

Indian Standard
SPECIFICATION FOR
PRECAST CONCRETE KERBS, CHANNELS,
EDGINGS, QUADRANTS AND GUTTER APRONS
(*First Revision*)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR PRECAST CONCRETE KERBS, CHANNELS, EDGINGS, QUADRANTS AND GUTTER APRONS (First Revision)

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Indian Standard
SPECIFICATION FOR
PRECAST CONCRETE KERBS, CHANNELS,
EDGINGS, QUADRANTS AND GUTTER APRONS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 12 March 1984, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 With the development of precast concrete industry, the precast concrete kerbs, channels, edgings, quadrants and gutter aprons will also gain popularity in this country due to their ease of manufacture and architectural and other considerations. The different sections shown in this standard are, as far as possible, a fair representation of the types which will be useful.

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

NOTE 1 — The provisions of this standard are based upon the assumption that to comply therewith the kerbs, channels, etc, have been manufactured of cement of the quality specified and suitable clean properly graded aggregate with sufficient clean water to provide for effective hydration, mixing and consolidation, and that the kerbs, channels, etc, have been properly matured by being stacked for at least 28 days or cured in some other manner proved to the satisfaction of the engineer to give equivalent results.

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

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

0.4 This standard was first published in 1970 under the title 'Specification for precast concrete kerbs'. The first revision is being issued under the modified title 'Specification for precast concrete kerbs, channels, edgings, quadrants and gutter aprons' so as to reflect the contents of the standard in the title. This revision has been prepared with a view to incorporating the modifications found necessary consequent to the revision of various related standards since its first publication so as to bring it in line with the present practices in the field in this country. In this revision the requirements in respect of aggregates have also been modified.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers precast concrete units for kerbs, channels, edgings, quadrants and gutter aprons in a range of sections, for use in the construction of carriageways and footways.

2. MATERIALS

2.1 Cement — The cement used shall be ordinary and low heat Portland cement conforming to IS : 269-1976† or rapid hardening Portland cement conforming to IS : 8041-1978‡ or Portland slag cement conforming to IS : 455-1976§ or Portland pozzolana cement conforming to IS : 1489-1976|| or supersulphated cement conforming to IS : 6909-1973¶ or hydrophobic Portland cement conforming to IS : 8043-1978**.

2.2 Aggregates — All aggregates shall conform to IS : 383-1970††. The aggregate crushing value, aggregate impact value and aggregate abrasion value shall not exceed the corresponding requirements laid down in IS : 383-1970†† for concrete for wearing surfaces. The aggregate impact test shall be done only as an alternative test to aggregate crushing test.

*Rules for rounding off numerical values (*revised*).

†Specification for ordinary and low heat Portland cement (*third revision*).

‡Specification for rapid hardening Portland cement (*first revision*).

§Specification for Portland slag cement (*third revision*).

||Specification for Portland pozzolana cement (*second revision*).

¶Specification for supersulphated cement.

**Specification for hydrophobic Portland cement (*first revision*).

††Specification for coarse and fine aggregates from natural sources for concrete (*second revision*).

2.2.1 Alternatively, coarse aggregates, such as blastfurnace slag, which may be found suitable having regard to strength, durability and freedom from harmful properties, may be used, but such aggregates shall not contain more than one percent of sulphate and shall not absorb more than 10 percent of its own mass of water.

2.2.2 The maximum size of coarse aggregates may be as large as possible within the limits specified but in no case greater than one-fourth of the minimum thickness of the section.

2.3 Concrete — The concrete shall be minimum of M 20 grade, with the strength requirements specified in IS : 456-1978*. Air-entrained concrete may also be used for freezing and thawing conditions.

3. DESIGNATION OF SIZES

3.1 In the designation of the sizes of kerbs, channels, etc, the dimensions of the face which will be horizontal after laying shall be given first, and the dimensions of the face which will be vertical, second.

4. DIMENSIONS

4.1 The nomenclature of kerbs and channels are shown in Fig. 1.

4.2 Dimensions of Straight Kerbs — Unless otherwise specified straight kerbs shall be manufactured to a uniform length of one metre and to the sections shown in Fig. 1A to 1H.

NOTE — It is recommended that the sections shown in Fig. 1D and Fig. 1E should not be used where the footway is immediately adjacent to the carriageway. Their use should be confined to cases where a strip of substantial width, but in no case less than 1 500 mm, separates the footway from the carriageway.

