

Precast concrete flags, kerbs, channels, edgings and quadrants —

**Part 3: Precast, unreinforced concrete
kerbs, channels, edgings and
quadrants — Requirements and test
methods**

ICS 91.100.30

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/507, Paving units and kerbs, upon which the following bodies were represented:

Brick Development Association
 British Cement Association
 British Ceramic Research Ltd.
 British Precast Concrete Federation Ltd.
 Cementitious Slag Makers' Association
 County Surveyors' Society
 Department of Transport (Highways Agency)
 Institution of Civil Engineers
 Institution of Highways and Transportation
 Interlay, the Association of Block Paving Contractors
 Interpave, the Concrete Block Paving Association
 Landscape Institute
 Society of Chemical Industry
 Stone Federation

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Civil Engineering Test Equipment Manufacturers' Association
 Institution of Structural Engineers
 National Federation of Clay Industries Ltd.
 National Paving and Kerb Association

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Foreword

This part of BS 7263 has been prepared by Technical Committee B/507. Together with BS 7263-1:2001 it supersedes BS 7263-1:1994 which is withdrawn.

This revision has been prepared to reflect current CEN principles regarding the writing of standards for this type of product: such standards are now performance-based instead of recipe-based. This has entailed taking out the requirements for materials and inserting far more performance requirements. To support this change, test methods have now been included as annexes. This revision has also introduced a requirement for type testing and factory production control, together with an example of a production control procedure.

Users of this standard should be aware that the concept of type testing (see **A.2**) has been brought forward from Harmonized European Standards, and is intended to give the manufacturer and any attestation body confidence that a new or modified product will conform to the performance requirements during regular production runs. The requirements for products to meet this standard are given in clause **5**. The requirements specified in **A.2** are only for type testing.

The following specific changes have been made in this revision:

- a) the dimensional requirements have been removed so that kerbs can be of any shape or size (the shapes and sizes in the previous edition have been retained as designated units);
- b) the water absorption limit has been removed;
- c) the bending load requirement has been replaced by a bending strength requirement and the test method has been modified accordingly;
- d) performance requirements and test methods have been added for:
 - 1) weathering resistance (freeze/thaw);
 - 2) abrasion resistance;
 - 3) slip/skid resistance;
 - 4) visual properties;
- e) for weathering resistance, abrasion resistance and slip/skid resistance, performance classes have been introduced; these include a class for “no performance determined”, which enables the purchaser to request a product appropriate to its intended use and location.

This British Standard is an adaptation of the current draft of the European Standard prEN 1340, following the publication of which as BS EN 1340 this standard, BS 7263-3, will be withdrawn.

Annex A, Annex B, Annex C, Annex D, Annex E, Annex F, Annex G, Annex H, Annex I and Annex K are normative. Annex J is informative.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprise a front cover, an inside front cover, pages i to iv, pages 1 to 37 and a back cover.

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1 Scope

This part of BS 7263 specifies requirements and test methods for precast, unreinforced concrete kerbs, channels and complementary fittings. It specifies dimensions for the cross-sections of kerbs designated in the United Kingdom. It is applicable to precast, unreinforced concrete kerbs, channels and complementary fittings that are particularly for use in external trafficked paved areas.

NOTE The concrete kerbs specified in this part of BS 7263 are used for separation, physical or visual delineation, the provision of drainage or the containment of paved areas or other surfacing.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of BS 7263. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 812-114:1989, *Testing aggregates — Method for determination of the polished-stone value*.

BS 7932:1998, *Method for determination of polished paver value (PPV)*.

BS EN 10083-2:1991, *Quenched and tempered steels — Part 2: Technical delivery conditions for unalloyed quality steels*.

BS EN ISO 4288:1998, *Geometric product specification (GPS) — Surface texture — Profile method — Rules and procedures for the assessment of surface texture*.

BS ISO 8486-1:1996, *Bond abrasives — Determination and designation of grain size distribution — Part 1: Macrogrits F4 to F220*.

3 Definitions

For the purposes of this British Standard the following definitions apply:

3.1

kerb

precast, unreinforced concrete unit (including channels, edgings, quadrants, angles etc.) intended to separate surfaces at the same or different levels to provide:

- physical or visual delineation or containment;
- drainage channels, individually or in combination with other kerbs;
- separation between surfaces submitted to different kinds of traffic.

3.2

complementary fitting

unit that is used as a transition piece for changes in direction, shape or height or a small piece to complete a line

NOTE A complementary fitting can be part of a kerb, channel, etc.

3.3

face

surface intended to be seen when in use

3.4

bed face

lower surface in contact with the ground after laying

3.5

chased side face

side face of a kerb having a recessed profile

3.6

traffic face

face of a kerb intended by the manufacturer to be above a road surface and which provides containment of traffic

3.7

facing layer

layer of concrete providing a face, or part of a face, of a kerb, of different material and/or properties to the main body or backing layer

3.8

arris

part of a kerb where two faces meet

NOTE An arris can be bevelled, rounded, chamfered, radiused or splayed.

3.9

chamfer

bevelled arris with horizontal or vertical dimensions exceeding 2 mm

3.10

secondary processing

manufacturing process to texture a whole kerb or any of its surfaces, carried out after basic manufacture before or after hardening

3.11

work dimension

dimension of a kerb specified for its manufacture

3.12

actual dimension

dimension of a kerb as measured

3.13

overall length

length of a kerb, excluding any interlocking features or spacers

3.14

height

distance between the bed face and the top of a kerb

3.15

reference line

line to which the kerb is intended to be laid

3.16

slip resistance

ability of a kerb to resist relative movement between a pedestrian foot and the trafficked kerb surface

3.17

skid resistance

ability of a kerb to resist relative movement between a vehicle tyre and the trafficked kerb surface

4 Materials

The materials used for the manufacture of kerbs shall be at the manufacturer's discretion. Details of the materials used shall be declared in the manufacturer's production control documentation (see Annex A).

5 Requirements

5.1 General

Kerbs shall be produced either with a single type of concrete throughout or with different facing and backing layers. If kerbs are produced with a facing layer this shall, when measured in accordance with Annex B, have a minimum thickness of 25 mm, excluding isolated particles of aggregate protruding into the facing layer, over the area declared by the manufacturer. The facing layer shall be bonded to the backing layer.

It shall be permissible for a "square" arris to be either bevelled or rounded. A "square" arris shall have horizontal and vertical dimensions not exceeding 2 mm. The dimensions of a chamfer shall be at the discretion of the manufacturer. The dimensions shall be declared in the manufacturer's production control documentation (**A.3.1**).

NOTE A bevelled arris with dimensions exceeding 2 mm is described as chamfered.

If a kerb is produced with functional and/or decorative profiles, these profiles shall not be included in the work dimensions of the kerb. If a kerb is produced with surfaces that are textured, secondary processed or treated chemically, these finishes or treatments shall be at the discretion of the manufacturer. All finishes and treatments shall be declared in the manufacturer's production control documentation (**A.3.1**).

In the event of a dispute regarding the quality of a consignment of kerbs, the procedure specified in Annex C shall be followed.

5.2 Shape and dimensions

5.2.1 Work dimensions

The work dimensions of designated kerbs shall be as shown in Annex K. The work dimensions of kerbs of other shapes and sizes shall be at the discretion of the manufacturer. The work dimensions used for these kerbs shall be declared in the manufacturer's production control documentation (**A.3.1**).

5.2.2 Radius kerbs

Radius kerbs shall be either convex (external) or concave (internal), as shown in Figure 1. The type of curvature (convex or concave) of a radius kerb shall be determined according to the reference line, as shown in Figure 1. The work dimensions of the radius and overall length of a radius kerb shall be declared in the manufacturer's production control documentation (**A.3.1**).

The dimensions of the radius and overall length of a radius kerb shall be determined in accordance with **B.4**.

NOTE The preferred radii for radius kerbs and channels are shown in Table 1.

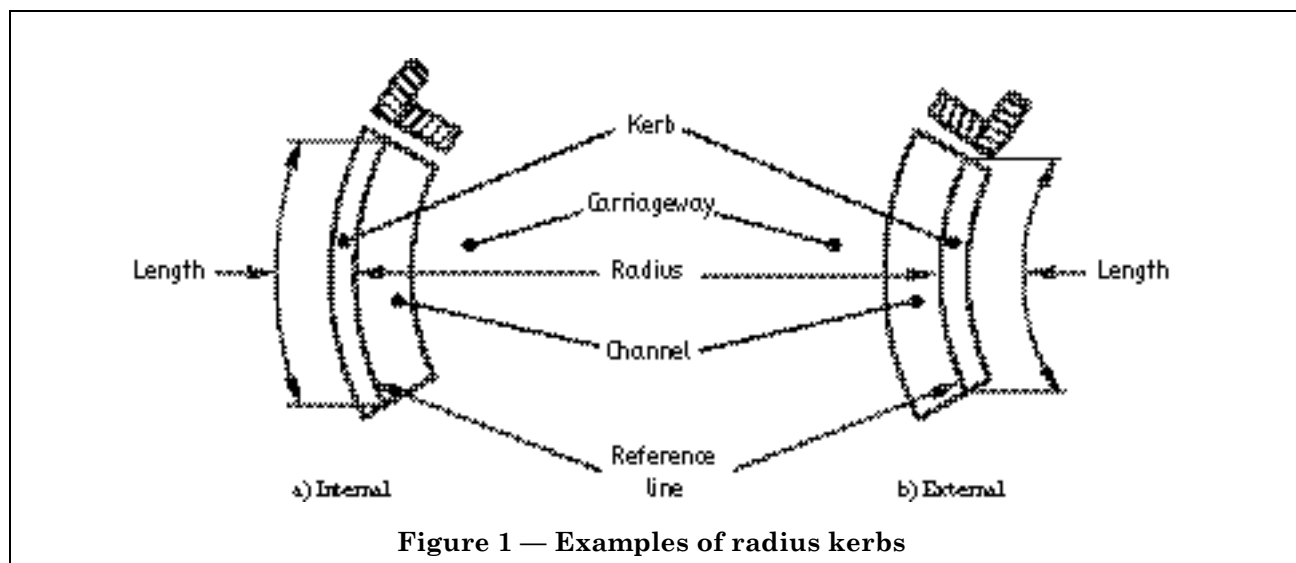


Figure 1 — Examples of radius kerbs

Table 1 — Convex and concave radii for kerbs and channels

Type of kerb	Preferred radii ^a m
Convex only	0.5
	1.0
	2.0
Concave and convex	3.0
	4.0
	5.0
	6.0
	8.0
	15.0

^a A right-angled curve with a unit length of 780 mm requires only full-length units when using these radii.

5.2.3 Tolerances

When the dimensions of a single kerb are measured in accordance with Annex B, the tolerances shall be as specified in Table 2.

Table 2 — Tolerances for work dimensions

Class	Length	Width or height	Straightness and bow
D1	±1 % to nearest mm min. 3 mm, max. 10 mm	±3 % to nearest mm min. 3 mm, max. 10 mm	±2 mm measured over 250 mm to 450 mm ±3 mm measured over 550 mm to 850 mm
D2	±3 mm	±3 mm	±1 mm measured over 250 mm to 450 mm ±2 mm measured over 550 mm to 850 mm

For kerbs with functional or decorative profiles or surfaces, the tolerances shall be at the discretion of the manufacturer. These tolerances shall be declared in the manufacturer's production control documentation (A.3.1).

The difference between any two measurements of a single dimension of a single kerb shall not exceed 5 mm except for kerbs with decorative profiles or surfaces.

