



BRITISH STANDARD 340 : 1963

SPECIFICATION FOR
PRE-CAST CONCRETE
KERBS, CHANNELS
EDGINGS & QUADRANTS

BRITISH STANDARDS INSTITUTION

Gr 4

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PRE-CAST CONCRETE
KERBS, CHANNELS
EDGINGS & QUADRANTS**

B.S. 340 : 1963

BRITISH STANDARDS INSTITUTION

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THIS BRITISH STANDARD, having been approved by the Cement, Lime and Gypsum Products Industry Standards Committee and endorsed by the Chairman of the Building Divisional Council, was published under the authority of the General Council on 30th September, 1963.

First published October, 1928.

First revision July, 1936.

Second revision July, 1950.

Third revision September, 1963.

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.

This standard makes reference to the following British Standards:

- B.S. 12. Portland cement (ordinary and rapid hardening).
- B.S. 146. Portland-blastfurnace cement.
- B.S. 812. Methods for sampling and testing of mineral aggregates, sands and fillers.
- B.S. 882. Coarse and fine aggregates from natural sources for concrete.
- B.S. 915. High alumina cement.
- B.S. 1014. Pigments for cement, magnesium oxychloride and concrete.
- B.S. 1047. Air-cooled blastfurnace slag coarse aggregate for concrete.
- B.S. 1610. Verification of testing machines. Part 1. Methods of load verification, requirements for elastic proving devices, and verification of machines for tension and compression testing.

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 references CEB/6 and CEB/6/4
Draft for comment D62/7929

CO-OPERATING ORGANIZATIONS

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

- Air Ministry
- Association of Consulting Engineers (Incorporated)
- *British Cast Concrete Federation
- *British Granite and Whinstone Federation
- *British Iron and Steel Federation
- *British Railways Board
- British Ready Mixed Concrete Association
- British Slag Federation
- *Cast Stone and Concrete Federation
- *Cement and Concrete Association
- *Cement Makers' Federation
- *Chalk, Lime and Allied Industries Research Association
- Chalk Quarrying Association
- *D.S.I.R.—Building Research Station
- Federation of Civil Engineering Contractors
- Gypsum Plasterboard Development Association
- *Institution of Civil Engineers
- *Institution of Municipal Engineers
- *Institution of Structural Engineers
- Institution of Water Engineers
- *Limestone Federation
- *London County Council
- *London Transport Board
- Ministry of Housing and Local Government
- *Ministry of Public Building and Works
- *Ministry of Transport
- *National Federation of Building Trades Employers
- *Reinforced Concrete Association
- *Royal Institute of British Architects
- *The Royal Institution of Chartered Surveyors
- *Sand and Gravel Association of Great Britain
- *Society of Chemical Industry

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 Committees entrusted with the preparation of this standard:

- County Surveyors Society
- D.S.I.R. Road Research Laboratory
- Federation of Building Block Manufacturers
- National Paving and Kerb Association
- Prestressed Concrete Development Group
- Roads Improvement Association
- South-Western Roadstone Employers Federation

BRITISH STANDARD SPECIFICATION FOR PRE-CAST CONCRETE KERBS, CHANNELS, EDGINGS AND QUADRANTS

FOREWORD

This British Standard for concrete kerbs, channels and quadrants was first issued in 1928 and revised in 1936 and 1950. As a result of experience gained through the application of the standard over a further period of years, certain modifications have been incorporated in the present revised issue.

As in the 1936 and 1950 editions, no specific requirements are given as to the details of manufacture, such as the composition of the mixture, the methods of moulding, etc. These details are left to the discretion of the manufacturer, provided the ingredients comply with the appropriate British Standards and the finished products satisfy the tests included in this standard.

The rectangular sections in the 1950 edition, the splayed kerb for use in rural areas, which was introduced in an Amendment made in 1938, together with the 1950 range of edgings in various sizes and quadrants to suit the several sections have all been retained, but the strength requirements for edgings have been relaxed slightly and the methods of designating products have been improved.

