IS 1478 (1992): Clay flooring tiles- [CED 30: Clay and Stabilized Soil Products for Construction]

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IS 1478 : 1992
(Reaffirmed 2002)

भारतीय मानक

फर्श बिछाने हेतु मिट्टी की टाईल — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

CLAY FLOORING TILES — SPECIFICATION

(Second Revision)

UDC 691·421·2 — 431 : 692·533·42

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

December 1992

Price Group 3

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Clay Products for Buildings Sectional Committee had been approved by the Civil Engineering Division Council.

Flooring tiles are unglazed tiles made from natural clays or shales and burnt to dense mass which are used for flooring of residential, public and industrial buildings. Since a number of mechanized plants are being set up in different parts of this country for manufacturing clay products it is felt that tiles will be produced in large numbers and will find greater application in general building construction. This standard covers essential requirements regarding dimensions, quality and strength of flooring tiles and is intended to serve as a guide to control the quality of manufacture and use. This standard was first published in 1959 and subsequently revised in 1969. As a result of further experience gained on this subject, this standard has been revised. In this revision Amendments No. 1 and 2 have been incorporated.

The values for water absorption, breaking load under flexure and impact included in the standard are based on the results of tests conducted at the Concrete and Soil Research Laboratory, Madras; and Central Building Research Institute, Roorkee.

In preparing this standard, the Sectional Committee responsible for the preparation of this standard has taken into consideration the views of producers, consumers and technologists and has related the standard to the prevailing manufacturing and trade practices followed in the country in this field. Due weightage has also been given to the need for international co-ordination among the standards prevailing in different countries of the world.

This standard contains clauses **6.1.1** and **8.3** which call for agreement between the concerned parties.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CLAY FLOORING TILES — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard specifies the requirements for dimensions, quality and strength for clay flooring tiles.

2 REFERENCES

2.1 IS 2248 : 1992 'Glossary of terms relating to clay products for building' is a necessary adjunct to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions of terms given in IS 2248 : 1992 shall apply.

4 CLASSIFICATION

4.1 The flooring tiles shall be of three classes, namely, Class 1, Class 2 and Class 3, with the characteristics as specified in Table 1 and shall satisfy the details of tests given in **8**.

Table 1 Classification of Flooring Tiles

(*Clauses* 4.1, 8.1, 8.2 *and* 8.3)

Sl No.	Characteristic	Requirements for		
		Class 1	Class 2	Class 3
i)	Water absorption percent, *Max*	10	19	24
ii)	Flexural strength, kg/cm width, *Min*:			
	a) Average	6	3·5	2·5
	b) Individual	5	3·0	2·0
iii)	Impact, maximum height in mm of drop of steel ball:			
	a) 15 mm thick	25	20	15
	b) 20 mm ,,	60	50	40
	c) 25 mm ,,	75	65	50
	d) 30 mm ,,	80	70	60

5 GENERAL QUALITY

5.1 The flooring tiles shall be made from good soils of even texture and shall be uniformly well burnt. They shall be uniform in size and shape and shall be free from irregularities, such as twists, bends, cracks, flaws, laminations and imperfections which affect appearance or serviceability. The faces of tiles shall be plain, grooved, fluted or figured as specified and the edges shall be square. The backs of the tile may have some type of either plain or engraved or embossed design.

5.1.1 Class 1 bricks shall be specially hard-burnt as they are meant for use in industrial flooring where heavy wear is anticipated.

6 DIMENSIONS, SHAPE, TOLERANCES AND WARPAGE

6.1 Dimensions and Shape

The dimensions of the square tiles shall be as given in Table 2, half-tiles, both rectangular and triangular in shape shall also be available. Half-tiles for use with the full tiles shall be such as to make two half-tiles, when joined together, match the dimensions of one full tile.

Table 2 Dimensions of Sides and Thickness of Tiles

Sl No.	Size mm	Thickness, *Min* mm
i)	150 × 150*	15
ii)	150 × 150*	20
iii)	200 × 200	20
iv)	200 × 200	25
v)	250 × 250*	30

*These are non-modular sizes and have been included because of current use. It is intended to revise these sizes as the industry adopts the modular sizes for tiles.

6.1.1 The dimensions and shape of flooring tiles other than square shall be as agreed to between the purchaser and the vendor.

