BS 340 : 1979
UDC 625.888 : 666.97

Specification for

Precast concrete kerbs, channels, edgings and quadrants

Spécification des bordures, des caniveaux, des bords et des quadrants en béton préfabriqué

Spezifikation für Bordsteine, Rinnsteine, Randsteine und Quadranten aus Fertigteilbeton

British Standards Institution

Gr 5

Contents

Foreword

This British Standard has been revised under the authority of the Road Engineering Standards Committee. It was first published in 1928 and subsequently revised in 1936, 1950 and 1963.

In accordance with the change to the metric system in the construction industry, values in this standard are expressed in metric terms. For further information on units reference should be made to BS 3763 and PD 5686.

A number of changes to the arrangement and headings of clauses have been made in this revision and a new appendix indicating methods of measuring the products is incorporated. These changes align the contents of this British Standard with those of BS 368, which specifies requirements for precast concrete flags. A further appendix has also been added giving recommendations for the ordering of products to this British Standard.

The clauses dealing with materials take into account revised and new British Standards. The provision allowing the use of high alumina cement has been omitted, but this standard now specifies the requirements for the use of pulverized-fuel ash.

As a result of research work on the method of performing the test for absorption of water, the previous test at 10 min has been deleted and replaced by a 30 min absorption test.

To give more uniform results, this test is carried out on specimens sawn from the products instead of cut, as previously. Due to the change in the test procedure the absorption limit has been changed and different values are given for different ages at test.

Additions to the range of cross sections included in this revision have been limited to three (figures 2(a), 7(a) and 16), not through any lack of desire to incorporate alternatives or even omit some profiles, but because statistics indicate that the range given in this standard still represents over 90 % of production in the United Kingdom. Dropper kerbs for figure 7 profile and crossing kerbs have been included (as figures 16 and 2(a) respectively) since, although relatively small in total production, they are considered of sufficient importance to merit inclusion.

The metric dimensions are conversions to the nearest 5 mm of the imperial sizes of the previous edition. By revising the average dimension tolerance in **8.2.1** from ± 2 mm to ± 4 mm (but keeping the individual value at ± 2 mm), products manufactured in imperially designed moulds will continue to comply with this specification, whilst allowing the replacement of life expired moulds with ones fabricated to more reasonable metric dimensions.

This revision does not preclude the use of air entrainment, but it specifies no special requirements for air-entrained products. Although there is evidence that air-entrainment improves the frost resistance of vibrated concrete kerbs, it may reduce transverse strength. The committee still does not favour either reducing the existing standard of test for transverse strength for non air-entrained kerbs, or introducing an alternative figure for air-entrained concrete. It still considers it preferable, for the time being, to leave the requirements for air-entrained kerbs as a subject of arrangement between the purchaser and the manufacturer.

Kerbs of good quality may have slight surface blemishes which are not detrimental to performance.

British Standard Specification for

Precast concrete kerbs, channels, edgings and quadrants

Specification

1. Scope

This British Standard specifies requirements for precast concrete 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.

2. References

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

3. Cement

The cement used in the manufacture of the products shall comply with the requirements of either BS 12 or BS 146.

When specially ordered by the purchaser, sulphate-resisting Portland cement complying with the requirements of BS 4027, or other cement complying with the physical requirements of BS 12, may be used.

4. Aggregates

4.1 Quality. The fine and coarse aggregate shall consist of naturally occurring materials, crushed or uncrushed, complying with the quality requirements of item *a* of clause 4 and item *d* of clause 5 of BS 882, 1201 : Part 1 : 1965 or 4.1 and 5.4 of BS 882, 1201 : Part 2 : 1973. Alternatively, coarse aggregate complying with the quality requirements of clause 5 of BS 1047 : Part 2 : 1974 may be used.

The coarse aggregate to be used, when tested in accordance with BS 812, shall comply with the following requirements:

(a) 10 % fines test: not less than 100 kN;

(b) flakiness index: not more than 35 % unless otherwise agreed between the purchaser and the manufacturer on the basis of acceptable evidence of durability.

4.2 Maximum size. All aggregates shall be of a size appropriate to the sections and method of manufacture of the products.

5. Other materials

5.1 Pulverized-fuel ash. Where pulverized-fuel ash is used, it shall comply with the requirements of BS 3892 and should have a specific surface within zone B.

The total sulphate content, expressed as SO_3, of the concrete mix shall not exceed 4.0 % by weight of the cement. The sulphate content shall be calculated from the known sulphate contents of the cement, aggregates (where applicable) and pulverized-fuel ash, as determined by tests carried out in accordance with the requirements of BS 12, BS 1047 and BS 3892 respectively.