The different sections shown in this standard are, as far as possible, a fair representation of the types in more general use in the country as a whole, but local demand varies so much that it has not yet been possible for the number of sections to be curtailed. It must be understood, however, that all these sections may not be available from every manufacturer throughout the country. The makers will concentrate on those of the standard shapes and sizes most in demand in their respective delivery areas.

In the test for transverse strength the relationship between the test load to be supported and the age of the concrete at which the load shall be applied has been retained. This is to ensure that this part of the standard shall be complied with by virtue of the use of a suitably low water/cement ratio, and not because the test kerbs have been left to mature for a long time. While kerbs may sustain the test load after a lengthy maturing period, they may still have been made with such a high water/cement ratio that damage is likely to occur subsequently from the effects of frost and low temperatures.

NOTE 1. The provisions of this standard are based upon the assumption that to comply therewith the kerbs have been manufactured of Portland type cements of the quality specified and suitable clean aggregate properly graded, with sufficient clean water only to provide for effective hydration, mixing and consolidation, and that the kerbs have been properly matured

by being stacked for at least 28 days or matured in some other manner provided, to the satisfaction of the engineer, to give equivalent results. It is desirable, in order to obtain satisfactory resistance to frost, that the water/cement ratio should not exceed 0.55 by weight immediately after moulding or pressing.

NOTE 2. The attention of users is drawn to the undesirability of requiring a very smooth surface finish. Kerbs of a good quality may have slight surface blemishes which are not detrimental.

NOTE 3. The kerbs are designed on the assumption that, in laying, appropriate provision will be made for expansion in the line of kerbing.

This revision does not preclude the use of air entrainment, but it provides no special standards for air-entrained products. Although there is evidence that air entrainment improves the frost-resistance of vibrated concrete kerbs, it reduces transverse strength. The Committee did not favour, at this time, either reducing the existing standard of test for transverse strength for non-air-entrained kerbs, or introducing an alternative figure for air-entrained concrete.

The content of entrained air in freshly made concrete is readily measurable but there is difficulty in measuring the content in matured concrete.

It was considered preferable for the time being, to leave the requirements for air-entrained kerbs as a subject of arrangement between purchaser and manufacturer.

Since kerbs are normally tested in a testing machine rather than by applying loads to a simply supported specimen, the relevant appendix has been revised to describe separately the requirements of the testing machine and the testing procedure.

As a result of research work on durability the limit for the 10-minute absorption value has been reduced and the age of the concrete at which the test is to be carried out has been specified. The requirement for a 24-hour absorption value has been deleted. The number of samples to be retested in the event of the failure of one sample has been increased and a limitation of the flakiness index of the aggregates has been introduced.

NOTE 1. Where metric equivalents have been given the figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in B.S. 350, 'Conversion factors and tables'.

NOTE 2. In place of the customary, but incorrect, use of the pound as a unit of force, the unit called a pound-force (abbreviation lbf) has been used in this standard. It is that force which, when acting on a body of mass one pound, gives it an acceleration equal to that of standard gravity.

SPECIFICATION

SCOPE

1. This British Standard covers pre-cast concrete units for kerbs, channels, edgings and quadrants, all referred to as 'products' in this standard, in a range of sections, lengths and radii, for use in the construction of carriageways and footways.

CEMENT

2. The whole of the cement used in the manufacture of the products shall comply in all respects with one of the following British Standards:

B.S. 12. Portland cement (ordinary and rapid hardening)

or

B.S. 146. Portland-blastfurnace cement.

When specially ordered by the purchaser, high alumina cement complying with B.S. 915*, or sulphate resisting Portland cement or hydrophobic cement complying with the physical requirements of B.S. 12†, or coloured cement complying with the physical requirements of B.S. 12‡, or of B.S. 915*, may be used.

AGGREGATE

3. Aggregate shall be either from natural sources, when it shall comply with B.S. 882‡ or, alternatively, coarse aggregate complying with B.S. 1047§ may be used.

The aggregate or mixture of aggregates shall be approved by the purchaser and no variations or additions to an agreed aggregate shall be made without the consent of the purchaser.