5.3 Physical and mechanical properties

5.3.1 Complementary fittings

When radius kerbs, edgings, quadrants, angles, etc. and complementary fittings cannot be tested according to this part of BS 7263, they shall be deemed to conform to this part of BS 7263, provided that they have at least the same concrete quality as kerbs that conform.

5.3.2 Weathering resistance

When kerbs are tested in accordance with Annex D, classes shall be assigned to them according to the mean value of the test results as specified in Table 3. Families of kerbs that have not been tested for weathering resistance shall be assigned class W1.

Table 3 — Weathering resistance classes

Class	Mass loss after weathering test
	mean value (kg/m ²)
W1	No performance determined
W2	≤1.0, no individual value >1.5
W3	Manufacturer's declared value (A.3.1)
NOTE The manufacturer's declared value is usually applied to secondary processed products.	

5.3.3 Bending strength

When kerbs are tested in accordance with Annex E, the mean bending strength shall be not less than 4.2 MPa and no individual result shall be less than 3.4 MPa.

5.3.4 Abrasion resistance

When kerbs are tested in accordance with Annex F, classes shall be assigned to them according to the values specified in Table 4. No individual result shall be greater than the specified value. Families of kerbs that have not been tested for abrasion resistance shall be assigned class A1.

NOTE This is not required unless the kerbs are to be laid as channels in a trafficked area.

Table 4 — Abrasion resistance classes

Class	Degree of abrasion
	mm
A1	No performance determined
A2	26
A3	Manufacturer's declared value (A.3.1)
NOTE Kerbs of class A1 are suitable for use in pedestrian areas.	

5.3.5 Slip/skid resistance

When kerbs are tested in accordance with Annex G, classes shall be assigned to them according to the mean value of the test results as specified in Table 5. The slip/skid resistance value shall be the lower of the values obtained for the unpolished skid resistance and the polished pendulum test. Families of kerbs that have not been tested for slip/skid resistance shall be assigned class S1.

NOTE This is not required unless the kerbs are to be laid as channels in a trafficked area.

Table 5 — Slip/skid resistance classes

Class	Mean slip/skid resistance value
	C scale units
S1	No performance determined
S2	≥35
S3	≥45
S4	Manufacturer's declared value (A.3.1)
NOTE Kerbs of class S2 are suitable for use in pedestrian areas and kerbs of class S3 are suitable for use in vehicular areas.	

5.4 Visual properties

5.4.1 Appearance

When examined in accordance with Annex H, the upper face of kerbs shall not exhibit defects such as cracking or flaking.

In the case of two-layer kerbs there shall be no delamination (separation) between the layers.

NOTE Efflorescence is not deleterious to the mechanical and physical performance of kerbs.

5.4.2 Texture

If kerbs are produced with a special surface texture, the texture shall be at the discretion of the manufacturer. The properties of the textured surface shall be declared in the manufacturer's production control documentation (see A.3.1). Kerbs with a special surface texture shall be deemed to conform to this part of BS 7263 if, when examined in accordance with Annex H, there are found to be no significant visible differences to any samples supplied by the manufacturer and approved by the purchaser.

5.4.3 Colour

NOTE 1 Colours may be provided in a facing layer or throughout a kerb at the manufacturer's discretion.

Kerbs containing colours shall be deemed to conform to this part of BS 7263 if, when examined in accordance with Annex H, there are found to be no significant differences in colour to any samples supplied by the manufacturer and approved by the purchaser.

NOTE 2 Variations in the colour consistency of kerbs can be caused by unavoidable variations in the shade and properties of the raw materials and by variations in hardening.

6 Manufacturer's evaluation of conformity

The manufacturer's evaluation of conformity shall be carried out as specified in Annex A.

Kerbs produced by the manufacturer shall be subjected to type testing in accordance with A.2.

The manufacturer shall also establish and maintain a production control system for product testing in accordance with A.3.

Conformity assessment for bending strength shall be carried out in accordance with Annex I.

NOTE 1 An example of a production control system is given in Annex J.

NOTE 2 The production control system is intended to enable the manufacturer to determine whether the kerbs conform to the requirements of this part of BS 7263 and to demonstrate that kerbs have been assigned the correct class markings.

7 Marking

The following particulars relating to kerbs shall be indicated clearly on any one of the delivery note, invoice, packaging, or supplier's certificate or brochure supplied with the consignment of kerbs:

- a) identification of the manufacturer or the factory;
- b) date of production;
- c) class(es) where applicable (see Table 6);
- d) the number of this British Standard¹⁾;
- e) identification of the product (i.e. concrete kerb units).

Table 6 — Classes and their identification

Parameter	Class marking
Weathering resistance	W1, W2 or W3
Abrasion resistance	A1, A2 or A3
Dimensions	D1 or D2
Slip/skid resistance	S1, S2, S3 or S4

¹⁾ Marking BS 7263-3:2001 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

8 Test report

A test report shall be produced for each test that is performed by an external laboratory. The test report shall contain the following particulars:

- a) name of the organization carrying out the test;
- b) name of the person carrying out the test;
- c) date of the test;
- d) the name of the source providing the sample;
- e) sample reference, including the date of production;
- f) name of the person taking the sample;
- g) annex and/or relevant British Standard in which the test method is specified;
- h) name of the test;
- i) test result;
- j) any pertinent remarks about the sample or test result.

Annex A (normative)

Manufacturer's evaluation of conformity

A.1 General

For the purpose of testing, products shall be grouped into families, where the value of a selected property is common to all products within that family.

NOTE Examples of such families are:

- **strength family:** kerbs manufactured using the same type of materials and production methods, irrespective of dimensions and colours;
- **surface family:** kerbs with face mixes having the same prime aggregate used in the mix, e.g. natural river gravel, crushed granite, porphyry, basalt or limestone and the same surface treatment of the finished product, irrespective of dimensions and colours.

A.2 Type testing

A.2.1 Initial type testing

NOTE Where the product has previously been tested in accordance with the procedures in this part of BS 7263, the results may be used to satisfy initial type testing.

Initial type testing shall be performed at the beginning of the manufacture of a new product type or a family of product types, or on the setting up of a new production line, to determine whether the achieved properties of the product conform to the requirements of this part of BS 7263.

The sampling, testing and conformity criteria for initial type testing shall be as specified in **A.2.3**.

A.2.2 Further type testing

Whenever a change occurs in the raw materials, the proportions used or the production equipment or process, which would significantly change some or all of the properties of the finished product, the type tests shall be repeated for the selected property.

The sampling, testing and conformity criteria for further type testing shall be as specified in **A.2.3**.

NOTE Examples of changes necessitating repeat tests are:

- change from natural river gravel to crushed rock aggregates;
- partial substitution of cement by additions;
- partial substitution of aggregate by recycled concrete.

For abrasion, weathering and slip and/or skid resistance, type testing shall be repeated periodically at the frequency given in Table A.1.

Table A.1 — Periodically repeated type testing

Property	Frequency
Abrasion (classes A2 and A3)	Once per year per surface family
Weathering resistance (classes W2 and W3)	Once per year per surface family ^a
Slip and/or skid resistance (classes S2, S3 and S4)	Once per year per surface family

^a If, for a surface family, the result of a type test (mass loss) is lower than 50 % of the required value, the repeated type tests may be carried out every 2 years as long as this condition continues to be fulfilled.

A.2.3 Sampling, testing and conformity criteria for initial and further type testing

The number of kerbs to be tested shall be in accordance with Table A.2 for the selected property.

Table A.2 — Sampling plan and conformity criteria for initial and further type testing

Property	Requirement specified in	Test method in accordance with	No. of kerbs	Conformity criteria
Shape and dimensions	5.2	Annex B ^a	3 ^b	Each kerb shall meet the requirements.
Weathering resistance (only where tested)	5.3.2	Annex D	3	The mean of the three results shall be not greater than 1.0 kg/m ² and no individual result shall be greater than 1.5 kg/m ² .
Bending strength	5.3.3	Annex E	3	The mean strength of the kerbs tested shall be not less than 4.2 MPa and no individual kerb shall have a bending strength less than 3.8 MPa.
Abrasion resistance (only where tested)	5.3.4	Annex F	3	Each kerb shall meet the requirements.
Slip/skid resistance (only where tested)	5.3.5	Annex G	3	Class S2: the slip/skid resistance shall be not less than 35.
				Class S3: the slip/skid resistance shall be not less than 45.
				Class S4: the slip/skid resistance shall be not less than the manufacturer's declared value.
Appearance	5.4.1	Annex H	3 ^b	No kerb shall show cracking, flaking or delamination ^c .
^a B.5 applies only to kerbs with a facing layer. ^b These kerbs may be used for subsequent tests. ^c Delamination applies only to kerbs with a facing layer.				

The type tests shall be carried out in accordance with the test methods called up in this part of BS 7263. The test results shall be recorded.

NOTE Type testing is normally carried out with the manufacturer's test equipment.

A.3 Production control system

A.3.1 General

A production control system shall be established, documented and maintained by the manufacturer.

NOTE 1 This is to ensure that the products placed on the market conform to the specified or declared values.

The documentation of the production control system shall contain the following information:

- a) production control procedures and responsibilities;
- b) details of production processes;
- c) materials to be used in the kerbs (see clause 4);
- d) dimensions of any chamfers to be included in the kerbs, if applicable (see 5.1);
- e) details of any finishes or treatments to be used, if applicable (see 5.1);
- f) work dimensions for non-designated kerbs, if applicable (see 5.2.1);
- g) radii and overall lengths of radius kerbs, if applicable (see 5.2.2);
- h) tolerances for kerbs with decorative profiles, if applicable (see 5.2.3);
- i) weathering resistance values, if applicable (see 5.3.2 and Table 3);
- j) abrasion resistance values, if applicable (see 5.3.4 and Table 4);
- k) slip/skid resistance values, if applicable (see 5.3.5 and Table 5);
- l) details of any special surface textures, if applicable (see 5.4.2);
- m) dates and results of inspections;
- n) details of apparatus used in tests;
- o) procedures for dealing with non-conforming products;
- p) action to be taken when control values or criteria are not met;
- q) test reports (see clause 8, B.6, D.7, E.5, F.9 and G.5);
- r) procedures for marking, storage and delivery control.

NOTE 2 An example of a production control system is given in Annex J.

A.3.2 Product testing

A sampling plan shall be prepared. Sampling and testing shall be carried out in accordance with this plan. The test results shall be considered by attributes to determine whether or not the products conform to this part of BS 7263.

Product testing shall be carried out either in accordance with the test methods specified in Annex D, Annex E, Annex F, Annex G and Annex H, or by applying alternative test methods with a proven correlation to those specified in Annex D, Annex E, Annex F, Annex G and Annex H.

The results of product testing shall be retained by the manufacturer.

A.3.3 Non-conforming products

If the results of the tests on a product are unsatisfactory, the manufacturer shall take the necessary steps in order to rectify the shortcoming.

Products that do not conform to the requirements shall be set aside and marked accordingly.

Annex B (normative)

Measurement of the dimensions of a single kerb

B.1 Preparation

Remove all flashings and burrs from the kerb to be measured.

B.2 Dimensions

B.2.1 *Length*

Using measuring equipment with a precision of 0.5 mm, measure the overall length of the kerb at the front and back, at 10 mm above the bottom of the kerb, to the nearest whole millimetre. Do not include any chase and draw in the measurements. Record the two measurements. Calculate and record the difference between the two measurements.

B.2.2 *Width*

Measure the width on both ends of a kerb at the top, at the extreme corners of any profile and at 10 mm from the bottom. Record the measurements in whole millimetres and the calculated difference.

B.2.3 *Height*

Measure the height at the back of the kerb and at the extreme corners of any profile at 10 mm from both ends. Record the measurements in whole millimetres and the calculated difference.