6.1.2 The depth of the grooves or frogging on the underside of flooring tiles shall not exceed 3 mm.

6.2 Tolerances

The permissible tolerances on the dimensions specified in **6.1** shall be as in **6.2.1** and **6.2.2**.

6.2.1 *Dimensions (Length and Breadth)*

The average dimensions of the tile when measured as described in **6.2.1.1** shall not vary more than ± 5 mm from the nominal dimension and also the dimensions of the individual tile furnished for a given area or space shall not vary more than ± 2 mm from the average.

6.2.1.1 The measurement of the dimensions shall be made to the nearest 0·5 mm and the results averaged; the dimensions shall not include spacers.

6.2.2 *Thickness*

The average thickness of the tile when measured as described in **6.2.2.1** shall not vary more than

±2 mm from the nominal thickness; also, the thickness of individual tile supplied for a given area or a space shall not vary more than ± 1 mm.

6.2.2.1 The thickness of the tile shall be measured 10 mm from each of the edges of the tile and rounded off to the nearest 0·25 mm. Four points of measurement shall be selected to give an average thickness representative of the tile. In case tile has keys or ribs these shall be included in the thickness.

6.3 Warpage

When measured as described in **6.3.1** the warpage shall not exceed 2 percent along the edges and 1·5 percent along the diagonals.

6.3.1 Place a straight edge flat over the tile resting on a plane surface so as to leave maximum gap between the straight edge and the surface of the tile, as judged by the naked eye. Insert the measuring metallic wedge (*see* Fig. 1) in the gap and measure the maximum value of the gap.

materials for taking and packing the samples. Each specimen shall be so marked that it may by identified at any time.

8 DETAILS OF TEST

8.1 Water Absorption Test

The average water absorption of six tiles, when tested by the method described in Annex A, shall conform to the requirements specified in Table 1.

8.2 Flexural Strength Test

When tested by the method described in Annex B, the average strength of six tiles, that is, three tiles in the dry condition and three in the wet condition, shall conform to the requirements specified in Table 1.

8.3 Impact Test

When tested by the method described in Annex C, the maximum height of release of the

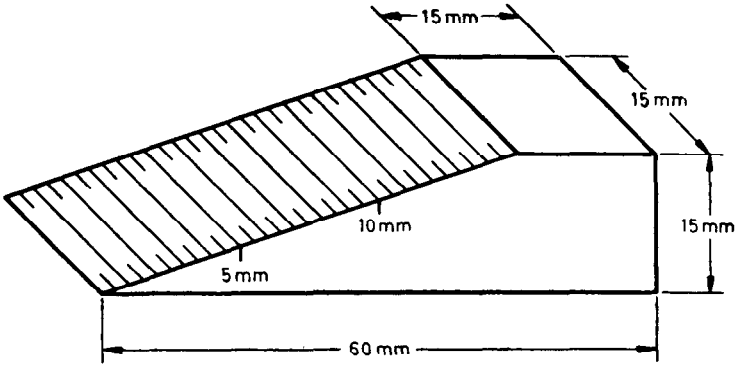


FIG. 1 MEASURING METALLIC WEDGE

7 SAMPLING

7.1 Samples shall be taken by the purchaser (or his representative) or by any person appointed to superintend the works for the purpose of which the tiles are required or by the latter's representative.

7.2 Procedure for Sampling

For conducting the tests specified in **8** atleast six tiles shall be selected at random for every 1 000 tiles or fraction thereof in a lot by the purchaser (or his representative) in the presence of the manufacturer (or his representative). Additional specimens may be taken for tests at the discretion of the purchaser. The number of tiles taken from a lot for tests shall be not less than 15 in any one lot.

7.3 Facilities for Sampling and Identifying

The manufacturer or the supplier shall afford every facility and provide all the labour and

steel ball, which does not cause a fracture in the tile obtained by tests on three specimens, shall conform to the requirements specified in Table 1. In case of tiles other than square tiles, the height of release of the steel ball shall be subject to prior agreement between the purchaser and the vendor.

9 NON-COMPLIANCE WITH TESTS

9.1 If any of the tiles in the sample fails to comply with the requirements of any of the tests specified in **8**, another sample shall be similarly drawn and tested. If any of the tiles in the second sample also fails to comply with the requirements of any of the tests specified in **8**, then the whole lot, from where the samples were taken, shall be rejected as not complying with this standard.

10 INDEPENDENT TEST

10.1 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), if required, in his presence, and the test shall be carried out in accordance with this standard on the written instructions of the purchaser (or his representative). Tests shall be completed before the tiles are fixed in position.