The coarse aggregate to be used, when tested in accordance with B.S. 812||, shall not exceed the following limits:

Aggregate crushing value	30 per cent
Flakiness index	35 per cent

All aggregate shall be of a size appropriate to the sections and method of manufacture of the products.

FINISH AND COLOUR

4. Special surface finishes may be agreed upon between the vendor and purchaser.

Unless otherwise specified by the purchaser, the products shall be supplied in natural colour. When the products are ordered coloured, the colour shall be agreed between the vendor¶ and the purchaser at the time of placing the order. The vendor and purchaser shall agree whether the products will be coloured throughout or only in a surface layer. If the latter, the surface layer shall be not less than ½ in thick.

* B.S. 915, 'High alumina cement'.

† B.S. 12, 'Portland cement (ordinary and rapid hardening)'.

‡ B.S. 882, 'Coarse and fine aggregates from natural sources for concrete'.

§ B.S. 1047, 'Air-cooled blastfurnace slag coarse aggregate for concrete'.

|| B.S. 812, 'Methods for sampling and testing of mineral aggregates, sands and fillers'.

¶ The term 'vendor' throughout this specification shall mean the seller of the products whether he be the manufacturer or not.

Any pigments used in the colouring of the products shall comply with B.S. 1014, 'Pigments for cement, magnesium oxychloride and concrete'.

PROTECTION FROM FROST

5. No material which has been exposed to temperatures below freezing point shall be used until such material has been completely thawed, nor shall products be moulded when the temperature of the mould itself is below freezing point.

Products shall be protected from damage by frost immediately after moulding and for a period of at least 48 hours.

MOULDING

6. The products may be made by any process. The escape of the finer particles of mortar during the process of manufacture shall be prevented as far as practicable.

A product described as 'Pressed' shall only be made by employing a pressure of not less than 1000 lbf/in² over the entire surface receiving the pressure.

DESIGNATION OF PRODUCTS FOR ORDERING PURPOSES

7. The products specified in this standard shall be designated B.S. 340 for the purposes of enquiries and orders. The profile shall be designated by the appropriate figure number.

In the designation of the sizes of kerbs, channels and edgings the width of the bed which will be horizontal after laying shall be given first, and the overall height second.

Example: B.S. 340, straight kerb, Figure 3, 4 inch × 10 inch.

DIMENSIONS OF STRAIGHT KERBS

8. Straight kerbs shall be manufactured to a uniform length of 3 ft and to the sections shown in Figs. 1 to 7 and Fig. 9.

NOTE. It is recommended that the sections shown in Figs. 4 and 5 should not be used where the footway is immediately adjacent to the carriageway. Their use should be confined to cases where a strip of substantial width, but in no case less than 5 ft, separates the footway from the carriageway.

DIMENSIONS OF RADIUS KERBS

9. Radius kerbs shall be manufactured to the sections shown in Figs. 1 to 7 and Fig. 9, and to the lengths and radii shown in the following table. The radii and lengths shall be measured on the front vertical faces of the kerbs which adjoin the channel.

The radius shall be marked on one of the unexposed faces of each kerb.

External kerbs		Internal kerbs	
Length	Radii	Length	Radii
ft	ft	ft	ft
2 (min.) 3 (max.)	3, 6, 8, 10, 15, 20, 25, 30, 35, 40	2 (min.) 3 (max.)	6, 10, 15, 20, 30, 40

Fig. 15 shows the application of the above nomenclature and dimensions.

DIMENSIONS OF STRAIGHT CHANNELS

10. Straight channels shall be manufactured to a uniform length of 3 ft and to the sections shown in Figs. 1, 2, 3 and 8.

DIMENSIONS OF RADIUS CHANNELS

11. Radius channels shall be manufactured to the section shown in Figs. 1, 2 and 3 (laid flat) or in Fig. 8 and to the lengths and radii shown in the following table. The radii and lengths shall be those of the faces adjoining the kerbs.

The radius shall be marked on one of the unexposed faces of each channel.