B.3 Straightness and bow

Using measuring equipment with a precision of 0.1 mm, measure the maximum convex and concave deviation along the traffic face. Record the measurement.

B.4 Radius kerbs

Measure the radius of the kerb to its reference line. Measure the overall length of the kerb along its reference line. Record both measurements.

B.5 Thickness of facing layer

Using measuring equipment with a precision of 0.5 mm, measure the thickness of the facing layer at the broken or sawn face where, by visual inspection, the value is at its lowest. Ignore isolated particles of aggregate protruding into the surface layer.

Record the measurement to the nearest millimetre.

B.6 Test report

The test report shall include all the measurements taken (see also clause 8).

Annex C (normative)**Sampling and testing of a consignment in case of dispute****C.1 General**

In the event of a dispute regarding the quality of a consignment of kerbs, the procedure specified in this annex shall be followed. The properties to be tested shall be restricted to those that are in dispute.

The properties to be tested shall normally be restricted to those specified in Table C.1.

The test for visual properties shall be carried out prior to the tests for any other properties. The purchaser and the manufacturer shall agree a location for the test and they shall perform the test together at that location.

NOTE 1 The location used for visual testing is normally the site or the factory.

With the exception of the test for visual properties, all tests shall be carried out in a laboratory agreed by both the purchaser and the manufacturer. The purchaser and the manufacturer shall both be given the opportunity to witness the sampling and testing.

NOTE 2 The manufacturer's test equipment may be used to carry out the tests.

C.2 Sampling and testing

The number of kerbs to be sampled, and the tests to be made on them, shall be as specified in Table C.1 or Table C.2 according to the property to be tested. The specified number of kerbs to be sampled shall be taken from each batch of up to 1 000 kerbs in the whole consignment. The kerbs used for testing shall be selected as being representative of the batch and shall be evenly distributed through the batch.

Table C.1 — Sampling and testing plan

Property	Requirement specified in	Test method in accordance with	No. of kerbs
Shape and dimensions	5.2	Annex B ^a	3 ^b
Bending strength	5.3.3	Annex E	3
Appearance	5.4.1	Annex H	3 ^b
^a B.5 applies only to kerbs with a facing layer. ^b These kerbs may be used for subsequent tests.			

Table C.2 — Sampling and testing plan for additional properties

Property	Requirement specified in	Test method in accordance with	No. of kerbs
Weathering resistance	5.3.2	Annex D	3
Abrasion resistance	5.3.4	Annex F	3
Slip/skid resistance	5.3.5	Annex G	4

Annex D (normative)

Method for determining weathering resistance

D.1 Principle

A test specimen is preconditioned and then subjected to 28 freeze/thaw cycles while the surface is covered with a 3 % NaCl solution. The material that has scaled off is collected and weighed and the result expressed as a mass per unit area of surface.

D.2 Materials

D.2.1 Potable water.

D.2.2 Freezing medium, consisting of a mass fraction of 97 % potable water and a mass fraction of 3 % NaCl.

D.2.3 Adhesive, resistant to the environmental conditions used in the test, for gluing the rubber sheet to the concrete specimen.

NOTE Contact adhesive has proved to be a suitable adhesive for use in this procedure.

D.2.4 Silicon rubber, or other sealant, to provide a seal between the specimen and the rubber sheet and to fill in any chamfer around the perimeter of the specimen.

D.3 Apparatus

D.3.1 Saw, for cutting the concrete specimen.

D.3.2 Climate chamber, with a temperature of $(20 \pm 2) ^\circ\text{C}$ and a relative humidity of $(65 \pm 10) \%$. In the climate chamber the evaporation from a free water surface shall be $(200 \pm 100) \text{ g/m}^2$ in $(240 \pm 5) \text{ min}$. The evaporation shall be measured from a bowl with a depth of approximately 40 mm and a cross-section area of $(22500 \pm 2500) \text{ mm}^2$. The bowl shall be filled up to $(10 \pm 1) \text{ mm}$ from the brim.

D.3.3 Rubber sheet, $(3 \pm 0.5) \text{ mm}$ thick, resistant to the salt solution used and elastic down to a temperature of $-20 ^\circ\text{C}$.

D.3.4 Vernier calliper, with an accuracy of $\pm 0.1 \text{ mm}$.

D.3.5 Thermal insulation material, consisting of expanded polystyrene $(20 \pm 1) \text{ mm}$ thick with a thermal conductivity between $0.035 \text{ W/m}\cdot\text{K}$ and $0.04 \text{ W/m}\cdot\text{K}$ or other equivalent insulation.

D.3.6 Polyethylene sheet, 0.1 mm to 0.2 mm thick.

D.3.7 Freezing chamber, incorporating a time-controlled refrigerating and heating system with a capacity and air circulation such that the time-temperature curve presented in Figure D.3 can be followed.

D.3.8 Thermocouples, or an equivalent temperature-measuring device, for measuring the temperature in the freezing medium on the test surface to an accuracy within $\pm 0.5 ^\circ\text{C}$.

D.3.9 Vessel, for collecting scaled material. The vessel shall be suitable for use up to $120 ^\circ\text{C}$ and shall withstand sodium chloride attack.

D.3.10 Spray bottle, containing potable water for washing off scaled material and washing salt out of scaled material.

D.3.11 Paint brush, 20 mm to 30 mm wide, with bristles cut down to about 20 mm long, for brushing off scaled material.

D.3.12 Filter paper, for collecting scaled material.

D.3.13 Drying cabinet, with a temperature of $(105 \pm 5) ^\circ\text{C}$.

D.3.14 Balance, with an accuracy of $\pm 0.05 \text{ g}$.

D.4 Preparation of test specimen

The test specimen shall incorporate a face area greater than 7500 mm² but less than 25000 mm², which shall be the test surface and shall have a uniform thickness of between 50 mm and 103 mm. A kerb shall be at least 20 days old when a specimen is cut from it.

When the test specimens are at least 28 days old, flashings and loose material shall be removed.

The specimens shall be placed in the climate chamber (D.3.2). There shall be a minimum air space between the specimens of 50 mm. The specimens shall be cured for (168 ± 5) h.

The rubber sheet (D.3.3) shall be glued to all surfaces of the specimen except the test surface, using the adhesive (D.2.3). Silicon rubber or other sealant (D.2.4) shall be used to fill in the chamfer around the perimeter of the specimen and to provide a seal around the test surface in the corner between the concrete and the rubber sheet to prevent water penetration between the specimen and rubber. The edge of the rubber sheet shall reach (20 ± 2) mm above the test surface.

NOTE The adhesive should normally be spread on the concrete surfaces as well as on the rubber surfaces. The manner of gluing the rubber sheet illustrated in Figure D.1 has proved suitable.

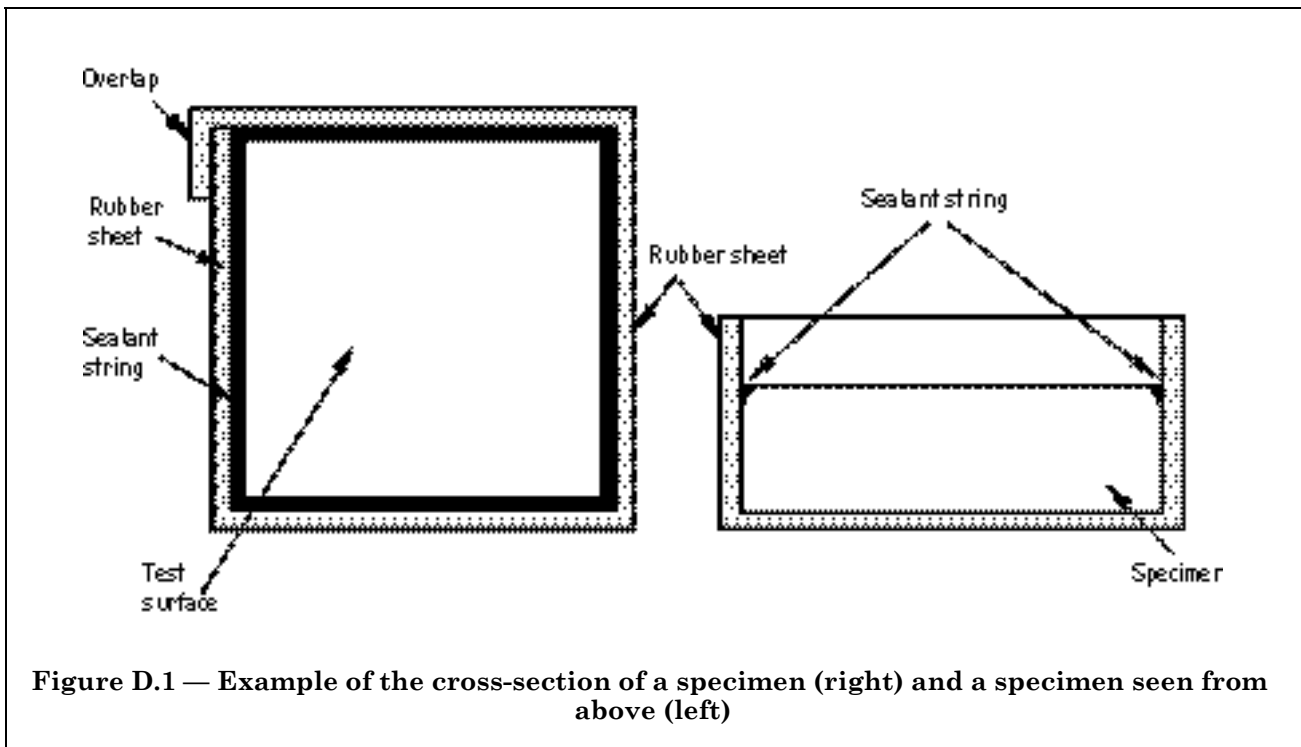


Figure D.1 — Example of the cross-section of a specimen (right) and a specimen seen from above (left)

Using the vernier calliper (D.3.4), the tested area A shall be established from the mean of three measurements of its length and width to the nearest millimetre. After curing in the climate chamber, potable water (D.2.1) with a temperature of (20 ± 2) °C shall be poured on the test surface to a depth of (5 ± 2) mm. This shall be maintained for (72 ± 2) h at (20 ± 2) °C.

NOTE 1 This may be used to assess the effectiveness of the seal between the specimen and the rubber sheet.

Before the freeze/thaw cycling, all surfaces of the specimen except the test surface shall be covered with thermal insulation material (D.3.5).

NOTE 2 The thermal insulation of the surfaces may be carried out during curing.

Between 15 min and 30 min before the specimens are placed in the freezing chamber, the water on the test surface shall be replaced with a (5 ± 2) mm layer, measured from the top surface of the specimen, of 3 % NaCl in potable water (D.2.2). This shall be prevented from evaporating by applying a horizontal polyethylene sheet (D.3.6) as shown in Figure D.2. The polyethylene sheet shall remain as flat as possible throughout the test and shall not come into contact with the freezing medium.

