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IS 3367 (1993): Burnt clay tiles for use in lining irrigation and drainage works-Specification [CED 30: Clay and Stabilized Soil Products for Construction]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

अस्तर सिंचाई व्यवस्था और जल निकास कार्यों में
प्रयुक्त पक्की मिट्टी की टाइलें — विशिष्ट

(दूसरा पुनरीक्षण)

Indian Standard

BURNT CLAY TILES FOR USE IN LINING
IRRIGATION AND DRAINAGE WORKS —
SPECIFICATION

(*Second Revision*)

UDC 691.421 - 431 : 626 : 823.91

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BUREAU OF INDIAN STANDARDS
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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.

Burnt clay tiles are extensively used for lining irrigation and drainage works. To control the quality of these tiles this standard was first formulated in 1965 and subsequently revised in 1975. This standard has been revised as a result of further experience gained on the subject.

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, 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

BURNT CLAY TILES FOR USE IN LINING IRRIGATION AND DRAINAGE WORKS — SPECIFICATION

(*Second Revision*)

1 SCOPE

1.1 This standard covers machine-pressed, wire-cut, or hand-made rectangular burnt clay tiles used for lining irrigation canals and for drainage channels (other than sewage works).

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to the standard:

<i>IS No.</i>	<i>Title</i>
3495 (Parts 1 to 4) : 1991	Method of tests of clay building bricks: Part 1 Determination of compressive strength (<i>third revision</i>) Part 2 Determination of water absorption (<i>third revision</i>) Part 3 Determination of efflorescence (<i>third revision</i>) Part 4 Determination of warpage (<i>third revision</i>)
5454 : 1978	Methods of sampling of clay building products (<i>first revision</i>)

3 GENERAL

3.1 The tiles shall be made from suitable soil of even texture and shall be uniformly well burnt. They shall be uniform in size, shape and free from irregularities, such as cracks and laminations.

3.2 The tiles shall be free from impurities like particles of stone, lime and other foreign materials visible to the naked eye on the surface or on the fractured surface of the tiles obtained by breaking the sample.

4 DIMENSIONS

4.1 The size of the tile shall be $300 \times 150 \times 50$ mm.

4.2 The permissible tolerance on the dimensions of the tile shall be ± 10 mm in length, ± 5 mm in width and ± 1.5 mm in thickness. There shall be no frog in the tile.

5 CLASSIFICATION

5.1 The tiles shall be classified into two classes, that is class 105 and class 75.

6 PHYSICAL PROPERTIES

6.1 When tested in accordance with the procedure given in Annex A, and the average compressive strength shall not be less than 10.5 N/mm^2 (105 kgf/cm^2 app) for class 105 and 7.5 N/mm^2 (75 kgf/cm^2 app) for class 75.

6.2 When tested in accordance with the procedure laid down in IS 3495 (Part 2) : 1991 the average water absorption shall not be more than 15 percent by weight for class 105 and 20 percent for class 75 after immersion in water for 24 hours.

6.3 When tested in accordance with the procedure given in Annex B, the average transverse strength of the tile shall not be less than 1.5 N/mm^2 (15 kgf/cm^2 app) for class 105 and 1.22 N/mm^2 (12 kgf/cm^2 app) for class 75.

6.4 When measured in accordance with the procedure laid down in IS 3495 (Part 4) : 1991 the maximum warp shall not exceed 3 mm for all classes of tiles.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 The sampling of the tiles shall be done as given in IS 5454 : 1978.

8 MARKING

8.1 Each tile shall be legibly and indelibly marked with an indication of the source of manufacture.

ANNEX A (Clause 6.1)

DETERMINATION OF COMPRESSIVE STRENGTH OF BURNT CLAY TILES FOR USE IN LINING CANALS

A-1 TEST SPECIMEN

A-1.1 The test specimen shall be obtained as in 7.1.

A-1.2 Each specimen shall be cut into two halves of equal length. Specimens may be slightly ground over a fine grinding machine in order to get completely plane and even top and bottom faces.

A-2 PROCEDURE

A-2.1 The specimen shall be immersed in water at room temperature for 24 hours. They shall then be removed and allowed to drain at room temperature for about five minutes.

A-2.2 Each specimen shall be placed with the flat surface horizontal between two 3 ply plywood sheets each approximately 3 mm thick and

carefully centred between the plate of the compression testing machine. At least one compression plate of the testing machine shall have a ball seating in the form of a portion of a sphere, the centre of which coincides with the centre of the face of the plate. The load shall be applied at a uniform rate of approximately 14 N/mm² (140 kgf/cm² app) per minute till failure occurs and note this load. The load at failure shall be the maximum load at which the indicator reading on the testing machine comes to a steady state.