External channels		Internal channels	
Length	Radii	Length	Radii
ft	ft	ft	ft
2 (min.) 3 (max.)	3, 6, 8, 10, 15, 20, 25, 30, 35, 40	2 (min.) 3 (max.)	6, 10, 15, 20, 30, 40

Fig. 15 shows the application of the above nomenclature and dimensions.

DIMENSIONS OF EDGINGS

12. Edgings shall be manufactured in lengths of 3 ft to the sections shown in Figs. 10, 11, 12 and 13, with half-rounded (Fig. 10), square (Fig. 11), chamfered (Fig. 12) or bullnosed (Fig. 13) profiles as specified by the purchaser.

NOTE. If Fig. 11 edging is made in a one piece mould due allowance should be made for the bend of the metal at the two top corners.

DIMENSIONS OF QUADRANTS

13. Quadrants shall be manufactured in 6 in, 8 in and 10 in depths of 12 in and 18 in radii, as shown in Fig. 14, and with faces to match the sections in Figs. 1 to 7, or 5 in deep to match the section shown in Fig. 9.

TOLERANCES

14. The following tolerances shall be permitted on the dimensions stated in Clauses 8 to 13:

Length	Width	Height
in	in	in
$\pm \frac{1}{16}$	$+\frac{1}{16}$ $-\frac{1}{16}$	$\pm \frac{1}{16}$

FREEDOM FROM DEFECTS

15. All angles of the products with the exception of the angles resulting from the splayed or chamfered faces in the sections shown in Figs. 4 to 7 and Figs. 9 to 13 shall be true right angles. The arrises shall be clean and, with the exception of the rounded arrises, sharp. The wearing surfaces shall be true and out of winding. On being fractured, the interior of the products shall present a clean, homogeneous appearance.

MANUFACTURER'S CERTIFICATE

16. The manufacturer shall satisfy himself that the products comply with the requirements of this British Standard and, if requested, shall forward a certificate to this effect to the purchaser or his representative.

The manufacturer shall, if requested to do so, supply a certificate stating the date of manufacture of the products, the aggregates used and the proportions thereof.

FACILITIES FOR SAMPLING

17. The purchaser or his representative shall, at all reasonable times, have access to the place where the products are manufactured or stored, for the purpose of examining and sampling the materials and the finished products, inspecting the process of manufacture, and testing and marking the products. The vendor shall, free of extra charge, provide or make arrangements for the provision of such facilities and labour required for examination, sampling, inspecting, and marking before delivery as may be necessary to establish that the products comply with the requirements of this standard.

SAMPLES FOR TESTING

18. For the purpose of the tests specified in Clause 19, the purchaser or his representative may select before or immediately after delivery three sample kerbs, channels and edgings for every order of 1000 linear yards or less, and one further sample kerb, channel and edging for every further 2000 linear yards, or part of 2000 linear yards, comprising the same order.

TEST REQUIREMENTS

19. The sample kerbs, channels or edgings selected in accordance with Clause 18 shall satisfy the following tests for transverse strength and absorption of water:

a. *Test for transverse strength of straight products.* The failing loads of individual straight kerbs, channels and edgings, when tested in the manner described in Appendix A, shall be not less than the values given in the following table:

Type of product	Fig.	Dimensions		Failing load
		in	in	
Rectangular kerb	1	6 × 12		5 000
	2	5 × 10		3 000
	3	4 × 10		2 000
Splayed kerb	4	6 × 12		5 000
	5	5 × 10		3 000
Half-batter kerbs	6	6 × 12		5 000
	7	5 × 10		3 000
Channels	8	10 × 5		3 000
Half-section kerbs	9	6 × 5		1 800
Edgings	10	2 × 10		700
	11	2 × 8		600
	12	2 × 6		450

The above test loads relate to tests for transverse strength carried out between the 28th and 35th days after the products are manufactured.