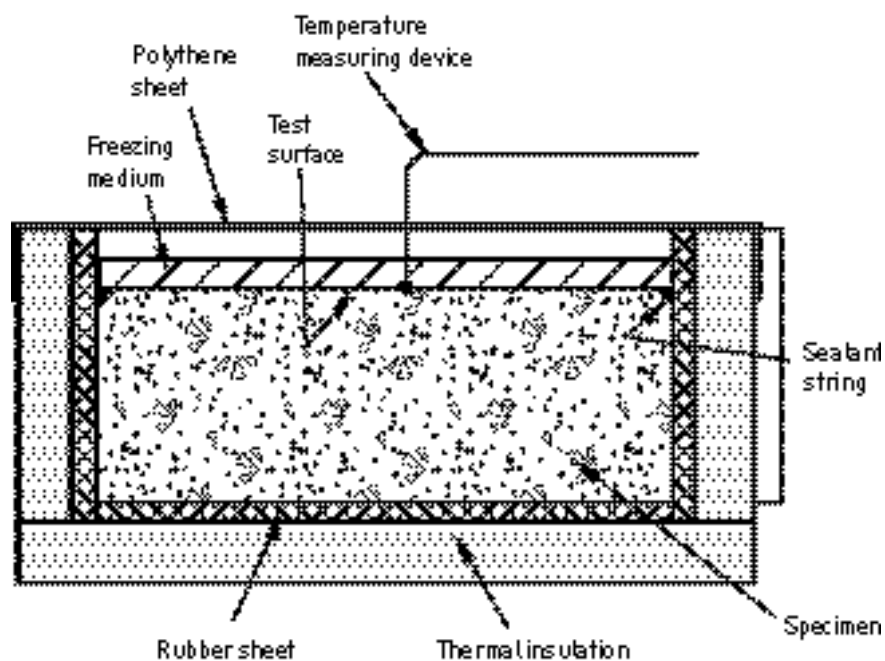


Figure D.2 — Principle of set-up for the freeze/thaw test

D.5 Procedure

Place the specimens in the freezing chamber (D.3.7) such that the test surface does not deviate from a horizontal plane by more than 3 mm/m in any direction and such that the specimens are subjected to repeated freezing and thawing.

During the test the time–temperature cycle in the freezing medium at the centre of the surface of all specimens shall fall within the shaded area shown in Figure D.3. Furthermore the temperature shall exceed 0 °C during each cycle for at least 7 h but not more than 9 h.

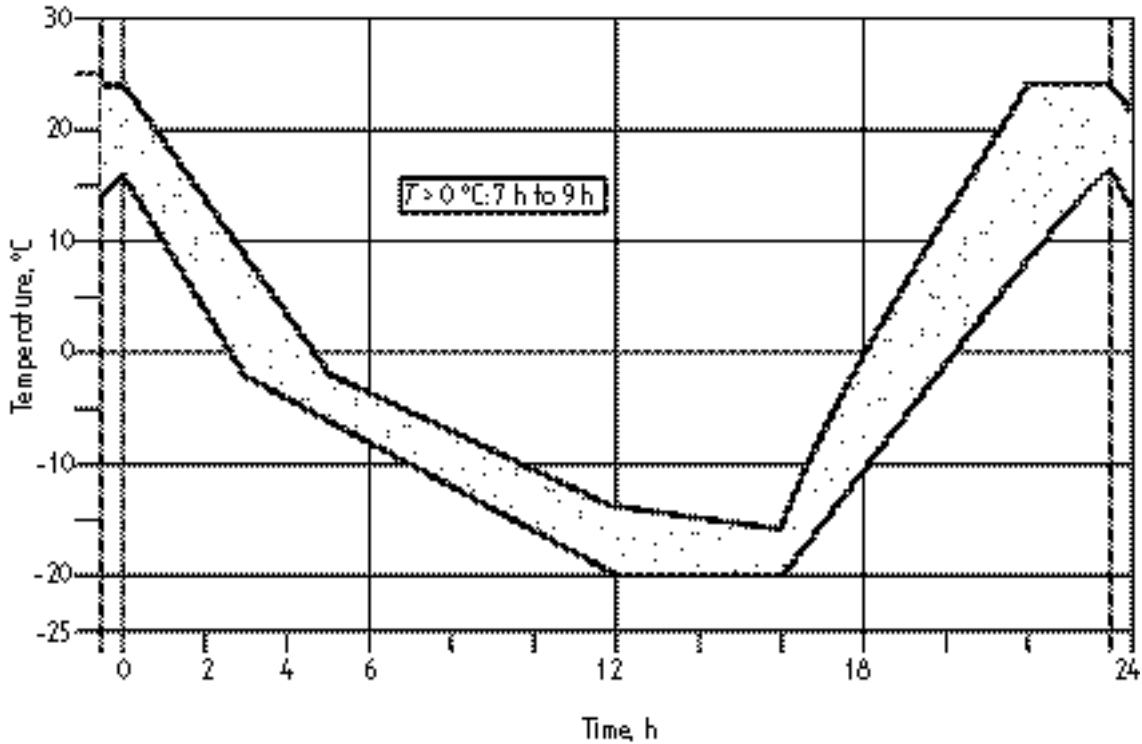


Figure D.3 — Time-temperature cycle

NOTE The break points specifying the shaded area are given in Table D.1.

Table D.1 — Co-ordinates of break points

Upper limit		Lower limit	
Time	Temperature	Time	Temperature
h	°C	h	°C
0	24	0	16
5	-2	3	-4
12	-14	12	-20
16	-16	16	-20
18	0	20	0
22	24	24	16

Using the thermocouples (D.3.8), continuously record the temperature in the freezing medium at the centre of the test surface for at least one specimen, which shall be located in a representative position in the freezing chamber. Record the air temperature in the freezer during the test. Start the timing of the first cycle of the test on a specimen within (0 ± 30) min of it being placed in the freezing chamber.

If a cycle has to be interrupted, the specimen shall be kept in the frozen state between -16 °C and -20 °C. If an interruption continues for more than 3 days the test shall be abandoned.

To obtain the correct temperature cycle for all the specimens, good air circulation shall be ensured in the freezing chamber. If only a few specimens are to be tested, the empty places in the freezer shall be filled with dummies, unless it has been demonstrated that the correct temperature cycle is achieved without them.

After 7 cycles and 14 cycles, during the thaw period further solution of 3 % NaCl in potable water shall be added if necessary in order to keep a (5 ± 2) mm layer on the surface of the samples.

After 28 cycles carry out the following procedure for each specimen.

- a) Collect material that has been scaled from the test surface by rinsing it into the vessel (D.3.9) using the spray bottle (D.3.10) and brushing it into the vessel using the paint brush (D.3.11) until no further scaled material is removed.
- b) Pour the liquid and scaled material in the vessel carefully through a filter paper (D.3.12). Wash the material collected in the filter paper with a minimum of 1 l of potable water to remove any remaining NaCl.
- c) Dry the filter paper and collected material in the drying cabinet (D.3.13) for at least 24 h at $(105 \pm 5) ^\circ\text{C}$.
- d) Using the balance (D.3.14), determine to ± 0.2 g the dry mass of the scaled material, making due allowance for the filter paper.

D.6 Calculation of test result

Calculate the mass loss per unit area, m , of the specimen in kilograms per square metre (kg/m^2) from the following equation:

$$m = \frac{M}{A}$$

where

- M is the mass of the total quantity of material scaled after 28 cycles, in milligrams (mg);
 A is the area of the test surface, in square millimetres (mm^2).

D.7 Test report

The test report shall include the following information (see also clause 8):

- a) mass of total quantity of material scaled after 28 cycles, in milligrams (mg);
- b) area of the test surface, in square millimetres (mm^2);
- c) mass loss per unit area of the specimen.

Annex E (normative)

Method for measuring bending strength

E.1 Apparatus

E.1.1 *Transverse testing machine*, with a scale having an accuracy of $\pm 3\%$ over the range of the anticipated test loads and capable of increasing the load at specified rates. It shall be equipped with a device that can induce 3-point bending into the specimen without torsion (see Figure E.1). The length of the supports shall be at least equal to the width of the kerb to be tested and the load shall be applied through a swivel joint on a (40 ± 1) mm diameter pad of steel with a minimum thickness of 20 mm. The lower bearers shall be parallel and rigid, and round, or rounded to a radius of (20 ± 1) mm.

E.1.2 *Plywood packing*, (4 ± 1) mm thick and (50 ± 5) mm square.

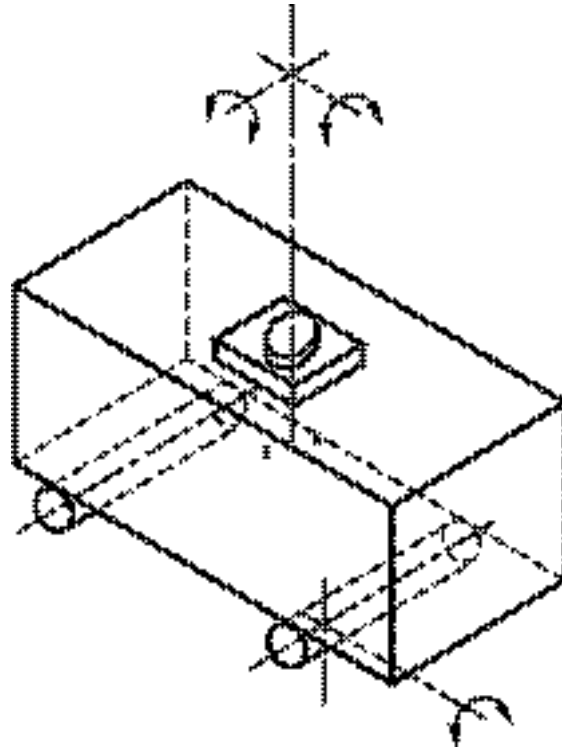


Figure E.1 — Principle of operation of transverse testing machine

E.2 Preparation of test specimen

Use whole kerbs and, if necessary, remove any burrs, high spots, etc. If a face is rough, textured or curved, prepare it by grinding or capping to receive the steel pad.

Immerse the specimen in water at (20 ± 5) °C for (24 ± 3) h, remove, wipe dry and test immediately.

E.3 Procedure

The distance between the supports and the edge of the specimen shall be at least 50 mm and the distance between the supports shall be at least four times the depth of the specimen, as placed in the testing machine.

The actual span shall be measured and recorded.

Place the specimen symmetrically on the bearers of the testing machine, with its greater cross-sectional dimension horizontal, and place the plywood packing (E.1.2) under the steel pad.

Apply the load vertically within 5 mm of the centre of the cross-section of the specimen, taking into account its shape.

Apply the load without shock and increase the stress at a rate of (0.06 ± 0.02) MPa/s until the specimen fails. Record the failure load, P , to the nearest 100 N.

E.4 Calculation of results

Using the manufacturer's work dimensions, calculate the second moment of area, I , about a horizontal axis through the centre of the area of the failure plane.

Calculate the strength, T , in megapascals (MPa) of the specimen tested from the following equation:

$$T = \frac{P \times L \times y}{4 \times I}$$

where

- P is the failure load, in newtons (N);
- L is the distance apart of the supports, in millimetres (mm);
- I is the second moment of area, in millimetres to the power 4 (mm^4);
- y is the distance from the centroid to the extreme tensile fibre, in millimetres (mm).

Record the individual result, T , in megapascals (MPa).

NOTE Values of I and y for designated kerbs are given in Annex K.

E.5 Test report

The test report shall include the following information (see also clause 8):

- a) strength of each kerb, to the nearest 0.1 MPa;
- b) mean strength of the kerbs tested.

Annex F (normative)

Method for measuring abrasion resistance

F.1 Principle

The test is carried out by abrading the upper part of the face of a kerb with an abrasive material under controlled conditions.

F.2 Materials

F.2.1 Abrasive material, comprising fused alumina with a grit size of F80 in accordance with BS ISO 8486-1:1996. A single quantity of abrasive material shall be used not more than three times. The moisture content of the abrasive material shall not exceed 1.0 %.

F.3 Apparatus

F.3.1 Wearing machine (see Figure F.1), comprising a wide abrasion wheel (F.3.2), a mobile clamping trolley (F.3.3), a storage hopper (F.3.4), a flow guidance hopper (F.3.5), and a counterweight.