10.2 Cost of Testing

The manufacturer shall supply, free of charge, the tiles required for testing. Unless otherwise specified, the cost of the tests shall be borne:

a) by the manufacturer in the event of the results showing that the tiles do not comply with this standard.

b) by the purchaser in the event of the results showing that the tiles comply with this standard.

11 CERTIFICATE OF COMPLIANCE

11.1 The manufacturer shall satisfy himself that the tiles conform to the requirements of this standard and, if required, shall furnish a certificate to this effect to the purchaser or his representative.

12 MARKING

12.1 Each tile shall be legibly and indelibly marked with the name of the manufacturer or his trade-mark, if any; the marking shall not cover more than five percent of the area of the specimen.

12.1.1 Each tile may also be marked with the Standard Mark.

ANNEX A

(*Clause* 8.1)

WATER ABSORPTION TEST

A-1 TEST SPECIMENS

A-1.1 Six tiles shall be used for this test from the sample selected in the manner described in 7.

A-2 PROCEDURE

A-2.1 Dry the six tiles in an oven at a temperature of 100° to 110°C till they attain a constant weight and then cool; weigh when cool and immerse the dry specimens completely in clean water at 24° to 30°C for 24 hours. Remove each specimen, wipe off the surface water carefully with a damp cloth, and weigh the specimen correct to a gram, within three minutes after removing the specimen from water.

A-3 CALCULATION AND REPORT OF TEST RESULTS

A-3.1 The percentage water absorption shall be calculated as follows:

$$\text{Percentage water absorption} = \frac{(B - A)}{A} \times 100$$

where

B = weight of the specimen in g after 24 hours immersion in cold water, and

A = weight of the dry specimen in g.

A-3.2 The average percentage water absorption of the six tiles shall be calculated and reported as the percentage water absorption.

ANNEX B

(*Clause* 8.2)