If tests are carried out after a longer period has elapsed the failing load shall be not less than the appropriate load stated in the table in this clause multiplied by the following conversion factors:

Age of sample at test Months	Conversion factors
2	1.1
3	1.15
4	1.2
5	1.25
6	1.3

Conversion factors for intermediate ages may be obtained by interpolation.

b. *Test for absorption of water.* When tested in the manner described in Appendix B between the 28th and 35th days after the products are manufactured, the average increase in weight of each group of three specimens by absorption of water in the first 10 minutes shall not exceed 2.5 per cent, the percentage being calculated on the dry weights of the test pieces.

INDEPENDENT TESTS

20. The samples to be tested in accordance with Clause 18 shall be tested by a mutually-agreed, independent testing laboratory whose results would be accepted by both the purchaser and the vendor.

If two or more sample kerbs, channels or edgings fail to pass either of the tests specified in Clause 19, the whole of the products comprising the batch represented by the samples shall be deemed not to comply with the requirements of this standard.

If one sample fails to pass, then the consignment shall only be deemed to comply if, upon the testing of a further ten samples from the products comprising the same order by that test which the sample previously failed, these further ten all pass.

The vendor shall be entitled to charge at the contract rates for all products which are found to comply with the requirements of this standard.

Unless otherwise specified at the time of the enquiry and order, the cost of the independent tests shall be borne as follows:

a. By the manufacturer, in the event of results showing that the products do not comply with the standard.

b. By the purchaser, in the event of the results showing that the products comply with the standard.

NOTE. The British Standards Institution is the owner of the registered certification trade mark shown below. This mark can be used only by manufacturers licensed under the certification mark scheme operated by the B.S.I. The presence of this mark on a product is an assurance that the goods have been produced to comply with the requirements of the British Standard under a system of supervision, control and testing operated during manufacture and including periodical inspections at the manufacturer's works in accordance with the certification mark scheme of the B.S.I.

Further particulars of the terms of licence may be obtained from the Director, British Standards Institution, 2 Park Street, London, W.1.



APPENDIX A

TEST FOR TRANSVERSE STRENGTH

Testing machine. The transverse testing machine complies with the requirements of a Grade A or Grade B machine when verified in accordance with B.S. 1610: Part 1* and is of sufficient capacity to apply loads 50 per cent higher than is required in Clause 20 (i.e. normally 7500 lbf). It is provided with two steel supporting rollers each $1\frac{1}{2}$ in diameter, spaced 30 in between centres for kerbs or 18 in between centres for edgings. Alternatively two steel bearers each $\frac{1}{4}$ in wide on the supporting surfaces, spaced 30 in apart internally for kerbs or 18 in apart internally for edgings may be used. In either case, one support is horizontal and the other is so mounted, e.g. by pivoting about an axis parallel to the length of the specimens, as to enable loads to be applied without inducing any torsional restraint in the specimen. The upper member of the loading frame is provided with a spherical seating to ensure that the load is applied axially and without inducing any torsion in the specimen, and a steel platen at least 2 in wide and of length not less than the width of the widest specimen to be tested (normally 12 in).

Testing procedure. The specimen is placed symmetrically on the bearers of the testing machine and a 2 in wide hardwood fillet is bedded on the upper surface at the mid-point of the span, using a thin layer of plaster of Paris which is allowed to set before the test is carried out. Where splayed or half-batter kerbs are to be tested a suitable hardwood wedge is inserted between the kerb and the fillet, both wedge and fillet being bedded in plaster of Paris. When the plaster has hardened a load is applied to the hardwood fillet. The load is applied steadily and continuously at a rate of approximately 60 lbf per minute for each inch of width of the specimen, until the specimen breaks or the capacity of the machine is reached. The individual failing loads are recorded in the report, except that when a specimen does not fail at the upper limit of the testing machine, the failing load is recorded as 'greater than — lbf'.

* B.S. 1610, 'Verification of testing machines': Part 1.

