13. The permissible deviation from straightness of any pipe throughout the effective length, measured on the inside on a line parallel to the longitudinal axis of the pipe and tested by means of a rigid straightedge shall not exceed for all diameters $\frac{1}{8}$ in. for every 3 ft of length.

INTERNAL DIAMETER OF SOCKETS

14. The internal diameter of the socket of a pipe or fitting shall be such that the minimum clearance between the inner surface of the socket and the outer surface of the spigot of the entering pipe or fitting when the two pipes or the pipe and fitting are placed concentrically, shall be not less than the amount set out in Column 4 of Table 1 for the appropriate diameter of pipe or fitting.

MINIMUM DEPTHS OF SOCKETS

15. The minimum depth of the socket of a pipe measured from its outer end shall be not less than the amount set out in Column 5 of Table 1, for the appropriate diameter of pipe. In any one pipe the difference between the depths of the socket at any two points shall not exceed $\frac{1}{8}$ in.

OGEE OR REBATED ENDS OF PIPES

16. The axial length of each ogee or rebated end of a pipe shall be not less than $(D/36 + \frac{1}{2})$ in. where D is the internal diameter of the pipes in inches.

TESTS

17. The pipes and loose collars in accordance with Clause 18, shall be subjected to the following tests:—

a. *Hydraulic proof test.* The pipe or loose collar shall withstand an internal hydraulic pressure of 20 lb/sq. in. applied on the barrel, or, if so specified by the purchaser, upon the complete pipe or loose collar without

* In order to allow for the use of certain forms of joints the minimum dimensions for the clearance and for the depth of the socket as specified in these clauses may be modified provided the approval of the purchaser is first obtained.

showing signs of injury or sweating. The pressure shall be applied at a rate not exceeding 10 lb/sq. in. in five seconds, and full pressure shall be maintained for at least half a minute. Care shall be taken that there is no air in the pipe or loose collar when the pressure is applied. When testing ogee and rebated pipes the ogee and rebated ends may be suitably protected.

b. Absorption test. From each pipe or loose collar selected, a test piece of the full thickness of the pipe or loose collar and approximately 4 in. square, all edges being broken, shall be taken.

The test pieces shall be dried for 72 hours in a suitably ventilated drying oven, the temperature of which, as measured by a thermometer suspended centrally, is between 185°F and 204°F (85°C and 95°C). On removal from the oven they shall at once be weighed and immediately submerged in water, the temperature of which is between 58°F and 64°F (14.4°C and 17.8°C), for a period of ten minutes, at the end of which time they shall be taken out, immediately wiped with a dry cloth for a period of half a minute, and again weighed. They shall then be submerged in water again for a total period of 24 hours, at the end of which time they shall be taken out, wiped with a dry cloth and weighed. The increase in weight by absorption of water in the first ten minutes shall not exceed 2.5 per cent of the dry weight of the test piece, nor shall the total absorption exceed 6.5 per cent of the dry weight.

c. Crushing proof test. Each pipe or loose collar to be tested shall be placed centrally between, and with its longitudinal axis parallel to, two hard unyielding bearers of 6 in. width, with rubber packing 6 in. wide and 1 in. thick between the bearers and the pipe (see Fig. 2). The hardness of the rubber packing shall be between 50 and 60 British Standard degrees of hardness measured in accordance with the British Standard hardness test for vulcanized rubber as defined in the current edition of B.S. 903: Part 19, Methods of testing vulcanized rubber.*

The bearers shall have true plane surfaces and shall extend the full length of the barrel of the pipe or loose collar. The load shall be steadily and uniformly applied, starting from zero, at a rate not exceeding 112 lb per foot length of pipe or loose collar in ten seconds. The pipe or loose collar shall support without any sign of failure for at least one minute a minimum load of 1350 lb per foot of length.

SAMPLES FOR TESTING

18. *a. Number of pipes or fittings (where applicable) to be selected for the hydraulic test.* From each batch of pipes or fittings submitted for inspection the purchaser or his representative may, if he so desires select pipes or fittings for the hydraulic test specified in Clauses 17 a, 25 a and 29 a as follows:—

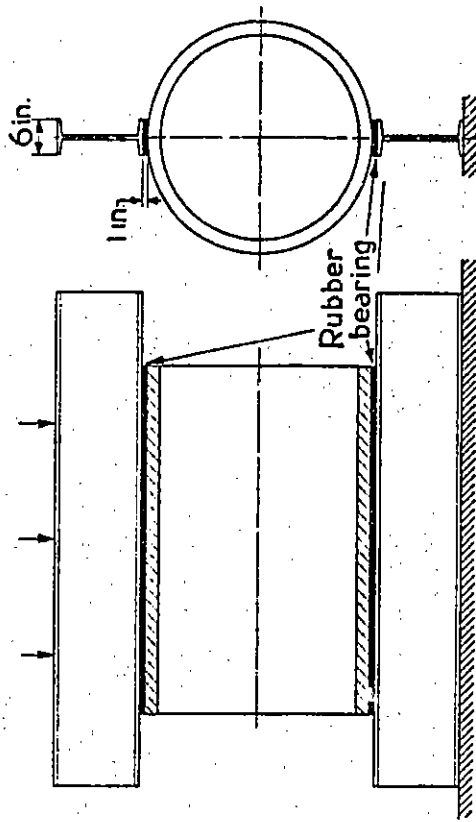


Fig. 2. Diagram illustrating method of carrying out the crushing test

Two per cent of the pipes or fittings when the batch comprises 500 pipes or fittings or less, and if the batch comprises more than 500 pipes or fittings, 2 per cent of the first 500 and one pipe or fitting from every 100 or part thereof beyond this number. On orders of less than 100 pipes or fittings the number of pipes to be tested shall be agreed between the manufacturer and the purchaser.

Should all the pipes or fittings selected pass the test the whole of the pipes or fittings comprising the batch shall be deemed to comply with this test. If one pipe or fitting fails, the purchaser or his representative may select from the same batch a further similar number for testing, and if all of such further pipes or fittings comply with the test the whole of the pipes or fittings comprising the batch shall be deemed to comply with this test. If any of the pipes or fittings selected for the re-test fail, then the purchaser or his representative may require all of the remaining pipes or fittings to be tested, and in that event only such as comply with the test shall be accepted.

b. Number of pipes or fittings (where applicable) to be selected for the absorption test. From each batch of 100 pipes or fittings or any smaller number submitted for inspection, the purchaser or his representative may, if he so desires, select one pipe or fitting for the absorption test specified in Clauses 17 b, 25 b, 29 b, and 36 a. If this pipe or fitting fails the purchaser or his representative may select from the same batch two further pipes or fittings for testing and if both comply with the test the batch represented shall be accepted, but if either fails the whole of the batch represented shall be deemed not to comply with this test.

c. Number of pipes to be selected for the crushing proof test.* From each batch of pipes submitted for inspection the purchaser or his representative

* Applies also to loose collars for testing.