5.2 Pigments. Any pigments used in the colouring of the products shall comply with the requirements of BS 1014.

5.3 Additional materials. Any additional materials required to produce special properties shall not have any deleterious effect upon the properties of the concrete.

6. Finish and colour

6.1 Finishes. Surface finishes may be agreed between the purchaser and the manufacturer.

6.2 Angles and arrises. All angles of the products, with the exception of angles resulting from the splayed or chamfered faces in the sections shown in figures 4 to 7 and figures 9, 10, 12 and 13, shall be right angles, subject to the tolerances specified in 8.2.

The arrises shall be clean and, with the exception of the rounded arrises, sharp. The wearing surfaces shall be true and out of winding, subject to the tolerances specified in 8.2.

6.3 Colour. 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 purchaser and the manufacturer at the time of placing the order. The purchaser and the manufacturer shall agree whether the products shall be coloured throughout or only in a surface layer. In the latter case the surface layer shall be not less than 25 mm thick and cast as an integral part of the product.

7. Casting and curing

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

A product described as 'pressed' shall be made by employing a pressure of not less than 7 MPa over the entire surfaces receiving the pressure.

7.2 Work in cold weather. The following precautions shall be taken to prevent the temperature of the concrete falling to 0 °C during the early stages of hardening.

(a) The temperature of the concrete at the time of placing shall be not less than 5 °C.

(b) The temperature of the mould itself shall be above 0 °C.

(c) No material which has been exposed to temperatures below 0 °C shall be used until it has been completely thawed.

Products shall be protected from frost damage during curing.

8. Dimensions and tolerances

8.1 Dimensions. All kerbs, channels and edgings shall be manufactured to the profiles shown in figures 1 to 13 subject to the tolerances permitted in **8.2**.

For the purpose of enquiries and orders, in the designation of the sizes, the width of the bed which will be horizontal after laying shall be given first and the overall height second.

Straight kerb, channel and edging shall be manufactured to a length of 915 mm subject to the tolerances permitted in **8.2**.

Radius kerb and channel shall be manufactured to a maximum length of 915 mm and to the radii shown in the following table. The radii and lengths shall be measured on the vertical contact face between kerb and channel (see figure 15).

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

External and internal radius kerb and channel

External only		Internal and external			
m	m	m	m	m	m
1.0	2.0	3.0	4.5	6.0	7.5
		9.0	10.5	12.0	

Quadrants shall be manufactured to the dimensions shown in figure 14 with faces to match the profiles shown in figures 1 to 7 and 9.

Dropper kerbs for use with figure 7 units and other figure combinations shall be manufactured to the dimensions exemplified in figure 16.

8.2 Tolerances. When sampled in accordance with clause **12** and measured as described in appendix A, for length, width or height, the average dimension of the 12 values obtained from the four measurements on each of the three units shall be within ± 4 mm of the specified dimension, but none of the individual values shall vary from the avarage by more than ± 2 mm.

8.2.1 *Straightness and winding.* The maximum deviation from a 850 mm notched straightedge placed in any position on the wearing surface of each straight kerb, channel or edging sampled in accordance with clause **11** shall not exceed 2 mm.

9. Test requirements

9.1 General. The products sampled in accordance with the provisions of clause **11** shall comply with the following test requirements for transverse strength and water absorption.

9.2 Transverse strength of straight products. The failing loads of individual straight kerbs, channels and edgings, when tested in the manner described in appendix B, shall be not less than the values given in the following table.

Dimensions mm	Failing load kN
150 x 305	22.2
150 x 125	8.0
125 x 255	13.3
125 x 175	9.2
100 x 255	8.9
50 x 255	3.1
50 x 205	2.7
50 x 150	2.0
Dropper kerb as figure 16	10.3

The minimum test loads in the table above relate to transverse strength tests carried out on products up to an age of 28 days from the date of manufacture.

If tests are carried out at later ages, the failing load shall be not less than the appropriate load given in the table above, multiplied by the following conversion factors.

Age of sample at test	Conversion factor
months	
1	1.00
2	1.05
3	1.10
4 and over	1.15

Conversion factors for intermediate ages shall be obtained by linear interpolation.

9.3 Water absorption. When tested in the manner described in appendix C, none of the three product absorptions shall exceed the value appropriate to the age of test given in table 1.

Table 1. Water absorption limits

Age of sample at test	Maximum product absorption	
	Figures 1 to 9 and 14	Figures 10 to 13
months	%	%
Up to 1	3.0	3.6
2	2.6	3.2
3	2.5	3.0
4	2.4	2.9
5	2.3	2.8
6 and over	2.2	2.7

Maximum product absorption values for intermediate ages shall be obtained by linear interpolation.