APPENDIX B

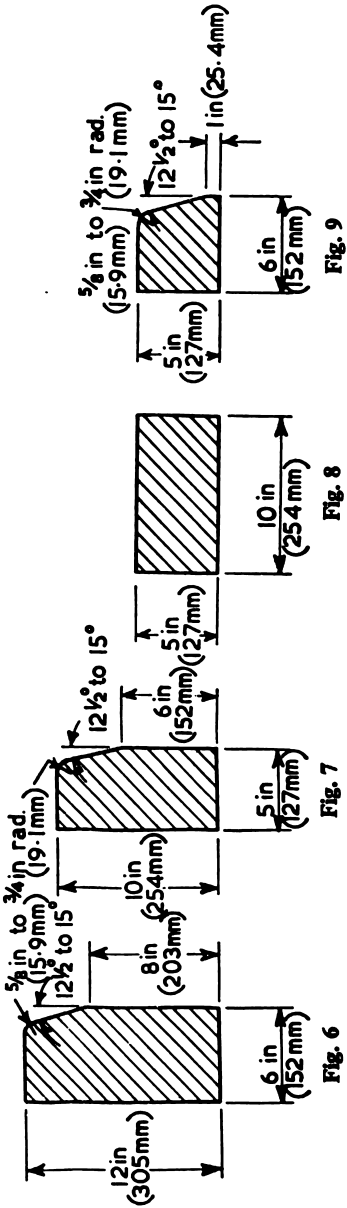
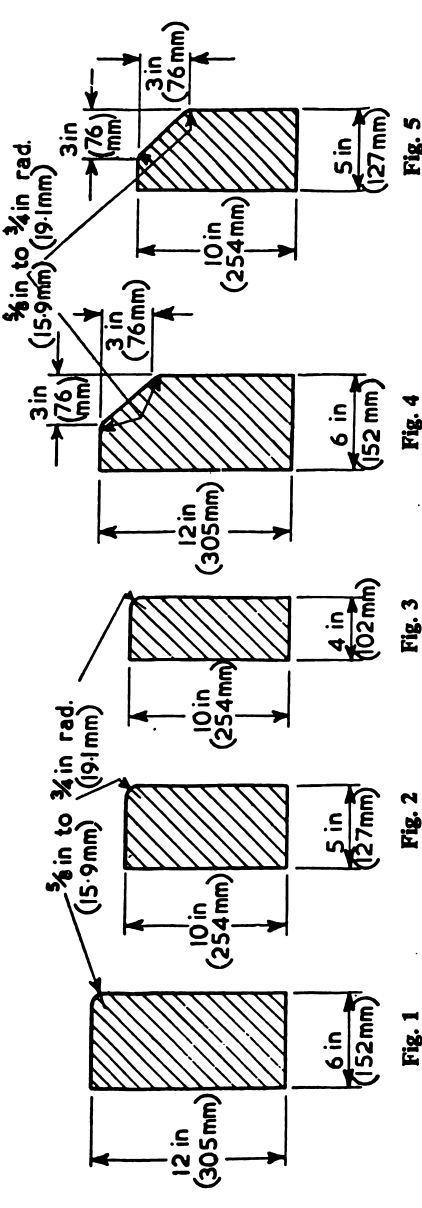
TEST FOR ABSORPTION OF WATER

From each sample kerb or channel three test pieces are taken, each approximating in size and shape to a 4 in cube and having two moulded faces and four faces cut by hammer and chisel. From each sample edging three test pieces are taken approximately 4 in \times 4 in \times 2 in, having the two 4 in \times 4 in faces moulded and the four 4 in \times 2 in faces cut by hammer and chisel.

The test pieces are dried for 72 hours prior to the date of test in a suitably ventilated drying oven, the temperature of which is between 100° and 105°C. On removal from the oven they are cooled for 24 hours in a desiccator or in a small dry airtight vessel. They are then weighed and immediately immersed in water the temperature of which is between 14° and 18°C, for a period of 10 minutes (\pm 10 seconds). At the end of this period they are removed, shaken to remove the bulk of the water, and then dried with a cloth as rapidly as possible until all the free water is removed from the surface, and again weighed.