F.3.2 Wide abrasion wheel, which shall be made of steel E360 in accordance with BS EN 10083-2:1991. The hardness of the steel shall be between 203 HB and 245 HB. The diameter of the wheel shall be (200 ± 1) mm and its width shall be (70 ± 1) mm. It shall be driven to rotate 75 revolutions in (60 ± 3) s.

F.3.3 *Mobile clamping trolley*, mounted on bearings and forced by a counterweight to move forwards to the wheel.

F.3.4 *Storage hopper*, which shall contain the abrasive material and shall feed into the flow guidance hopper. It shall have one or two control valves to regulate the output of the abrasive material. When two valves are used, one shall be used to regulate the rate of flow and can be permanently set while the other shall be used to turn the flow on and off.

F.3.5 *Flow guidance hopper*, which shall be either cylindrical or rectangular and shall have a slotted outlet (see Figure F.2). The length of the slot shall be (45 ± 1) mm and the width shall be (4 ± 1) mm. The body of the flow guidance hopper shall be at least 10 mm bigger than the slot in all directions [see Figure F.2a)], unless the hopper is rectangular, with at least one of the sides inclined down to the long side of the slot, in which case there shall be no dimensional limitations [see Figure F.2b)].

The distance of the fall between the slot and the axle of the wide abrasion wheel shall be (100 ± 5) mm and the flow of the abrasive shall be 1 mm to 5 mm behind the leading edge of the wheel (see Figure F.3 or Figure F.4).

The flow of the abrasive material from the flow guidance hopper shall be at a minimum rate of 2.5 l/min onto the wide abrasion wheel. The flow of abrasive shall be constant and the minimum level of the abrasive material in the flow guidance hopper shall be 25 mm (see Figure F.3 or Figure F.4).

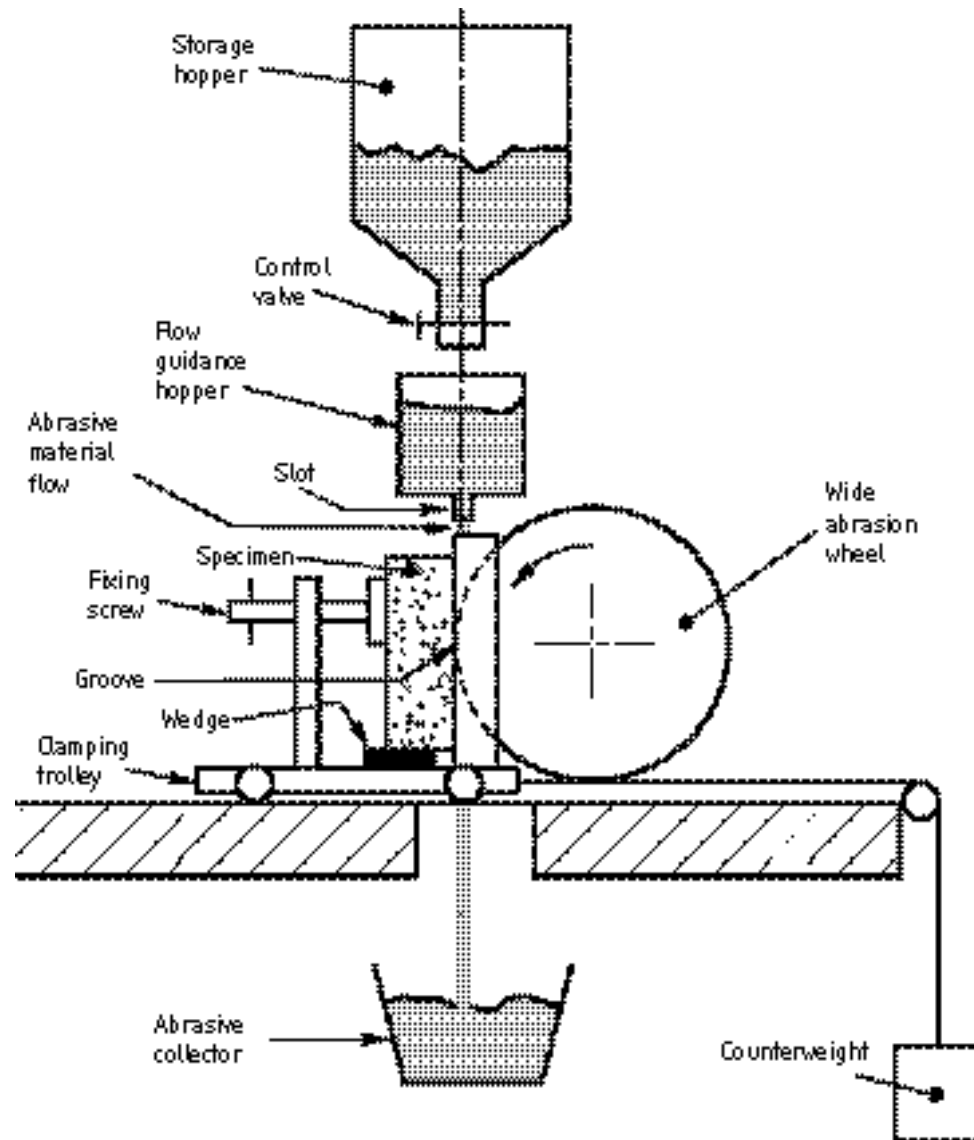
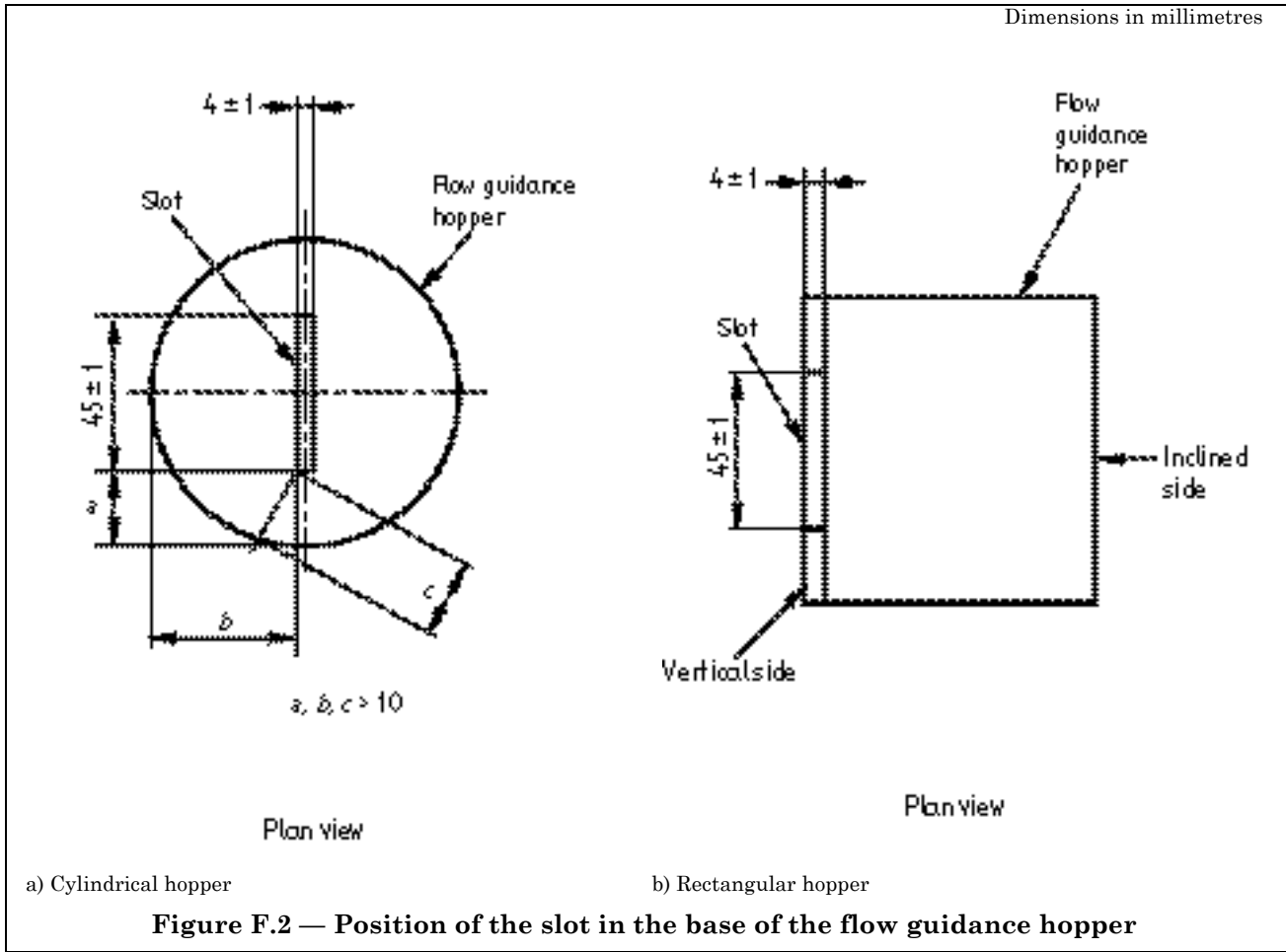
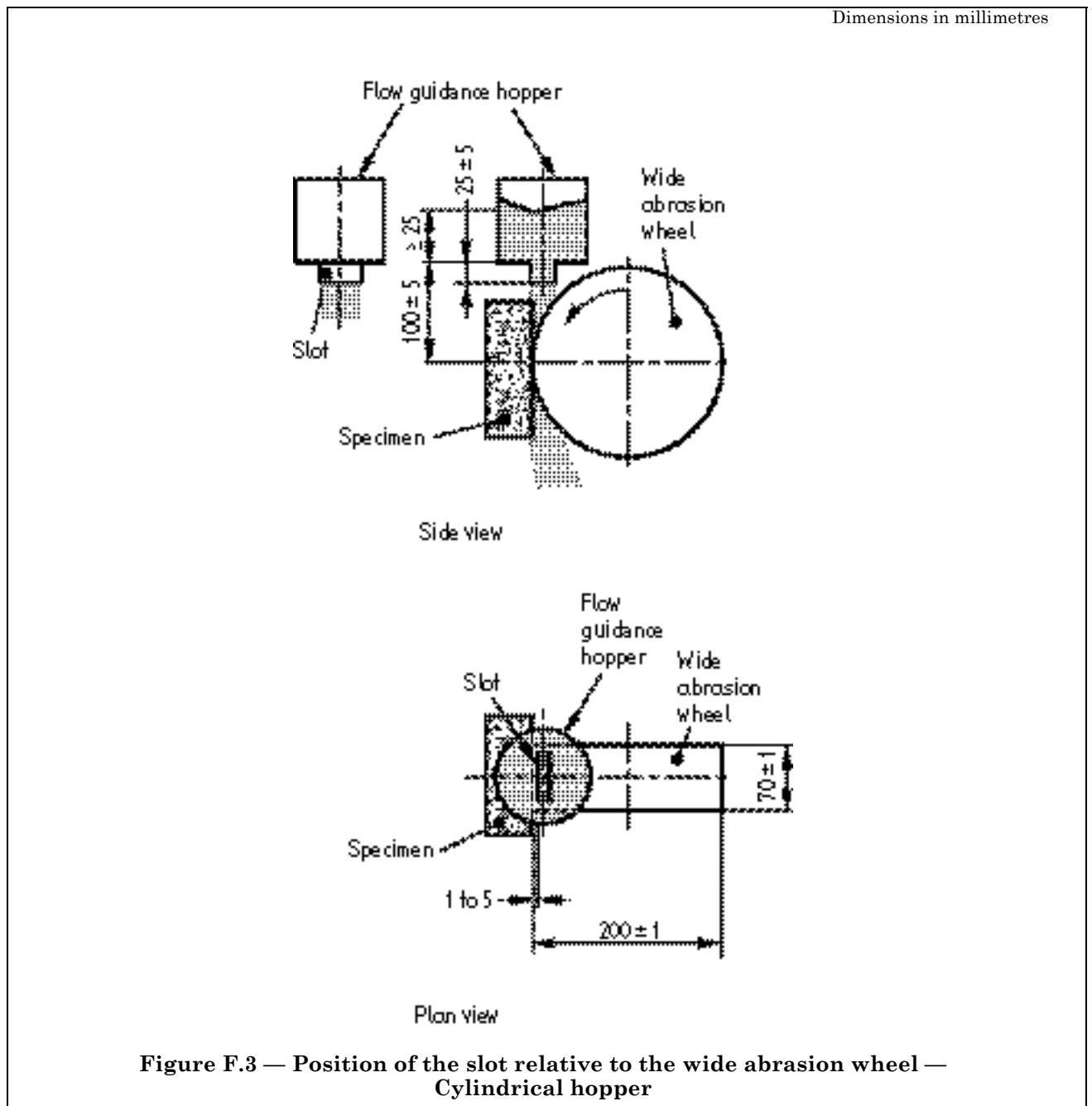