10. Manufacturer's certificate

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

The manufacturer shall, if requested to do so, supply a certificate stating the date of manufacture of the products.

11. Facilities for sampling

The purchaser or his representative shall at all reasonable times have access to the place where products are manufactured or stored, for the purpose of examining and sampling the materials and the finished products, inspecting the process of manufacture, and marking the products. The manufacturer 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.

12. Samples for testing

12.1 General. When required, the samples shall be taken at random from the appropriate consignment representing the whole or part of the order. These samples may be taken as required in 12.2.

For the checking of the dimensions specified in clause **8** and for carrying out the tests specified in clause **9**, three sample products are preferably taken and tested before or immediately after delivery for every order for 2000 or less. For orders for more than 2000 products, three sample products may be taken for every 2000 products forming part of the order.

12.2 Sampling for independent testing. When it is agreed that independent testing as described in clause **13** is required, the random sample of three products shall be selected and marked when both the purchaser and the manufacturer, or their representatives, are present.

13. Independent tests

13.1 Sampling and testing. If requested by the manufacturer, or by the purchaser, independent tests shall be carried out by a mutually agreed, independent testing laboratory whose results shall be accepted.

The samples required for these independent tests shall be taken as specified in clause **12**, measured and tested in accordance with clauses **8** and **9** and the test results judged as specified in clause **14**.

13.2 Costs of tests. The allocation of costs of independent tests are to be agreed between the manufacturer and the purchaser.

14. Test results

Should any of the test results not comply with the requirements of clauses **8** or **9**, then the whole of the consignment of 2000 products or less, comprising the whole or part of the order, shall be deemed not to comply with this standard.

15. Ordering

Recommendations for the ordering of products to this British Standard are given in appendix D.

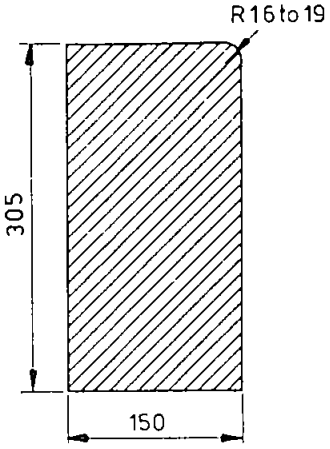


Figure 1

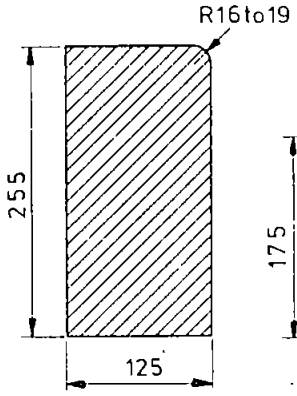


Figure 2

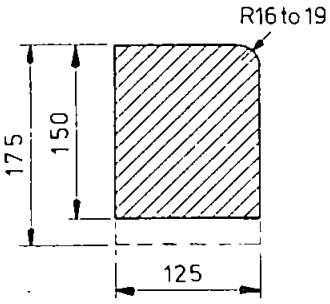


Figure 2(a)