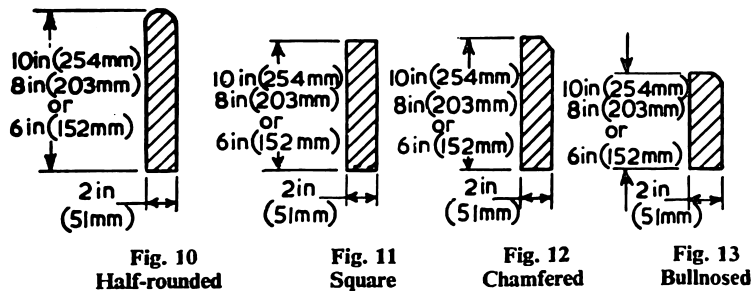
APPENDIX C
APPROXIMATE METRIC EQUIVALENTS

Linear		Linear	
in	mm	ft	m
$\frac{1}{16}$	1.6	15	4.57
$\frac{1}{8}$	3.2	20	6.10
$\frac{1}{4}$	6.4	25	7.62
$\frac{3}{8}$	12.7	30	9.14
$\frac{1}{2}$	15.9	35	10.67
$\frac{3}{4}$	19.1	40	12.19
1	25.4	yd	metres
$1\frac{1}{8}$	38		
2	51		
3	76	1 000	914.4
4	102	2 000	1828.8
5	127	Force	
6	152		
8	203	lbf	kgf
10	254		
12	305	60	27.2
18	457	450	204.1
30	762	600	272.2
ft	m	700	317.5
		1 800	816.5
		2 000	907.2
2	0.61	3 000	1 360.8
3	0.91		
5	1.52	5 000	2 268.0
6	1.83	7 500	3 401.9
8	2.44	10	3.05
10	3.05		



Standard sections of concrete kerbs and channels

NOTE. The figure number denotes the profile. All edgings are available 10 in (254 mm), 8 in (203 mm) or 6 in (152 mm) deep.