DETERMINATION OF FLEXURAL STRENGTH

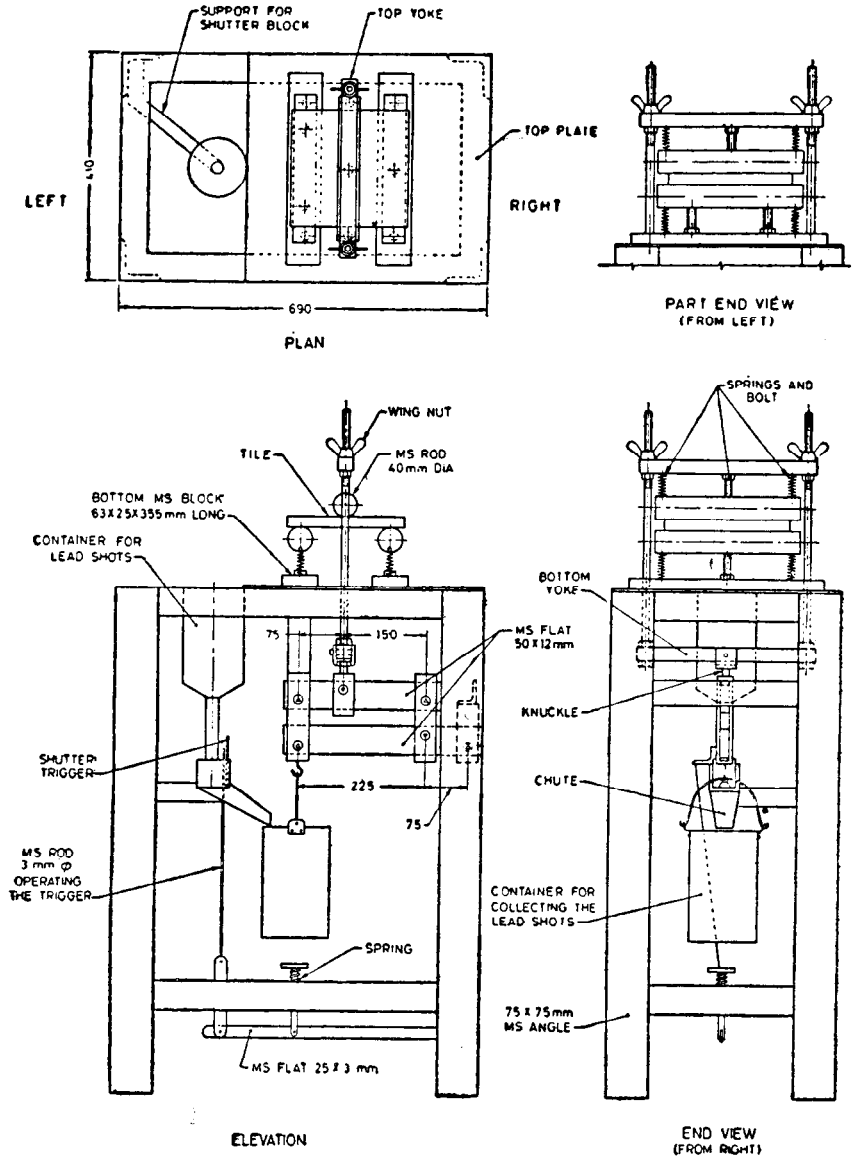
B-1 TEST SPECIMENS

B-1.1 Six tiles shall be used for this test from the sample selected in the manner described in 7.

B-2 APPARATUS

B-2.1 The apparatus (*see* Fig. 2) shall consist of two parallel self-aligning cylindrical steel bearers, with the bearing surface rounded to 40 mm diametre, and so placed that the distance between the centres can be altered. The load shall be applied through a third steel bearer of similar shape placed midway between and parallel to the supports. The length of all the bearers shall exceed the maximum width of the tile under test for square and rectangular tiles.

B-2.1.1 The loading device may consist of a bucket connected either directly or through levers to the loading arms. The loading shall be at a uniform rate of 450 to 550 N/min by allowing lead shots to flow into the bucket. Provision shall be made to arrest the flow or lead shots immediately as the tile breaks.



All dimensions in millimetres.

FIG. 2 TILE TESTING MACHINE FOR DETERMINATION OF FLEXURAL STRENGTH

B-2.2 Alternatively, a compression testing machine with a minimum load frame capacity of 10 tons may be used (*see* Fig. 3). In this system the bearer assembly is mounted on a rigid mild steel plate and the third central loading bearing is fixed through a suitable dial micrometer (least count 0·25 mm) or an equally sensitive device to bear on the loading member or on the specimen at mid span. The specimen is supported on the bottom parallel bearers separated by a distance of minimum three-fourths (3/4) of the length of the tile.

B-2.2.1 The error in the load reading shall not exceed 2·2 N for loads up to 220 N and for greater load, the error shall not exceed 1 percent of the maximum load. The rate of loadings should be uniform and vary in the range of 450-550 N/min.

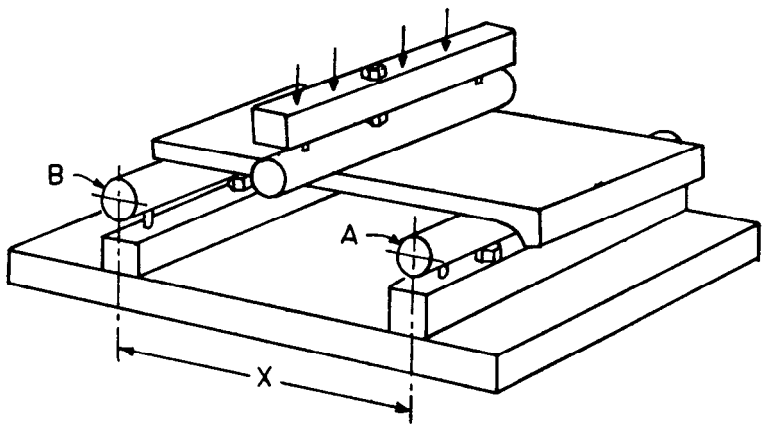
B-3 PROCEDURE

B-3.1 Test three tiles in the dry condition, that is, after drying in an oven at 100° to 110°C till constant weight is attained and the other three tiles after soaking in water at 24° to 30°C for 24 hours. Support the tile evenly flatwise on the bearers set with a span equal to three-fourths the dimension of the tile and resting on the natural bottom surface. To ensure uniform distribution of load at supports, provide suitable packing between the tile and the bearers. Apply the load with the direction of the loa dperpendicular to the span at a uniform rate of 450 to 550 N/min.