4.3 Dimensions of Straight Channels — Unless otherwise specified, straight channels shall be manufactured to a uniform length of one metre and to the sections shown in Fig. 1A, 1B, 1C (laid flat) and Fig. 2.

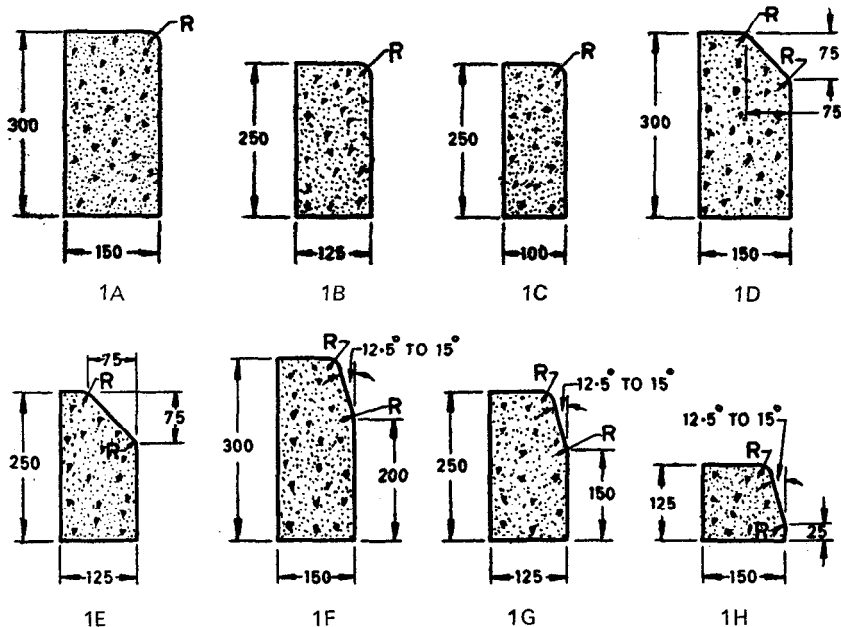
4.4 Dimensions of Edgings — Unless otherwise specified, edgings shall be manufactured in lengths of one metre and to the sections shown in Fig. 3A to 3D.

NOTE — If the edging shown at Fig. 3B is made in a one-piece mould, due allowance shall be made for the bend of the metal at the two top corners.

4.5 Dimensions of Quadrants — Quadrants shall be manufactured in 125, 250 or 300 mm (see Fig. 1A to 1H) depths and 300 or 450 mm radius, as shown in Fig. 4, with faces to match the sections shown in Fig. 1A to 1H.

*Code of practice for plain and reinforced concrete (third revision).

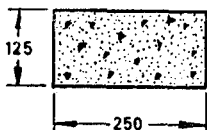
4.6 Dimensions of Gutter Aprons — The width of gutter aprons shall range from 150 to 2 500 or 3 000 mm wide pavement slab, to provide a parking area where other types of pavements would be damaged by oil drippings or standing wheels, but the usual width of aprons shall range from 300 to 900 mm. While the kerbs may be of any heights, 125 to 200 mm shall be the usual range. The slopes of the aprons shall be continuations of the regular crowns of the roads. The thickness of the precast kerb shall be 75 to 150 mm, while the minimum thickness of the channel shall preferably be 125 mm, although a 100 mm thick channel may also be used for a similar depth of concrete pavement.



$R = 16$ to 20 mm.

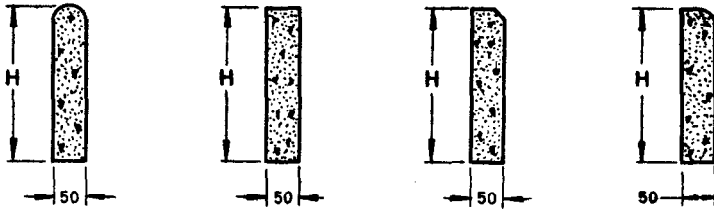
All dimensions in millimetres.

FIG. 1 STANDARD SECTIONS OF CONCRETE KERBS



All dimensions in millimetres.