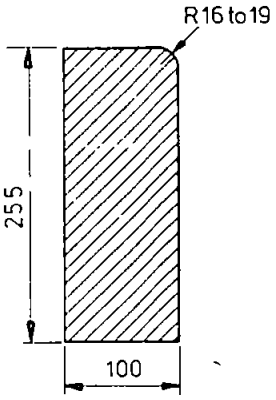


Figure 3

Figures 1 to 3. Bull nosed

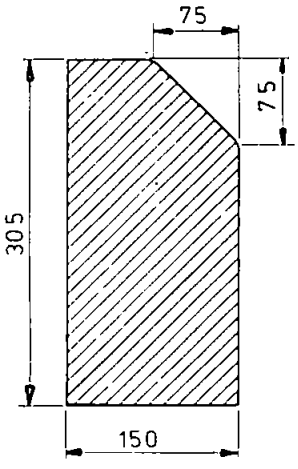


Figure 4

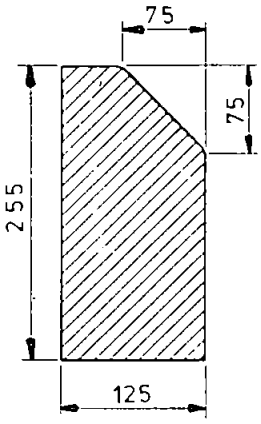


Figure 5

Figures 4 and 5. Full batter

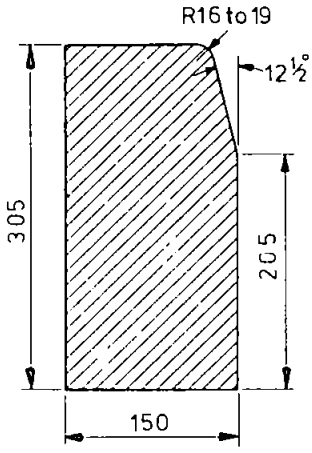


Figure 6

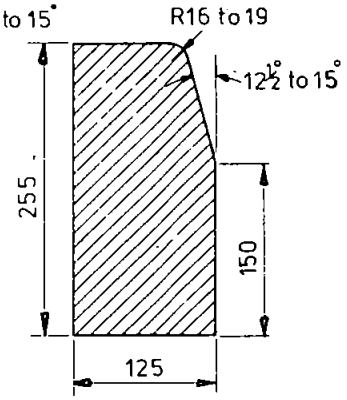


Figure 7

Figures 6 and 7. Half batter

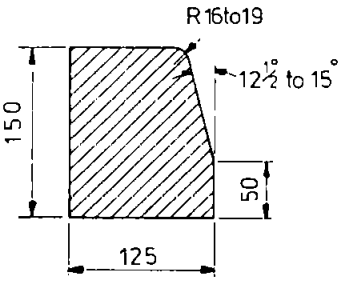


Figure 7(a). Half batter

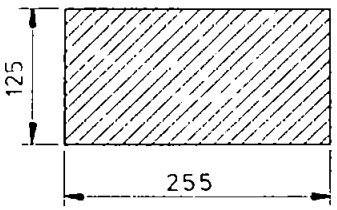


Figure 8. Square

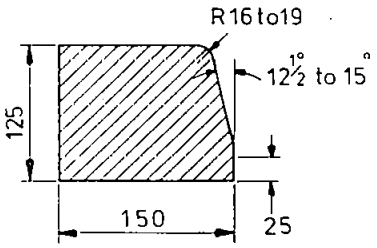


Figure 9. Half batter

All dimensions are in millimetres.

Figures 1 to 9. Sections of standard kerbs and channels

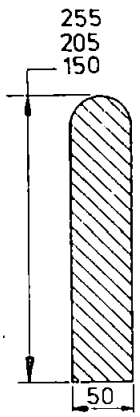


Figure 10. Half rounded

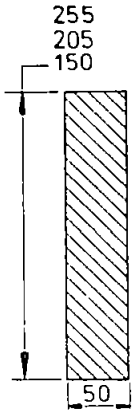


Figure 11. Square

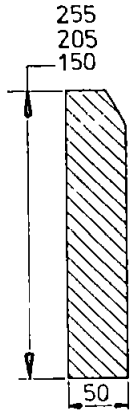


Figure 12. Chamfered

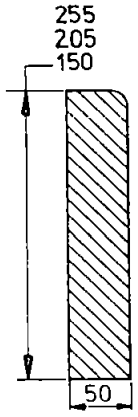
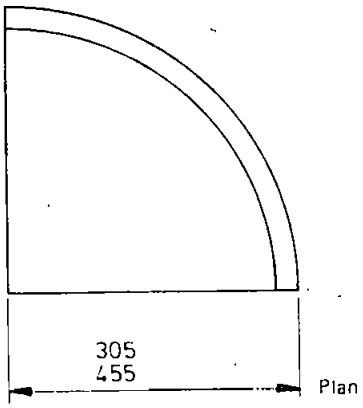
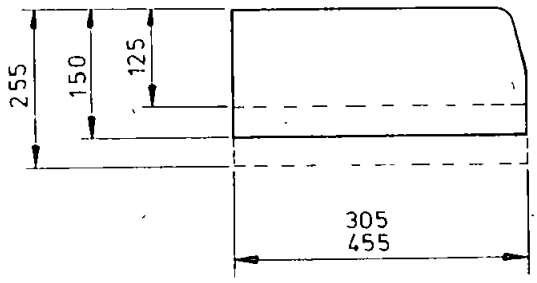


Figure 13. Bullnosed

All dimensions are in millimetres.