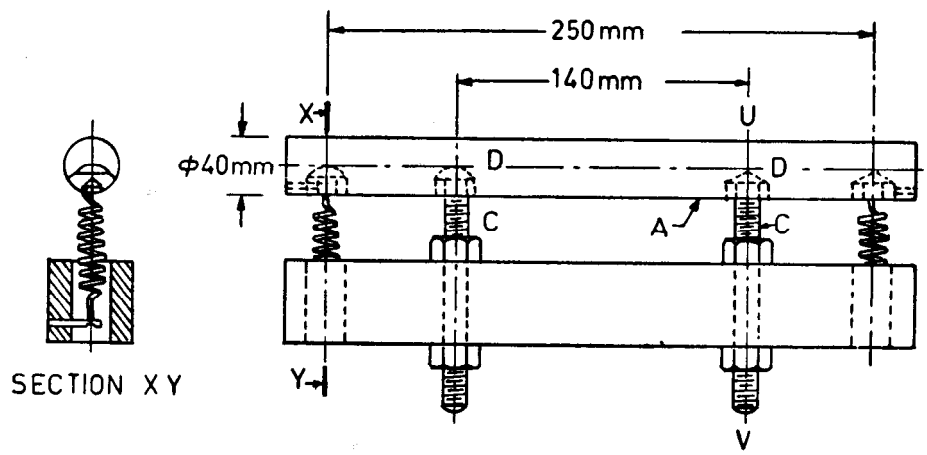
B-4 CALCULATION AND REPORT OF TEST RESULTS

B-4.1 The individual breaking load shall be recorded and the flexural strength shall be obtained by dividing the breaking load by the width of the tile and the average of the six values calculated.

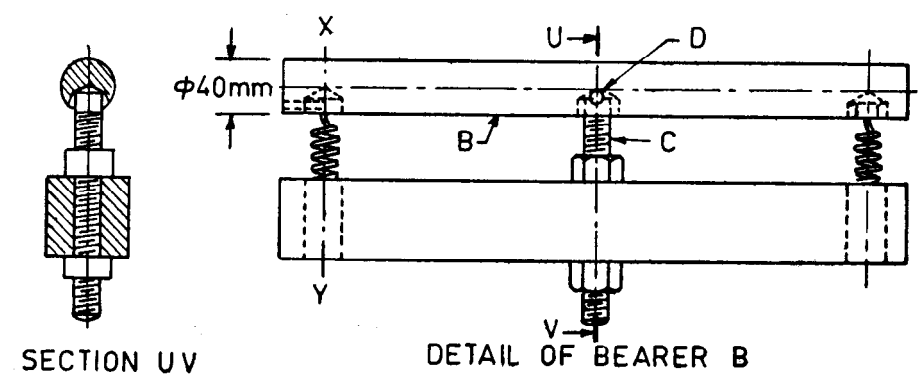
B-4.2 The result shall be expressed in N/mm width.



X = SPAN AS PER TILE SIZE



DETAIL OF BEARER A



DETAIL OF BEARER B

FIG. 3 ESSENTIAL OF APPARATUS FOR TRANSVERSE TEST

ANNEX C

(*Clause* 8.3)

IMPACT TEST

C-1 TEST SPECIMENS

C-1.1 Three tiles shall be used for this test from the sample selected in the manner described in **7.**

C-2 APPARATUS

C-2.1 The apparatus for the impact test shall contain an upright stand fixed to a heavy base. A clamp fixed to the vertical stand just holds between its jaws a steel ball 35 mm diameter and of mass 170 g. A fraction of a turn of the screw to widen the jaws space shall release the steel ball to fall on the tile below.

C-2.2 Alternatively, the steel ball may be supported by a thread tied to a hook provided in the ball and released at will by burning the thread.

C-3 PROCEDURE

C-3.1 Dry the three tiles in an oven at a temperature of 100° to 110°C till they attain a constant weight and then allow them to cool to room temperature. Place the tile horizontally with the tile face upwards over a 2·5 cm thick rubber sheet which in turn be placed over a rigid horizontal surface. The stand and the tile shall be so adjusted that when the ball is released from the clamp it falls vertically on the centre of the tile.

C-3.2 The steel ball shall be released first from a height of 7·5 cm. Then the height of release shall be raised in steps of 7·5 cm until fracture of the test specimen occurs.

C-4 EVALUATION AND REPORT OF TEST RESULTS

C-4.1 The maximum height of release of the test ball, which does cause a fracture in the tile, shall be recorded in each case and the average for the three tiles shall be reported.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

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