A-3 EVALUATION AND REPORT OF TEST RESULTS

A-3.1 The maximum load at failure divided by the area of tile shall be taken as the compressive strength. The average compressive strength of the tiles tested shall be reported.

ANNEX B

(Clause 6.3)

DETERMINATION OF TRANSVERSE STRENGTH OF BURNT CLAY TILES FOR LINING CANALS

B-1 TEST SPECIMENS

B-1.1 The test specimen shall be obtained as in 7.1.

B-2 APPARATUS

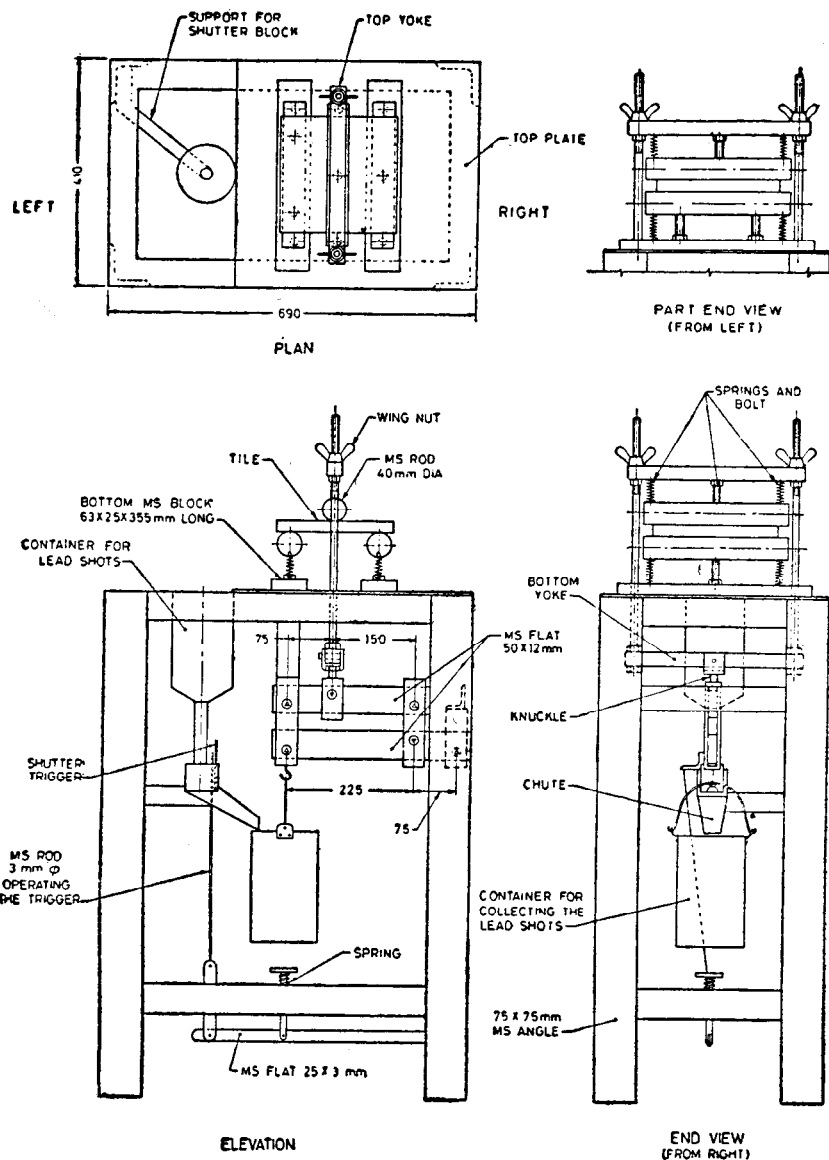
B-2.1 The apparatus (*see* Fig. 1) shall consist of two parallel self-aligning semi-cylindrical steel bearers, with bearing surface rounded to 40 mm diameter and so placed that the distance between the centres could be altered. The load shall be applied through a third steel bearer of similar shape placed midway between the parallel to the supports. The length of all the bearers shall exceed the maximum width of the tile under test.

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 of lead shots immediately the tile breaks.

B-2.2 Alternatively, a compression testing machine with a minimum load frame capacity of 10 tons may be used (*see* Fig. 2). 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 loading should be uniform and vary in the range of 450-550 N/min (45 to 55 kg/min).



All dimensions in millimetres,

FIG. 1 TILE TESTING MACHINE
(FOR THE DETERMINATION OF TRANSVERSE STRENGTH OF CLAY TILE)

B-3 PROCEDURE

B-3.1 The tiles shall be soaked in water at room temperature for 24 hours. The tiles shall then be supported evenly flat-wise and over the steel bearers set with a span of three-fourths of the length of the tile. The load shall be applied with the direction of the loading bearer perpendicular to the span at the rates specified in B-2.1.1.