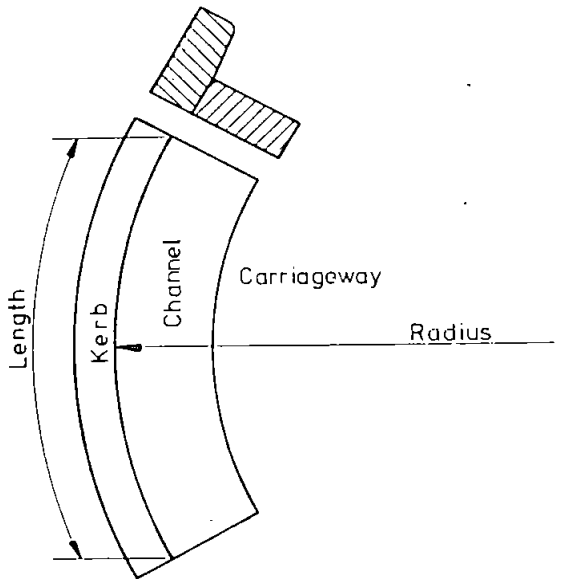
Sections of standard edgings



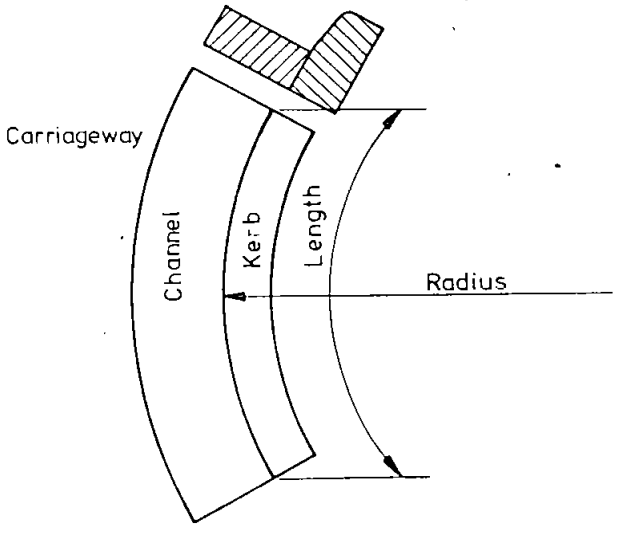


All dimensions are in millimetres.

Figure 14. Standard quadrants

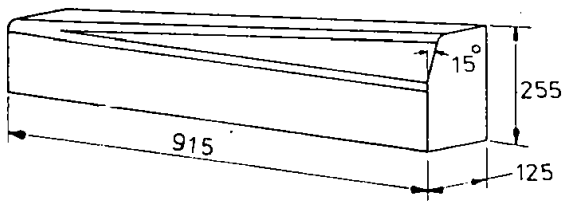


Internal kerb and channel

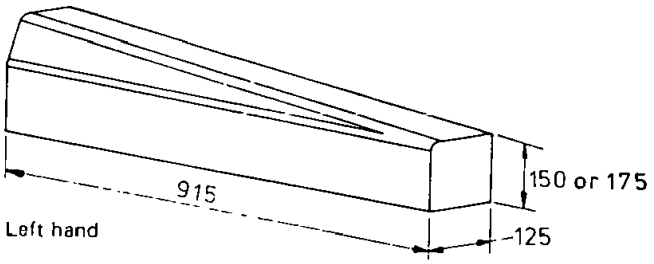


External kerb and channel

Figure 15. Nomenclature and length of radius kerbs and channels



Right hand



Left hand

Figure 16. Dropper kerbs for use with figure 7 and figure 2(a) profiles

Appendix A
Methods of measuring

A.1 Length. The length of each of the three sample products is measured on the face, within 25 mm of the four extreme corners of the profile, using a steel tape complying with the requirements of BS 4484 and expressed to the nearest 1 mm. The average of the 12 measurements shall be calculated and expressed to the nearest 1 mm.

A.2 Width and height. The width and height of the sample products is measured at both ends of each unit, using a steel ruler complying with the requirements of BS 4484. The width is measured at the top and bottom of parallel faces and the overall height at the face and back of the product. The average of the 12 measurements of height and the 12 measurements of width shall be calculated and expressed to the nearest 1 mm.

All dimensions shall be taken after any fins or localized protrusions have been removed.

A.3 Straightness and winding. Straightness and winding are measured by means of a notched straightedge and gauge block, both made of steel, as shown in figure 17. When the notched straightedge is placed in any position on the wearing faces of each sample product, if the surface of the product touches the notched section of the straightedge both the support ends of the notched straightedge shall be in contact with the product. Also, when placed in any position on the wearing faces of each sample product, the gauge block shall not pass between the notched straightedge and the surface of the product.