Figure F.1 — Principle of operation of wearing machine





Dimensions in millimetres

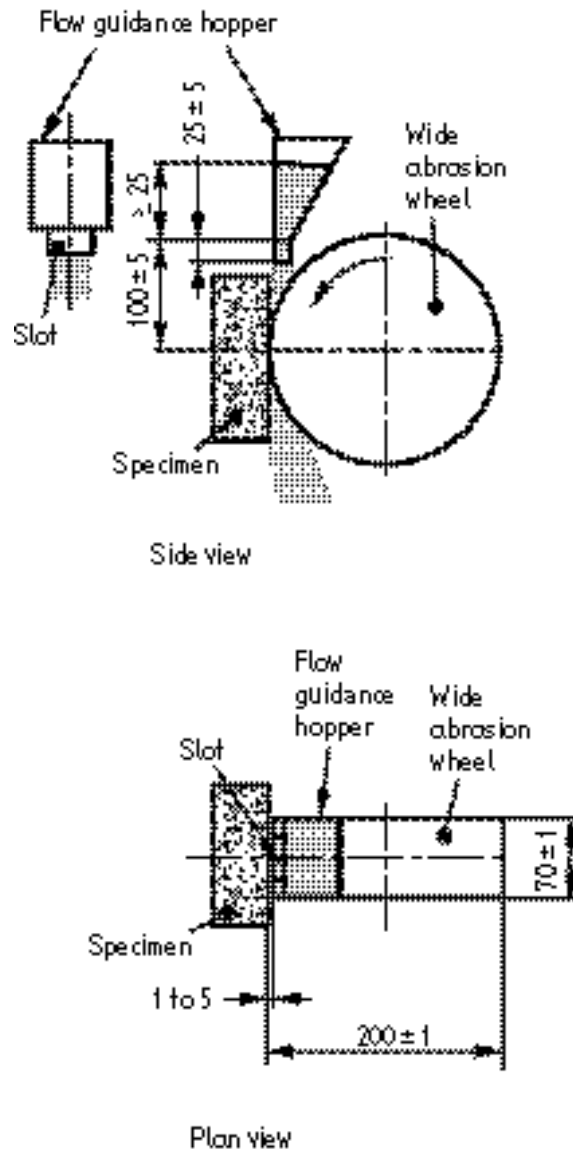


Figure F.4 — Position of the slot relative to the wide abrasion wheel — Rectangular hopper

F.3.6 *Stiff brush*, for cleaning the test surface.

F.3.7 *Surface dye*, to facilitate the measuring of the groove.

NOTE A marker pen has proved to be a suitable tool for dyeing the surface.

F.3.8 *Abrasive collector*, to collect abrasive material falling from the wheel.

F.3.9 *Pencil*, with a lead diameter of 0.5 mm and a hardness of 6H or 7H.

F.3.10 *Steel ruler*, for measuring the abrasion groove.

F.3.11 *Digital calliper*, for measuring the abrasion groove.

F.4 Calibration

The apparatus shall be calibrated after grinding 400 grooves or every 2 months, whichever is the lesser, and every time there is a new operator, a new batch of abrasive material, or a new abrasion wheel.

The flow rate of the abrasive material shall be verified by pouring the material from a height of approximately 100 mm into a pre-weighed rigid container with a smooth rim, of height (90 ± 10) mm and of approximately 1 l volume when filled to the top. As the container fills, the pouring height shall be raised to maintain approximately the 100 mm fall. When the container is filled, the top shall be struck off level and the container weighed to determine the mass of abrasive material for a known volume, i.e. the density. Abrasive material shall be run through the wearing machine for (60 ± 1) s and collected below the abrasion wheel in a pre-weighed container of at least 3 l capacity. The filled container shall be weighed and the rate of flow of abrasive material shall be determined.

The apparatus shall be calibrated, using the procedure in **F.6**, against a reference sample of "Boulonnaise Marble" with the following properties:

- "Lunel demi-clair";
- a thickness greater than or equal to 50 mm;
- cut perpendicular to the bed direction;
- two faces ground with a diamond grit size of 100/200;
- a roughness, when measured with a stylus measuring instrument in accordance with BS EN ISO 4288, of $R_a = (1.6 \pm 0.4)$ μm .

The counterweight shall be adjusted so that after 75 revolutions of the wheel in (60 ± 3) s the length of the groove produced is (20.0 ± 0.5) mm.

The clamping trolley/counterweight assembly shall be checked for undue friction.

The groove shall be measured to the nearest 0.1 mm using the procedure in **F.7**, and the three results shall be averaged to give the calibration value.

At every calibration of the apparatus, the squareness of the sample supports shall be checked and corrected if necessary.

The groove on the reference sample shall be rectangular with the difference between the measured length of the groove at either side not exceeding 0.5 mm. If necessary check that:

- a) the sample has been held square to the wheel;
- b) the clamping trolley and the slot from the flow guidance hopper are parallel to the wheel axle;
- c) the flow of abrasive is even across the slot;
- d) the friction in the trolley/counterweight assembly does not prevent smooth operation.

F.5 Preparation of specimen

The test specimen shall be a whole kerb or a cut piece measuring at least 100 mm \times 70 mm incorporating the face of the kerb. The test piece shall be clean and dry.

The face, which shall be tested, shall be flat within a tolerance of ± 1 mm measured in accordance with **B.3** in two perpendicular directions, but over 100 mm.

If the face has a rough texture or is outside this tolerance it shall be lightly ground to produce a smooth flat surface within this tolerance.

Immediately before testing, the surface to be tested shall be cleaned with a stiff brush (**F.3.6**) and covered with a surface dye (**F.3.7**) to facilitate measuring the groove.

F.6 Procedure

Fill the storage hopper with dry abrasive material (F.2.1). Move the clamping trolley away from the wide abrasion wheel. Position the test specimen on it such that the groove produced is at least 15 mm from any edge of the specimen, and fix the specimen on a wedge to let the flow of abrasive material pass under it. Place the abrasive collector (F.3.8) beneath the wide abrasion wheel.

Bring the test specimen into contact with the wide abrasion wheel, open the control valve and simultaneously start the motor so that the wide abrasion wheel achieves 75 revolutions in (60 ± 3) s. Visually check the regularity of the flow of the abrasive material during the test. After 75 revolutions of the wheel, stop the flow of abrasive material and the wheel.

F.7 Measuring the groove

Using the pencil (F.3.9) and ruler (F.3.10), draw the external longitudinal limits (l_1 and l_2) of the groove (see Figure F.5).

Draw a line (A B) in the middle of the groove perpendicular to the centreline of the groove. Position the square tips of the digital calliper (F.3.11) on the points A and B to the inside edge of the longitudinal limits (l_1 and l_2) of the groove, and measure and record the dimension of the groove to the nearest 0.1 mm.

For calibration purposes, repeat the measurement (10 ± 1) mm from the ends of the groove (C D) to give three readings.

NOTE Some surface dye can be removed above the groove by action of the abrasive. This should be ignored in producing line l_1 , which should be drawn where the sample surface is abraded.

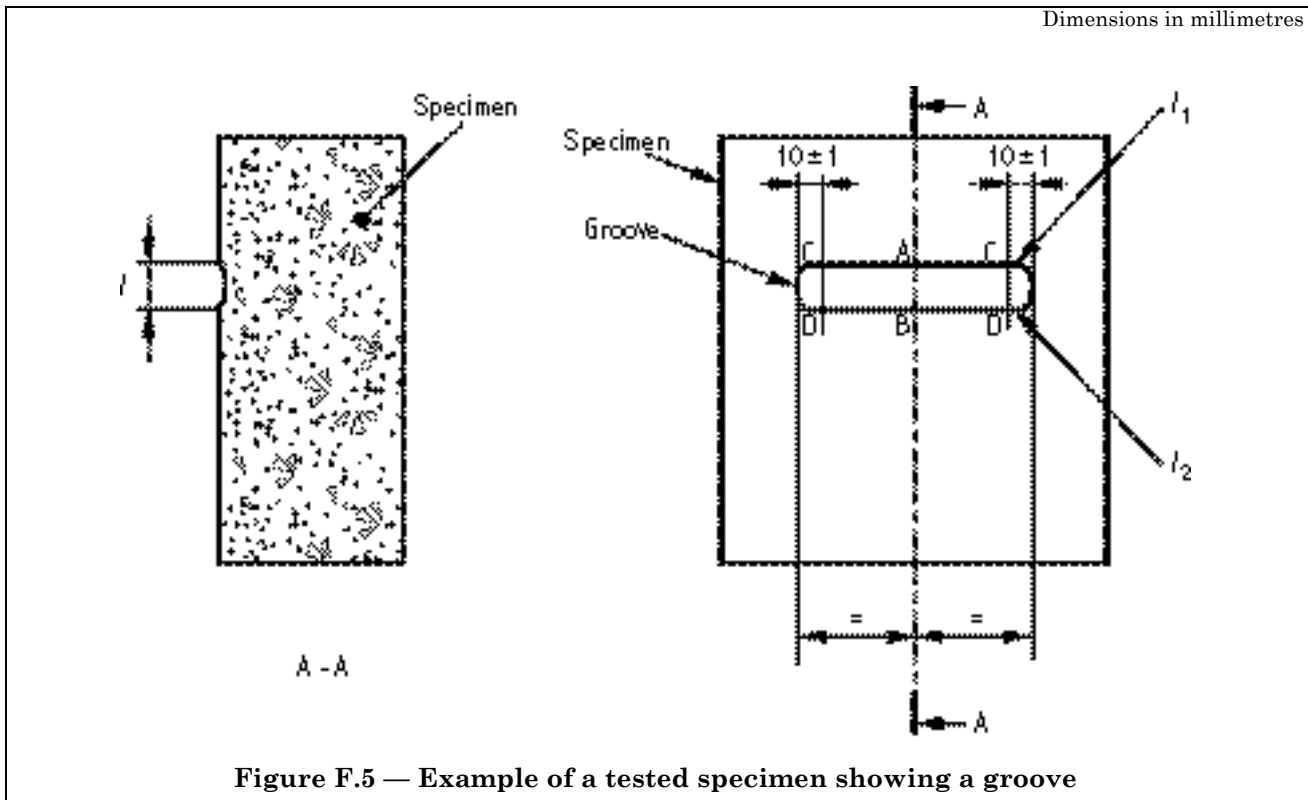


Figure F.5 — Example of a tested specimen showing a groove

F.8 Calculation of test result

The test result shall be the dimension of the groove, corrected by a calibration factor that shall be the arithmetic difference between 20.0 and the recorded calibration value, and then rounded to the nearest 0.5 mm.