B-4 EVALUATION AND REPORT OF THE TEST RESULTS

B-4.1 The individual breaking load shall be recorded and the flexural strength shall be calculated by the following formula:

$$F = \frac{3 PL}{2 BD^2}$$

where

F = flexural strength of the tile in N/mm^2 ,
 P = load in N,
 L = span in mm,

B = width of the tile in mm, and
 D = depth of the tile in mm.

B-4.2 The average of the transverse strength of the tiles tested shall be reported.

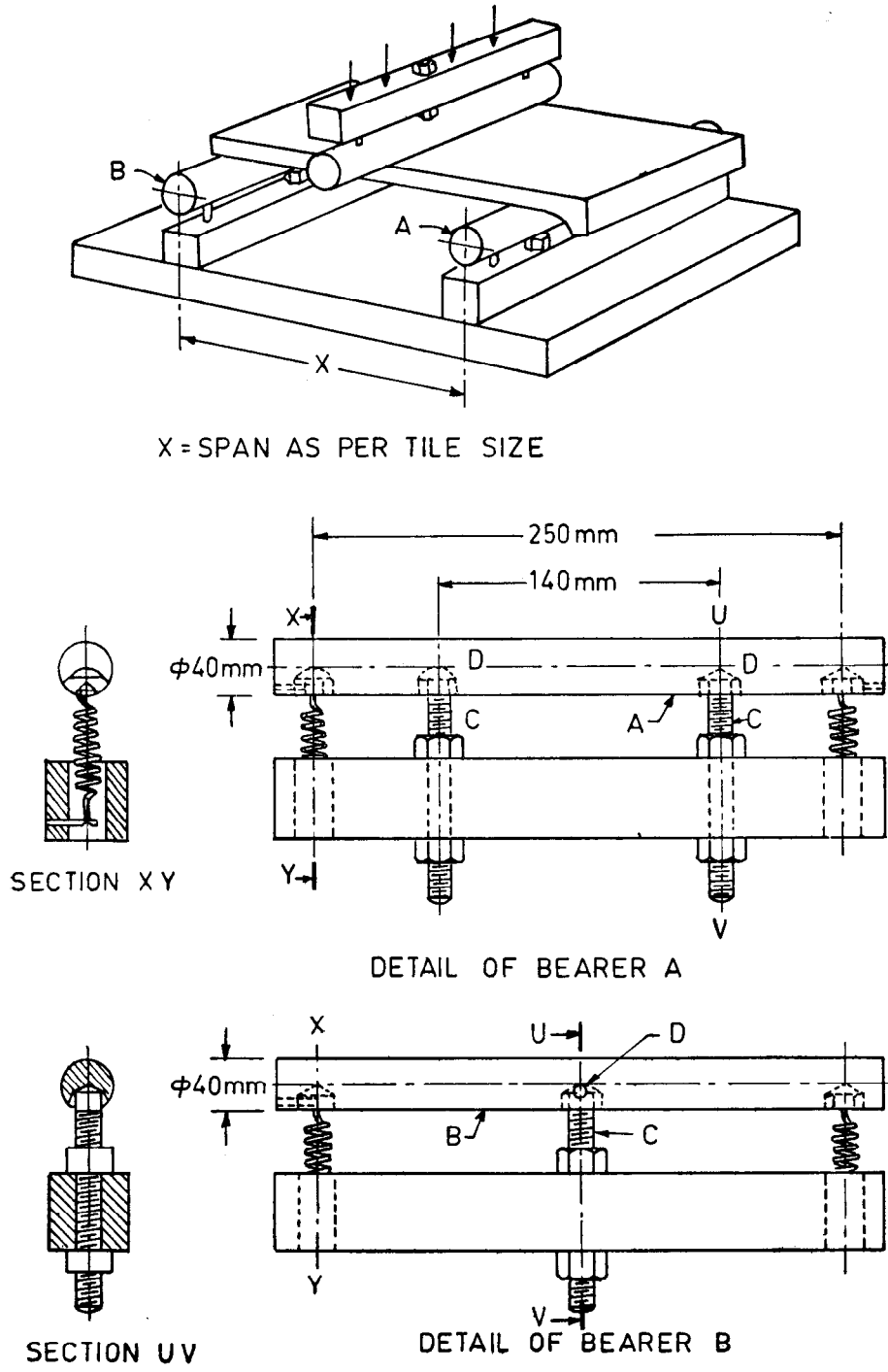


FIG. 2 ESSENTIALS OF APPARATUS FOR TRANSVERSE TEST

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