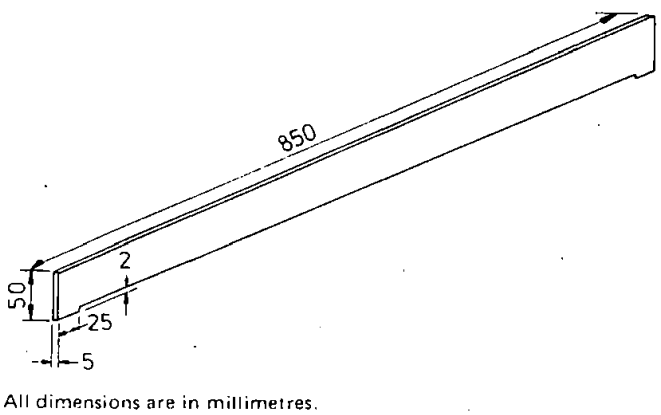
Appendix B
Test for transverse strength

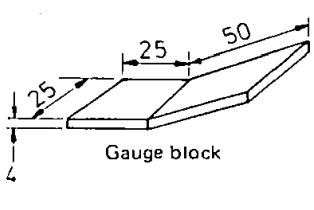
B.1 Testing machine. The transverse testing machine complies with the requirements of a grade A or grade B machine when verified in accordance with BS 1610 : Part 1 and is of sufficient capacity to apply loads 50 % higher than specified in 9.2 (i.e. normally 33 kN). It is provided with two steel supporting rollers each 38 mm diameter, spaced 750 mm between centres for kerbs and 450 mm for edgings (see note). Alternatively, two steel bearers, each 6 mm wide on the supporting surfaces, spaced 750 mm apart internally for kerbs or 450 mm 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 50 mm wide and of length not less than the width of the widest specimen to be tested, normally 305 mm (see figure 18).

B.2 Testing procedure. The specimen is placed symmetrically on the bearers of the testing machine with its greater cross-sectional dimension horizontal and a 50 mm wide hardwood fillet is bedded on the upper surface at mid-point of the span, using a thin layer of plaster of Paris which is allowed to set before the test is carried out. When products having profiles as figures 4, 5, 6, 7, 7a and 12 are to be tested, a suitable hardwood wedge is inserted between the kerb and the fillet. The load is applied steadily and continuously at a rate of approximately 4.5 N/s for each 25 mm of width of the specimen, until the specimen fails or the capacity of the machine is reached. The individual failing loads are recorded in the report.

When a specimen does not fail at the upper limit of the testing machine, the failing load is recorded as 'greater than ..... kN'.

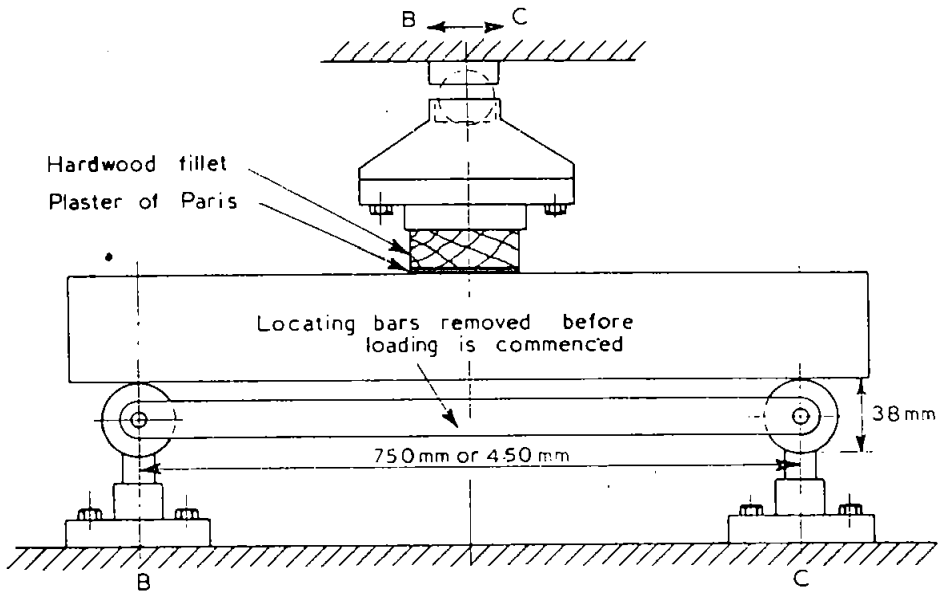
NOTE. If convenient, 762 or 457 spacing may be used, in lieu of 750 mm or 450 mm.