NOTE As an example of a test result, if the calibration value is 19.6 mm and the dimension of the groove is 22.5 mm, the result is $22.5 + (20.0 - 19.6) = 22.9$ mm, rounded to 23.0 mm.

F.9 Test report

The test report shall include the lengths of the grooves (see also clause 8).

Annex G (normative)

Method for determining the slip/skid resistance value

G.1 Principle

The kerb is tested to determine both the unpolished skid resistance value (USRV) and the polished pendulum test value (PPTV). The lower of the two values determined is taken to be the slip/skid resistance value.

G.2 Determination of the unpolished skid resistance value (USRV)

G.2.1 Principle

The measurement of the USRV of a specimen is made using a pendulum friction tester passing over the surface of the specimen.

The USRV is not measured if the surface of the kerb contains ridges, grooves or other surface features that prevent testing by the pendulum friction tester, or if the kerb is too small to provide a test area (see **G.2.3**).

G.2.2 Apparatus

G.2.2.1 Pendulum friction tester, with a C scale, conforming to BS 812-114:1989. This shall be calibrated at least annually and validated as specified in BS 7932:1998, **8.1**. The rubber slider shall be 76 mm wide and shall conform to BS 812-114.

G.2.3 Preparation of test specimens

Obtain a sample of four kerbs of the same family (see **A.1**) using the sampling procedure specified in BS 7932:1998, Annex A. Cut a test specimen (typically 200 mm × 100 mm) from each kerb which permits a test area of 136 mm × 86 mm of the face that is intended to be trafficked when the kerb is in use.

Place the test specimens in water at (20 ± 2) °C until they are tested.

G.2.4 Procedure

Keep the pendulum friction tester (**G.2.2.1**) and rubber slider in a room at a temperature of (20 ± 2) °C for at least 2 h before commencing testing.

Place the pendulum friction tester upon a firm, level surface and adjust the levelling screws so that the pendulum support column is vertical. Raise the axis of suspension of the pendulum so that the arm swings freely and adjust the friction in the pointer mechanism so that when the pendulum arm and pointer are released from the right-hand horizontal position the pointer comes to rest at zero position on the test scale.

Before using a new rubber slider, condition it using the method specified in BS 812-114:1989. Discard any rubber slider that fails to conform to BS 812-114:1989.

Carry out the pendulum test on each of the four specimens using the following procedure, using the rubber slider over a 126 mm swept length and with readings taken on the C scale.

Immediately prior to testing with the pendulum friction tester, remove the specimen from the water. Locate the test specimen with its longer dimension lying in the track of the pendulum, and centrally with respect to the rubber slider and to the axis of the suspension of the pendulum. Ensure that the test is carried out on the face that is intended to be trafficked when the kerb is in use. Ensure that the track of the rubber slider is parallel to the long axis of the specimen across the sliding distance.

Adjust the height of the pendulum arm such that in traversing the specimen, the rubber slider is in contact with it over the whole width of the slider and over the swept length of 126 mm. Wet the surfaces of the specimen and the rubber slider with a copious supply of clean water, being careful not to disturb the slider from its set position. Release the pendulum and pointer from the horizontal position, and catch the pendulum arm on its return swing. Record the position of the pointer on the scale.

Perform this operation five times, re-wetting the specimen each time. Record the mean of the last three readings.

Rotate the specimen through 180° and repeat the procedure.

Repeat the test on each of the remaining three specimens.

G.2.5 Calculation of the USRV

Calculate the USRV of each specimen as the mean of the two recorded mean values measured in opposite directions to the nearest 1 unit on the C scale.

Calculate the USRV of the sample as the mean of the values obtained for the four specimens.

G.3 Determination of the polished pendulum test value (PPTV)

G.3.1 Principle

The measurement of the PPTV of a specimen is made using a pendulum friction tester passing over the surface of the specimen after the specimen has been subjected to a polishing regime in a flat-bed polisher.

G.3.2 Preparation of test specimens

From the samples already tested for a USRV (G.2.4), prepare four specimens conforming to the plan area requirements of BS 7932:1998, but with a thickness less than 80 mm. Larger specimens, typically 200 mm × 100 mm, may be used using the wide rubber slider, long swing and C scale, provided that a correlation has been established.

G.3.3 Procedure

The test shall be carried out in accordance with BS 7932:1998.

G.3.4 Calculation of the PPTV

Calculate the PPTV of each specimen as the mean of the last three readings on that specimen.

Calculate the PPTV of the sample as the mean of the values obtained for the four specimens.

G.4 Test result

The slip/skid resistance value shall be the lower of the USRV and the PPTV values.

G.5 Test report

The test report shall include the following information (see also clause 8):

- a) the mean USRV of the specimens;
- b) the mean PPTV of the specimens;
- c) the slip/skid resistance value of the specimens;
- d) the number of this British Standard (BS 7263-3);
- e) any observations pertinent to the test made during testing, e.g. the surface texture of the specimens.

Annex H (normative)

Method for verifying visual properties

H.1 Preparation of sample

Each kerb in the sample shall be examined for delamination. If any kerb shows delamination, the procedure specified in A.3.3 shall be followed. The remaining kerbs shall then be laid out in a line at floor level.

H.2 Procedure

In natural daylight conditions an observer shall stand in turn at a distance of 2 m from the line and shall record any kerb showing cracks or flaking.

The texture shall be compared with any manufacturer's reference samples supplied.

The visual properties shall be compared with any manufacturer's reference samples supplied.

Annex I (normative)**Conformity assessment for bending strength**

If the mean strength of the kerbs tested is not lower than 4.2 MPa, and no individual kerb has a strength lower than 3.4 MPa, the corresponding production run shall be deemed to conform to this part of BS 7263.

If the mean strength of the kerbs tested is lower than 4.2 MPa, or the strength of any individual kerb is lower than 3.4 MPa, the corresponding production run shall be deemed not to conform to this part of BS 7263.

Annex J (informative)**Example of a typical production control system****J.1 Equipment inspection****J.1.1 Testing and measuring equipment**

Testing and measuring equipment should be inspected in accordance with Table J.1.

Table J.1 — Testing and measuring equipment

Subject	Aim	Method	Frequency
All testing and measuring equipment	To ensure functioning and accuracy	Where applicable calibrating against equipment which has been calibrated traceable to national standards and is used exclusively for this purpose except as indicated in the test method	On (re)installation, after major repair or once per year

J.1.2 Storage and production equipment

Storage and production equipment should be inspected in accordance with Table J.2.

Table J.2 — Storage and production equipment

Subject	Aim	Method	Frequency
Storage of materials	To ensure absence of contamination	Visual inspection or other appropriate method	On installation
			Weekly
Weighing or volumetric batching equipment	To ensure correct functioning	Visual inspection	Daily
	To ensure validity of manufacturer's declared accuracy	Calibrating against equipment which has been calibrated traceable to national standards and is used exclusively for this purpose	On (re)installation
			Weighing: twice a year
			Volumetric: twice a year
In case of doubt			
Mixers	To determine wear and ensure correct functioning	Visual inspection	Weekly
Moulds	To ensure cleanliness and determine condition	Visual inspection	Daily

J.2 Materials inspection

Materials should be inspected in accordance with Table J.3.

Table J.3 — Materials inspection

Subject	Aim	Method	Frequency
All materials	To ascertain that the consignment is as ordered and is from the correct source	Inspection of delivery ticket and/or label on the package showing conformity to the order	Each delivery

J.3 Production process inspection

Production processes should be inspected in accordance with Table J.4.

Table J.4 — Production process inspection

Subject	Aim	Method	Frequency
Mixture composition	To ensure conformity to intended composition (weight or volumetric batched)	Visual on weighing equipment Checking against production process documents	Daily
	To ensure conformity to intended mixture values (only volumetric batched)	Fresh concrete analysis	Monthly
Concrete	Concrete mixing	Visual check	Daily for each mixer
Production	To ensure conformity to production control system	Checking actions against factory procedures	Daily

J.4 Product inspection**J.4.1 Product testing**

Product testing (see A.3.2) should be carried out in accordance with Table J.5.

Table J.5 — Product testing

Subject	Aim	Method	Frequency ^a
Shape and dimensions	See 5.2	Annex B	Eight kerbs per production line per four production days
Bending strength	See 5.3.3 and Annex I	Annex E	Eight kerbs per strength family per production line per four production days
Appearance	See 5.4.1	Visual check	Daily
		Annex H	In case of doubt (sample of 10 kerbs)

^a This frequency does not include type testing (see A.2).

J.4.2 Marking, storage and delivery

Marking, storage and delivery should be inspected in accordance with Table J.6.

Table J.6 — Marking, storage and delivery

Subject	Aim	Method	Frequency
Marking	To ensure that the marking of the product conforms to clause 7	Visual check	Daily
Storage	To ensure segregation of non-conforming products	Visual check	Daily
Delivery	To ensure the correct delivery age, loading and loading documents	Visual check	Daily

Annex K (normative)**Shape and dimensions of designated kerbs**

Designated kerbs, channels, edgings and quadrants shall have the shape and dimensions shown in Table K.1 and Figure K.1, Figure K.2 and Figure K.3 and shall have a length in the range 450 mm to 1000 mm. All angles except those resulting from splayed, radiused or chamfered faces meeting as shown in Figure K.1, Figure K.2 and Figure K.3 shall be square.

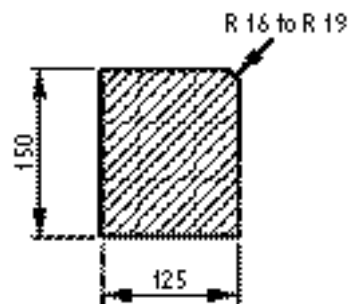
Quadrants shall have the sizes shown in Figure K.3d) with faces to match the profiles shown in Figure K.1a), Figure K.1b), Figure K.1d) or Figure K.1e), for kerb types BN, SP, HB2 or HB3 respectively.

Dropper kerbs shall have the sizes shown in Figure K.2b) or Figure K.2c) for dropper kerbs of type 1 or type 2 respectively.

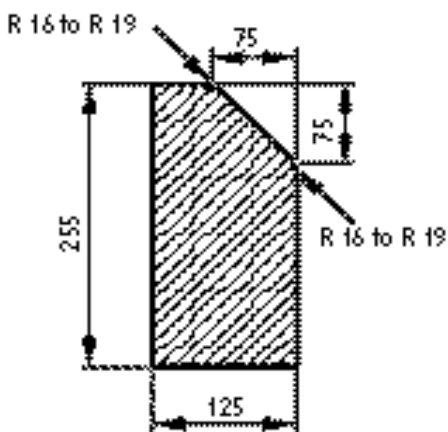
Table K.1 — Types of kerb and their designations

Type of kerb	Designation	Work dimensions shown in	x-height ^a mm	I^b mm ⁴	y^c mm
Kerbs:					
Bullnosed kerb	BN	Figure K.1a)		24200000	62.3
45° splayed kerb	SP	Figure K.1b)		35000000	58.9
Half battered kerb	HB1	Figure K.1c)		79600000	73.1
	HB2	Figure K.1d)		37300000	60.3
	HB3	Figure K.1e)		19700000	58.6
Transition kerb (left-hand)	TL	Figure K.2a)			
Transition kerb (right-hand)	TR	Figure K.2a)			
Dropper kerb (left-hand)	DL	Figure K.2b), Figure K.2c)			
Dropper kerb (right-hand)	DR	Figure K.2b), Figure K.2c)			
Channels:					
Channel square	CS1	Figure K.1f)		41500000	62.5
	CS2	Figure K.1g)		24400000	62.5
Channel dished	CD	Figure K.1h)		30700000	56.1
Edgings:					
Round top edging	ER	Figure K.3a)	150	1560000	25
Flat top edging	EF	Figure K.3b)	200	2080000	25
Bullnosed edging	EBN	Figure K.3c)	250	2600000	25
Quadrants:					
Bullnosed quadrant	QBN	Figure K.3d)			
45° splayed quadrant	QSP	Figure K.3d)			
Half battered quadrant	QHB	Figure K.3d)			
Angles:					
Internal angle	IA	Figure K.3e)			
External angle	XA	Figure K.3f)			
^a Shown in Figure K.3a), Figure K.3b) and Figure K.3c). ^b I is the second moment of area (see E.4). ^c y is the distance from the centroid to the extreme tensile fibre (see E.4).					