FIG. 2 CHANNEL



3A Half Rounded

3B Right Angled

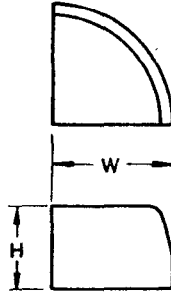
3C Chamfered

3D Bullnosed

$H = 250, 200$ or 150 mm.

All dimensions in millimetres.

FIG. 3 STANDARD SECTIONS OF CONCRETE EDGINGS



$H = 150, 200$ or 250 mm; $W = 300$ or 450 mm.

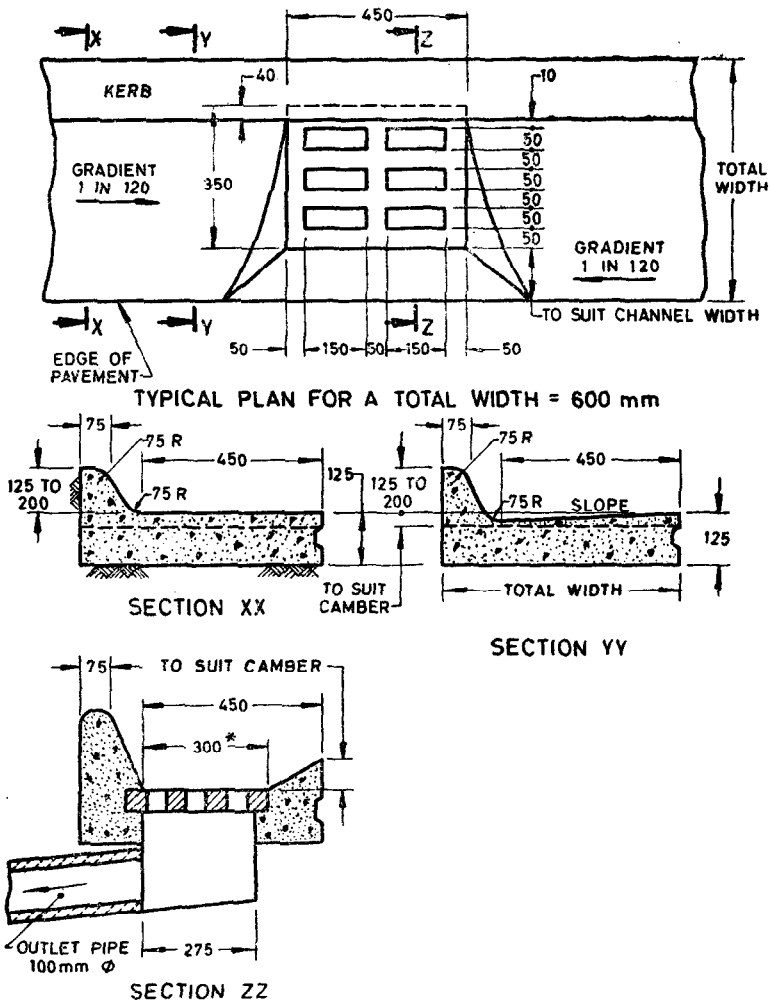
FIG. 4 STANDARD CONCRETE QUADRANTS

4.6.1 Lengths — The straight kerbs and gutters shall be manufactured to a maximum length of one metre normally; however, smaller lengths may be permitted for larger sections, so as to make them lighter and facilitate their handling and placement. The typical sections of kerb and gutter are given at Fig. 5.

5. TOLERANCES

5.1 The following tolerances shall be permitted on the dimensions:

Length	Width	Height
mm	mm	mm
± 3	$+1.5$ -3	± 3



NOTE — Slope depending on the camber — heavy rainfall areas — 1 in 60, moderate to low rainfall areas — 1 in 72 to 1 in 100.

*To suit the width for 600 mm total width, it should be 300 mm.

All dimensions in millimetres.

FIG. 5 COMBINED KERB AND GUTTER

6. FINISH AND COLOUR

6.1 Special finishes may be agreed upon between the purchaser and the supplier.

6.2 Unless otherwise specified by the purchaser, the kerbs, channels, etc, shall be supplied in natural colour. When these are ordered coloured, the colour shall be as agreed to between the purchaser and the supplier at the time of placing the order. These may be coloured throughout or only in a surface layer as agreed to between the purchaser and the supplier, and the surface layer shall be not less than 12.5 mm thick.