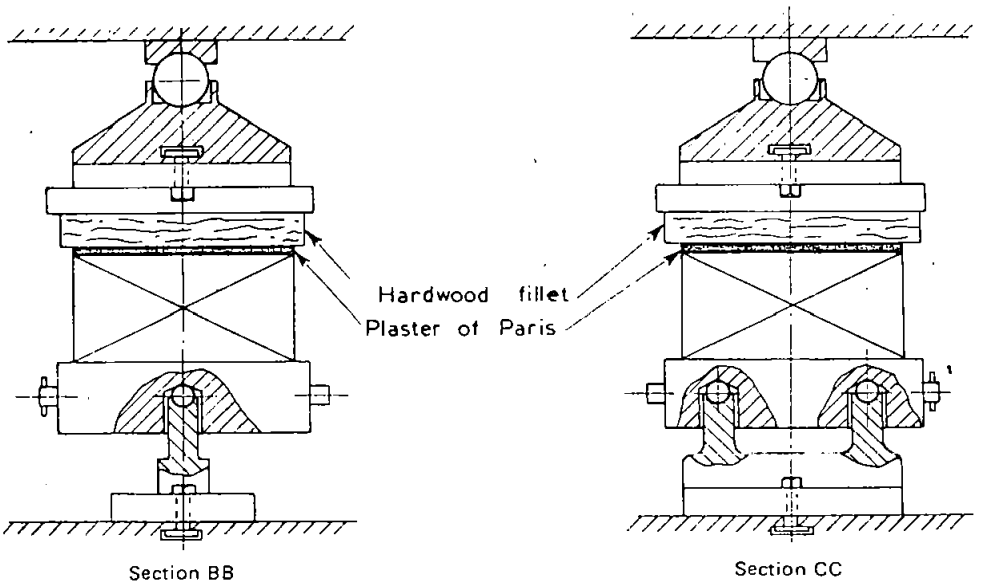


All dimensions are in millimetres.

Figure 17. Notched straightedge and gauge block



Side elevation



Section BB

Section CC

Figure 18. Arrangement of loading for transverse strength test

Appendix C

Test for absorption of water

C.1 Apparatus. The following apparatus is required.

C.1.1 *Suitable concrete sawing machine.*

C.1.2 *Balance*, capable of weighing up to 5 kg to an accuracy of 1 g.

C.1.3 *Oven*, well ventilated and complying with the requirements of BS 2648, in which the temperature is controlled at between 100 °C and 105 °C.

C.1.4 *Vessel*, small, dry and airtight, to contain the specimens.

C.1.5 *Tank*, approximately 200 mm deep, in which the specimens can be immersed in water.

C.2 Preparation of test specimens. Two test specimens are sawn from each of the three sample products. These test pieces are approximately 100 mm x 100 mm x 100 mm in the case of the kerb and channel, and approximately 100 mm x 100 mm x 50 mm in the case of the edging, having two moulded and four sawn faces in each case.

C.3 Testing procedure. Place the test specimens in the drying oven at the same time so that they are not nearer than 25 mm to any heating surface or to any other test specimen and dry them in the oven for 72 ± 1 h. On removal from the oven, cool them for 24 ± 0.5 h in the small, dry, airtight vessel. Then weigh each test specimen and immediately immerse it in water, the temperature of which shall be 20 ± 2 °C, for a period of 30 min ± 30 s. Immerse the test specimens flat on one 100 mm x 100 mm face, supported on glass rods or a plastic mesh, at a depth such that there is 25 ± 5 mm of water over the top of each test specimen. At the end of the 30 min immersion, remove the test specimens, shake them to remove the bulk of the

water and then dry them with a cloth as rapidly as possible until all the free water is removed from the surfaces. Immediately weigh each test specimen again.

Calculate the absorption of each specimen by dividing the gain in mass of the specimen after immersion by the mass of the dry specimen and express this ratio as a percentage to the nearest 0.1 %. Calculate the mean absorption of the two specimens from each of the three products and report the values of the three means, to the nearest 0.1 %, as the product absorptions.

Appendix D

Ordering kerbs, channels etc.

D.1 General. To simplify ordering of precast concrete kerbs, channels, edgings, quadrants etc., it is recommended that the following procedure and sequence of ordering be adopted to obviate misunderstanding.

D.2 For kerb and channels. Specify:

(a) kerb profile (figures 1 to 9) and overall dimensions, and/or channel profile (figures 2, 3 and 8) and overall dimensions;

(b) total length or number of units;

(c) any sawn units or special instructions.

D.3 For radius kerbs and channels. Specify:

(a) profile type;

(b) external or internal radius units (as per figure 15 designation);

(c) radius in metres;

(d) total length or number of units.

D.4 For dropper kerbs. Specify:

(a) cross section profiles to be connected over 915 mm length.

e.g. High – Low
Figure 5 – Figure 2a
Left or right (figure 16)

(b) number or pairs of units.

D.5 For edgings. Specify:

(a) profile (figures 10 to 13) and overall dimensions;

(b) total length or number of units.