Standard sections of concrete edgings

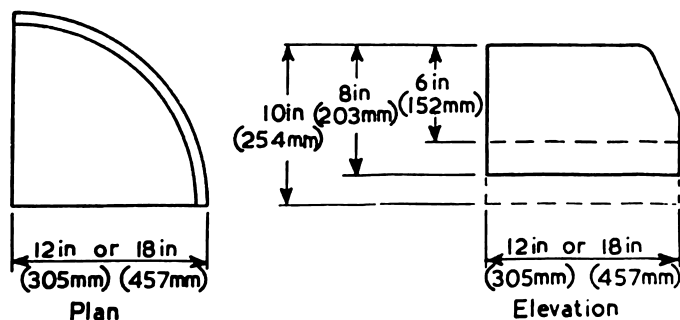


Fig. 14. Standard concrete quadrants

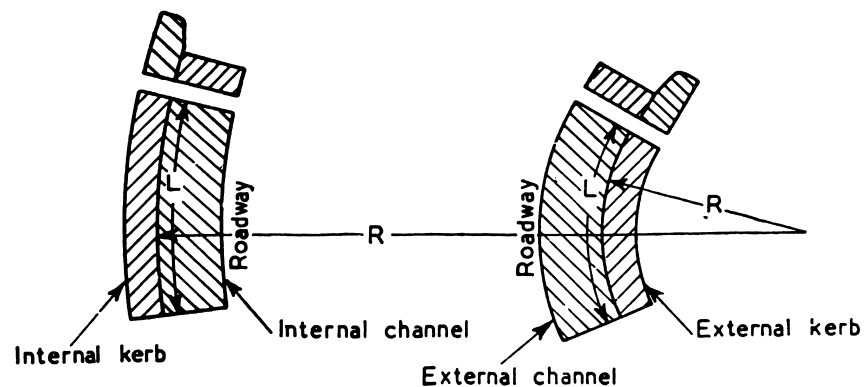


Fig. 15. Diagram showing nomenclature and dimensions of kerbs and channels

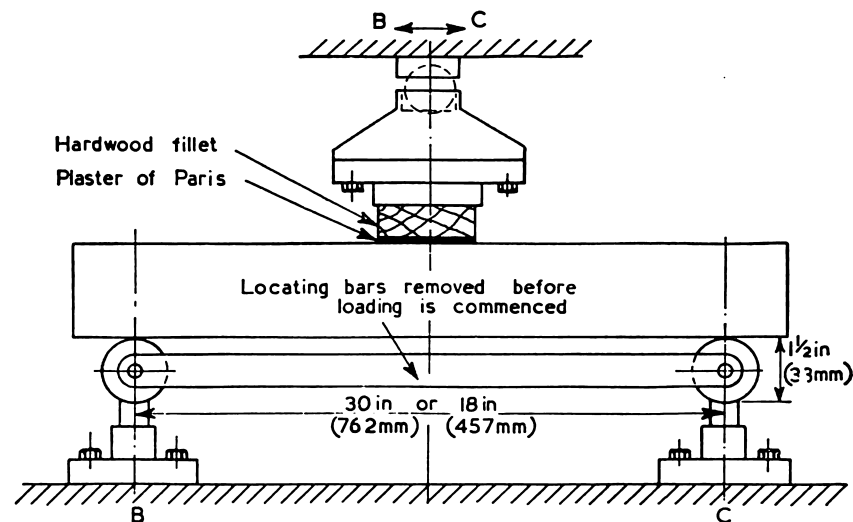


Fig. 16. Arrangement of loading for transverse strength test: side elevation

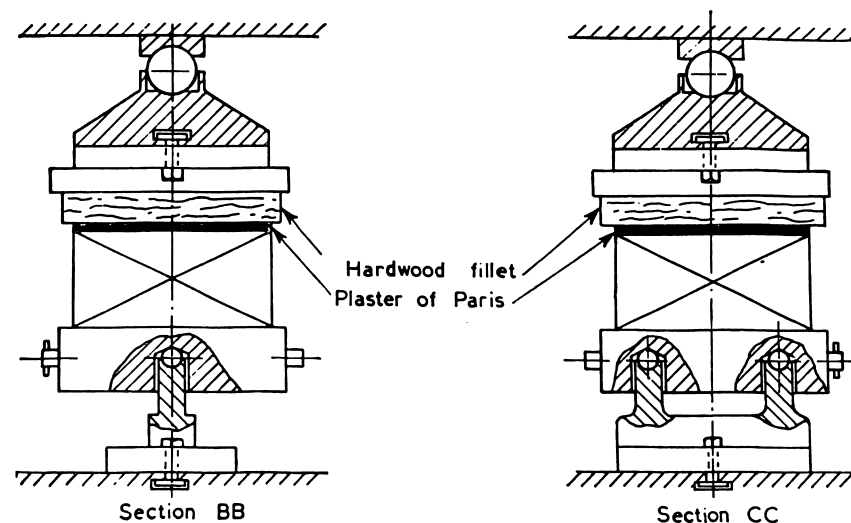


Fig. 17. Arrangement of loading for transverse strength test: end elevations

BRITISH STANDARDS

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BRITISH STANDARDS INSTITUTION

The British Standards Institution was founded in 1901 and incorporated by Royal Charter in 1929.

The principal objects of the Institution as set out in the charter are to co-ordinate the efforts of producers and users for the improvement, standardization and simplification of engineering and industrial materials; to simplify production and distribution; to eliminate the waste of time and material involved in the production of an unnecessary variety of patterns and sizes of articles for one and the same purpose; to set up standards of quality and dimensions, and to promote the general adoption of British Standards.

In carrying out its work the Institution endeavours to ensure adequate representation of all viewpoints. Before embarking on any project it must be satisfied that there is a strong body of opinion in favour of proceeding and that there is a recognized need to be met.

The Institution is a non-profit-making concern. It is financed by subscriptions from firms, trade associations, professional institutions and other bodies interested in its work, by a Government grant and by the sale of its publications. The demands on the services of the Institution are steadily increasing and can only be met if continuing and increased financial support is provided.

Membership of the Institution is open to British subjects, companies, technical and trade associations, and local and public authorities.