7. FREEDOM FROM DEFECTS

7.1 All angles of the precast units with the exception of the angles resulting from the splayed or chamfered faces in the sections shown in figures shall be true right angles. The arrises shall be clean and, with the exception of the rounded arrises, sharp. The wearing surfaces shall be true and out of winding. On being fractured, the interior of the products shall present a clean homogeneous appearance.

8. MOULDING

8.1 The kerbs, channels, etc, may be made by any process. Where they are made under hydraulic pressure, the pressure employed shall be not less than 7 MN/m^2 over the entire surface receiving the pressure. The escape of the finer particles of cement during the process of pressing shall be prevented as far as practicable.

9. TESTS

9.1 The sample or samples of the kerbs, channels, etc, selected in accordance with **10.1** shall satisfy the following tests for transverse strength and absorption of water.

9.2 Test for Transverse Strength — When tested in the manner described in Appendix A, straight kerbs, channels and edgings shall support without damage, for at least one minute, the loads given in Table 1.

9.2.1 The above test loads relate to tests for transverse strength carried out 28 days after the kerbs, channels, etc, are manufactured.

9.2.2 If tests are carried out after a longer period has elapsed, the load to be supported shall be the appropriate load stated in Table I multiplied by the following ageing factors:

<i>Age of Sample at Test</i>	<i>Ageing Factor</i>
Months	
1	1.0
3	1.10
6	1.15
12	1.20

9.2.3 Ageing factors for intermediate ages may be obtained by interpolation.

TABLE I TRANSVERSE STRENGTH OF STRAIGHT KERBS, CHANNELS AND EDGINGS

(Clause 9.2)

SL No.	TYPE OF PRODUCT	FIG. No.	DIMENSIONS	LOAD TO BE SUPPORTED
(1)	(2)	(3)	(4)	(5)
			mm	N
i)	Rectangular kerbs	1A	150 × 300	22 750
		1B	125 × 250	13 600
		1C	100 × 250	9 100
ii)	Splayed kerbs	1D	150 × 300	22 750
		1E	125 × 250	13 600
iii)	Half-batter kerbs	1F	150 × 300	22 750
		1G	125 × 250	13 600
iv)	Half-section kerbs	1H	150 × 125	8 200
v)	Channels	2	250 × 125	13 600
vi)	Edgings	3A to 3C	50 × 250	3 180
		3A to 3C	50 × 200	2 720
		3A to 3C	50 × 150	2 040

9.3 Test for Absorption of Water — When tested in the manner described in Appendix B, the average increase in mass of each group of three specimens by absorption of water in the first ten minutes shall not exceed 3.0 percent, and the absorption after 24 hours shall not exceed 8.0 percent, the percentages being calculated on the dry mass of the test pieces.

9.4 Retests

9.4.1 Should any test sample fail to comply with the requirements of either of the tests specified in **9.2** and **9.3**, two further test samples from the batch comprising the same order shall be tested.

9.4.2 Should one or both of these further test samples fail to comply with the requirements of the tests, the whole of the batch represented by the samples shall be rejected.

10. NUMBER OF SAMPLES FOR TESTING

10.1 For the purpose of the tests specified in **9** the purchaser or his representative may select up to three samples for every order of 900 m or less, and one further sample for every further 1 800 m or part of 1 800 m, comprising the same order.

11. FACILITIES FOR SAMPLING AND TESTING

11.1 The purchaser or his representative shall, at all reasonable times, have access to the place where the kerbs, channels, etc, are manufactured or stored, for the purpose of examining and sampling the materials and the finished products, inspecting the process of manufacture, and testing and marking the products. The supplier/manufacturer shall, free of extra charge, provide or make arrangements for the provision of every facility and all labour required for such examination, sampling, inspecting, testing and marking before delivery, and shall provide and maintain or make arrangements for providing and maintaining in good working order suitable, convenient and accurate apparatus for testing samples as hereinafter provided.

12. MANUFACTURER'S CERTIFICATE

12.1 The manufacturer shall satisfy himself that the kerbs, channels, etc, comply with the requirements of this Indian Standard and, if requested, shall forward a certificate to this effect to the purchaser or his representative. The manufacturer shall, if requested to do so, supply a certificate stating the date of manufacture of the products. If the purchaser or his representative requires independent tests, the samples shall be taken before or immediately after delivery at the option of the purchaser or his representative. The tests shall be carried out in accordance with the standard on the written instructions of the purchaser or his representative.