D.6 For quadrants. Specify:

(a) profile (BN/FB/HB);

(b) bed dimension (305/455 mm see figure 14);

(c) height dimension (125/150/255 mm see figure 14);

(d) number of units.

D.7 Any special requirements for any of the above items:

(a) colour;

(b) special finish;

(c) aggregate type.

D.8 Examples of orders

Customer A

Kerbs

Figure 7	125 mm x 255 mm HB	6 no.
Figure 5	125 mm x 255 mm FB	50 no.
Figure 2	125 mm x 150 mm BN	150 no.

Dropper kerbs

High figure 7 – Low figure 2	7 prs.

Edging

Figure 13	50 mm x 150 mm BN	300 no.

Customer B

Kerbs

Figure 7	125 mm x 250 mm HB	450 lin metres

Radius kerbs

Figure 7	EXT RAD	7 m rad	25 lin metres
Figure 7	EXT RAD	2 m rad	10 lin metres

Dropper kerbs

Figure 7 – Figure 2	Left hand	1 no.

Edgings

Figure 10	50 mm x 150 mm HR	220 lin metres
Figure 11	50 mm x 150 mm SQ	100 lin metres

Quadrants

Half batter	305 mm, 255 mm	1 no.

Standards publications referred to

BS 12 Portland cement (ordinary and rapid hardening)
BS 146 Portland-blastfurnace cement
BS 368 Specification for precast concrete flags*
BS 812 Methods for sampling and testing of mineral aggregates, sands and fillers
BS 882,1201 Aggregates from natural sources for concrete (including granolithic)
Part 1 Imperial units
Part 2 Metric units
BS 1014 Pigments for Portland cement and Portland cement products
BS 1047 Specification for air-cooled blastfurnace slag coarse aggregate for concrete
Part 2 Metric units
BS 1610 Methods for the load verification of testing machines
BS 2648 Performance requirements for electrically-heated laboratory drying ovens
BS 3763 The International System of units (SI)*
BS 3892 Pulverized-fuel ash for use in concrete
BS 4027 Sulphate-resisting Portland cement
BS 4484 Measuring instruments for constructional works
PD 5686 The use of SI units*

*Referred to in the foreword only.

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Contract requirements
Attention is drawn to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

Revision of British Standards
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 reference RDB/32 Draft for comment 74/13129DC

Cooperating organizations

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

Asphalt and Coated Macadam Association
Association of Consulting Engineers
*British Quarrying and Slag Federation
British Tar Industry Association
*Cement and Concrete Association
*Concrete Society Limited
Contractors' Plant Association
Convention of Scottish Local Authorities
*County Surveyor's Society
Department of the Environment (PSA)
Department of the Environment, Transport and Road Research Laboratory
Department of Transport
Federation of Civil Engineering Contractors
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*Greater London Council
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*Institution of Structural Engineers
Ministry of Defence
Refined Bitumen Association Ltd.
Road Emulsion Association Ltd.
Road Surface Dressing Association
*Sand and Gravel Association Limited
*Society of Chemical Industry

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:

Association of County Councils
Association of London Borough Engineers and Surveyors
Association of Metropolitan Authorities
British Precast Concrete Federation Ltd.
Cement Makers' Federation
Interlocking Paving Association
Landscape Institute incorporating the Institute of Landscape Architects
Milton Keynes Development Corporation
Modular Society Limited
National Paving and Kerb Association
Royal Institute of British Architects

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WEIGHT AND PACK SIZES PER PRODUCT

MATERIAL	PER TONNE	M(M)LTD PACKED	S.M.&S. PACKED
5" x 10" Kerb/Channel	16 Yds		
6" x 12" Kerb/Channel	10 Yds		
6" x 6" Kerb/Channel	20 Yds		
5" x 6" Kerb/Channel	25 Yds		
Drop Kerbs	16 Yds		
6" x 2" Edging	70 Yds		
8" x 2" Edging	50 Yds		
50mm Flags			
900 x 600mm	17 No.	25 No.	25 No.
750 x 600mm	20 No.	25 No.	25 No.
600 x 600mm	25 No.	25 No.	25 No.
450 x 600mm	34 No.	25 No.	25 No.
450 x 450mm			50 No.
63mm Flags			
900 x 600mm	13 No.	20 No.	20 No.
750 x 600mm	16 No.	20 No.	20 No.
600 x 600mm	20 No.	20 No.	20 No.
450 x 600mm	26 No.	20 No.	20 No.
450 x 450mm			40 No.

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Minimum pay loads Ex R Wild Ltd 15 tonnes.