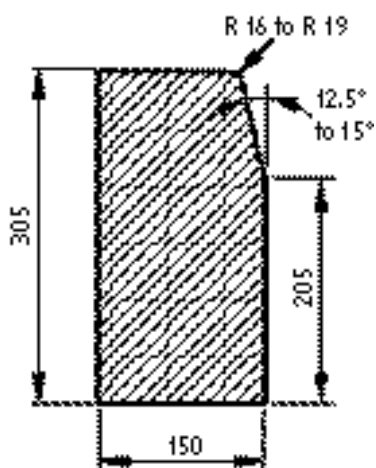
Dimensions in millimetres



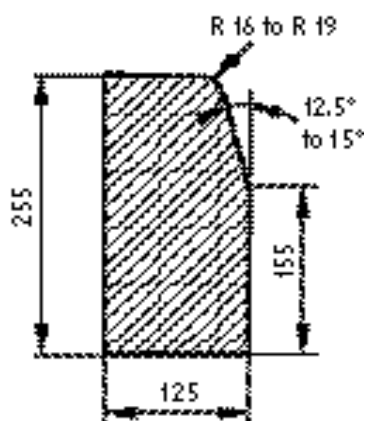
a) Bullnosed kerb: type BN



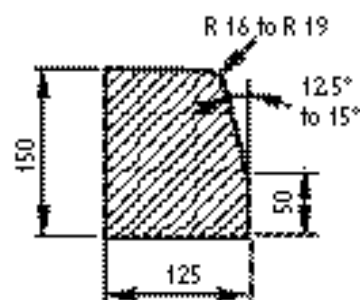
b) 45° splayed kerb: type SP



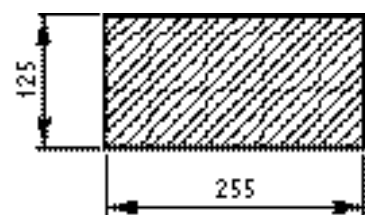
c) Half battered kerb: type HB1



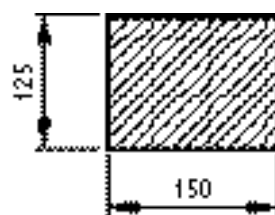
d) Half battered kerb: type HB2



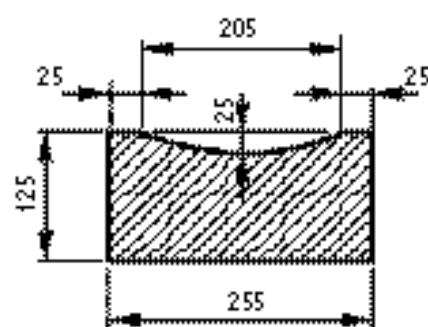
e) Half battered kerb: type HB3



f) Channel square: type CS1



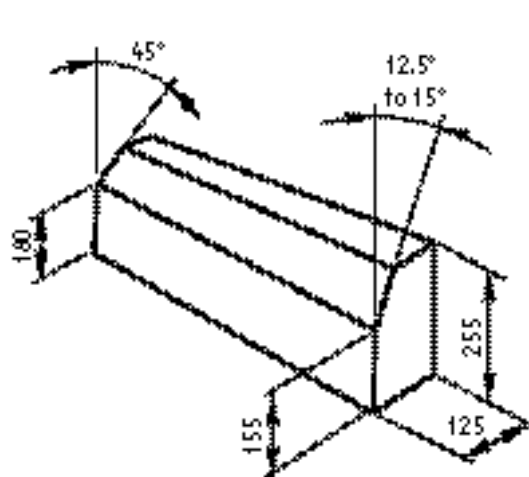
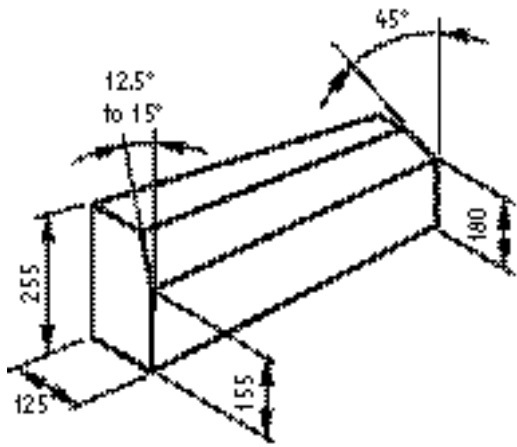
g) Channel square: type CS2



h) Channel dished: type CD

Figure K.1 — Bullnosed, splayed and half battered kerbs, and square and dished channels — Work dimensions

Dimensions in millimetres

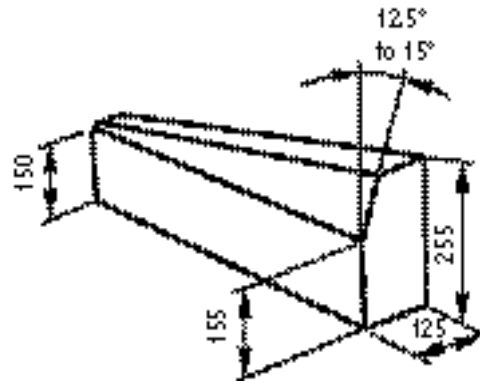
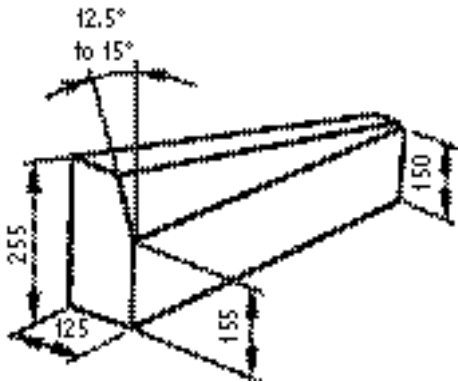


Left-hand: type TL

Right-hand: type TR

NOTE For use with kerb types SP and HB.

a) Transition kerb: half battered to 45° splay

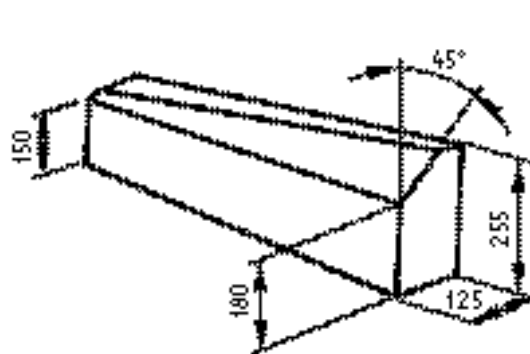
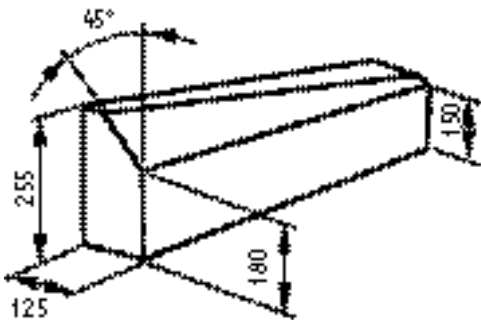


Left-hand: type DL1

Right-hand: type DR1

NOTE For use with kerb types BN and HB.

b) Dropper kerb type 1: half battered to bullnosed



Left-hand: type DL2

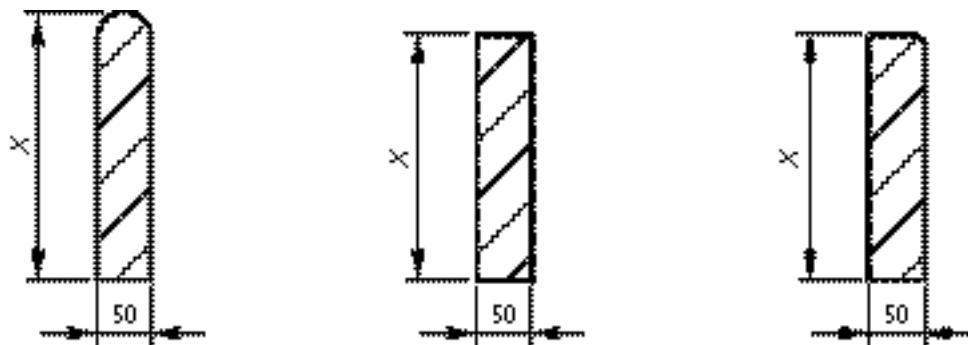
Right-hand: type DR2

NOTE For use with kerb types BN and SP.

c) Dropper kerb type 2: 45° splay to bullnosed

Figure K.2 — Transition and dropper kerbs — Work dimensions

Dimensions in millimetres



X = 150 mm, 200 mm or 250 mm.

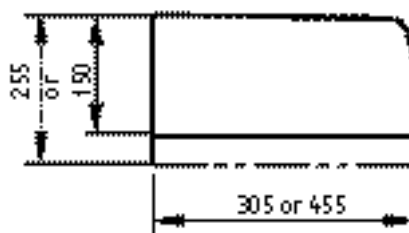
a) Round top edging: type ER

b) Flat top edging: type EF

c) Bullnosed edging: type EBN



Plan

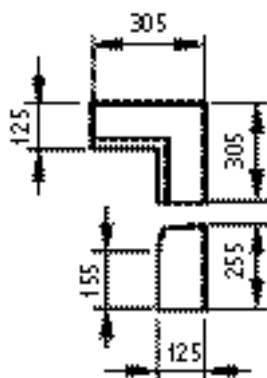


Elevation

NOTE Quadrants in these sizes may have the following profile:

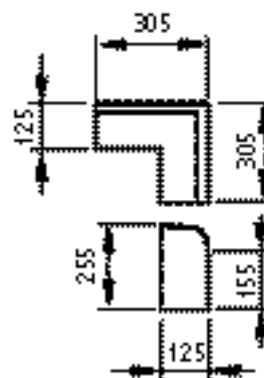
- bullnosed type QBN, to match corresponding kerb type BN; or
- half battered type QHB, to match corresponding kerb types HB2, HB3; or
- 45° splayed type QSP, to match corresponding kerb type SP.

d) Quadrants (sizes 305 × 150 or 305 × 255 or 455 × 150 or 455 × 255)



NOTE Angle kerbs in the above sizes may also have profiles to match 45° splayed type SP.

e) Internal angle kerb: type IA



f) External angle kerb: type XA

Figure K.3 — Edgings, quadrants and angle kerbs — Work dimensions

Bibliography

prEN 1340²⁾, *Concrete kerb units — Requirements and test methods.*

²⁾ In preparation.

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