APPENDIX A

(Clause 9.2)

METHOD OF TEST FOR TRANSVERSE STRENGTH

A-1. TRANSVERSE STRENGTH OF KERBS, CHANNELS AND EDGINGS OF RECTANGULAR SECTION

A-1.1 Each sample shall be supported as shown in Fig. 6 upon two steel bearers *P*, each 6 mm wide on the supporting surfaces, parallel to each other and spaced 750 mm apart for kerbs and channels and 450 mm apart for edgings. The sample *Q* shall be placed upon the bearers with the greatest width of its wearing face uppermost and its ends parallel to the bearers. The bearers shall be level in all directions and shall be so arranged as to support the sample when under test, throughout its whole width. The load *W* shall be applied through the medium of a hardwood fillet to a space 50 mm wide in the centre of the unsupported portion of the sample and extending the whole width of the sample, parallel to the bearers. The hardwood fillet shall be bedded in a thin layer of plaster of Paris which shall be allowed to set before testing is commenced. The load shall be steadily and uniformly applied, starting from zero, at a rate not exceeding 500 N per 300 mm of width (measured parallel to the bearers) per 10 seconds up to the maximum load specified in 9.2 which shall be maintained for at least 1 minute.

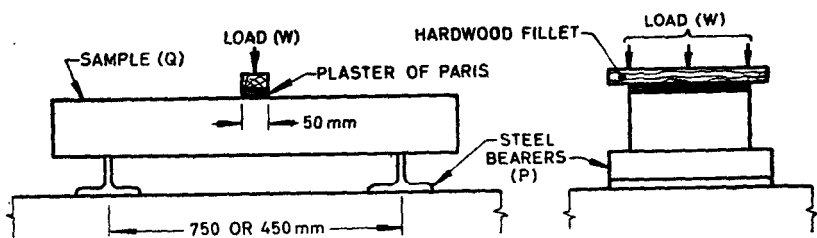


FIG. 6 METHOD OF TEST FOR TRANSVERSE STRENGTH

A-2. TRANSVERSE STRENGTH OF KERBS OF SPLAYED OR CHAMFERED SECTION

A-2.1 Kerbs of splayed or chamfered section shall be arranged for test in the manner described in **A-1.1** for kerbs of rectangular section, except that the splayed or chamfered portion shall be made up to a level surface in the portion coming below the hardwood fillet by using a rich cement sand mortar of stiff consistency, so as to distribute the load applied by the hardwood fillet over the full width of the kerb. Necessary precautions to prepare the surface receiving the plaster and minimum of one day's curing should be ensured. The fillet shall be bedded in a layer of plaster of Paris and the load be applied in precisely the same manner as for kerbs of rectangular sections.

NOTE — The test results could be affected if the loading is not uniform, and plaster of Paris used for bedding the wooden fillet suffers cracking during loading. Observations shall be made before and after the tests and retests shall be made with a better quality of plaster of Paris if this would fail under loading.

A P P E N D I X B

(Clause 9.3)

TEST FOR ABSORPTION OF WATER

B-1. TEST PIECE

B-1.1 From each sample kerb and channel three test pieces shall be taken approximating in size and shape to a 100 mm cube and having two moulded faces and four faces cut by hammer and chisel. From each sample edging three test pieces shall be taken approximately $100 \times 100 \times 50$ mm having the two 100×100 mm faces moulded and the four 100×50 mm faces cut by hammer and chisel.

B-2. WATER ABSORPTION TEST

B-2.1 The test pieces shall be dried for 72 hours in a suitably ventilated drying oven, the temperature of which is between 100 and 105°C. On removal from the oven they shall be cooled for 24 hours in a desiccator or in a small dry airtight vessel. They shall then be weighed and immediately immersed in water at $27 \pm 2^\circ\text{C}$ for a period of 10 minutes (± 10 seconds). At the end of this period they shall be removed, shaken to remove the bulk of the water, and then dried with a cloth as rapidly as possible until all the free water is removed from the surface, and again weighed. They shall then be immersed in water again for a total period of 24 hours, after which time they shall be removed, dried as before and weighed.

(Continued from page 2)

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