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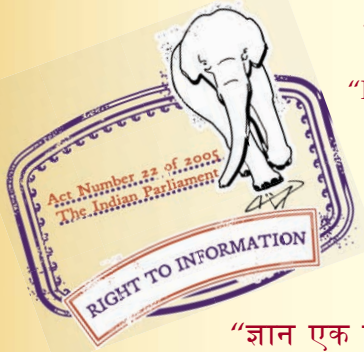
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IS 10646 (1991): Canal linings - Cement concrete tiles [WRD
13: Canals and Cross Drainage Works]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 10646 : 1991
(Superseding IS 3860 and IS 4969)

भारतीय मानक
नहरों के अस्तर — सीमेंट कंक्रीट टाइल्स — विशिष्ट
(पहला पुनरीक्षण)

Indian Standard

**CANAL LININGS-CEMENTCONCRETE
TILES- SPECIFICATION**

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 1

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Irrigation Canals and Canal Linings Sectional Committee had been approved by the River Valley Division Council.

Lining of canals is considered as an important feature of irrigation projects as it not only minimises the loss of water due to seepage, but also results in achieving considerable economy in the use of cultivable land which would otherwise be prone to water-logging due to rise in water table. Further, the water thus saved can be usefully employed for the extension and improvement of irrigation facility. Lining of water courses in the area irrigated by tubewells assumed special significance as the pumped water supplied is relatively more costly.

Further, lining of canals permits the adoption of high velocities resulting in proportionate savings of the cross-sectional areas of the canal and land width required with corresponding saving in the cost of excavation and masonry works which in certain cases may offset completely the extra cost of lining. Also, the lining improves stability of channel sections thereby reducing the maintenance/cost. The benefits that accrue from lining of canals generally justify the initial capital cost and because of this, there is now better appreciation of the need for lining of canals.

Judicious selection of serviceable and economical lining at the first instance and subsequently proper execution of the work while in laying the canal lining contributes considerably in achieving overall economy in the project. Guidance with regard to the selection of canal lining for any particular canal is given in a separate standard IS 10430 : 1982 'Criteria for Design of lined canals and guidance for selection of type of lining'. One of the methods of cement concrete lining is by using precast cement concrete tiles.

This standard has been formulated to cover specification of precast cement concrete tile which are compressed mechanically at the time of manufacture so as to achieve higher strength stipulated in this standard. This standard was issued in 1983. The revision covers additional sizes besides incorporating strength requirements and method of test thus covering requirement of IS 3860 : 1960 'Specification for precast cement concrete slabs for canal lining' and IS 4969 : 1968 'Method of test for determining flexural strength of precast cement concrete slabs for canal lining' (except of non-provision of bevelled sides type, with tongue and groove arrangement which are not used due to breakage in handling).

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***CANAL LININGS-CEMENT CONCRETE
TILES-SPECIFICATION***(First Revision)***1 SCOPE**

1.1 This standard lays down requirements of precast cement **concrete** tiles for canal lining.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard:

IS No.	Title
269 : 1976	Specification for 33 grade ordinary portland cement (<i>first revision</i>)
383 : 1970	Specification for coarse and fine aggregates from natural sources for concrete (<i>second revision</i>)
455 : 1976	Specification for portland slag cement (<i>third revision</i>)
1344 : 1981	Specification for calcined clay pozzolana (<i>first revision</i>)
3812 : 1981	Specification for fly ash for use as pozzolana and admixture (<i>first revision</i>)
1489 : 1976	Specification for portland pozzolana cement (<i>second revision</i>)

3 MANUFACTURE

The cement used in the manufacture of tiles shall conform to IS 269 : 1976, IS 455 : 1976 or IS 1489 : 1976. Fine aggregates and coarse aggregates shall conform to IS 383 : 1970. The size of the coarse aggregate shall be not more than 20 mm. Pozzolana conforming to IS 1344 : 1981 or IS 3912 : 1981 may also be used

as aggregate. The potable water shall be used for mixing concrete and curing.

4 DIMENSIONS

4.1 The nominal dimension shall be as below:

500 mm x 500 mm, 500 mm x 250 mm, 400 mm x 400 mm, 300 mm x 300 mm and 250 mm x 250 mm.

4.1.1 Each of these shall be manufactured in the thicknesses 60, 50 and 40 mm.

NOTE — However other **size** than **those given in 4.1** may also be manufactured if specifically required by the user.

5 TOLERANCE

In length and breadth shall be ± 3 mm and thickness shall not be less than the specified value.

6 SHAPE

The tile shall have its all sides at right angles to the faces.

**7 FLEXURAL STRENGTH OF
MANUFACTURED TILES**

When tested according to the method given at Annex A, minimum breaking load per cm length of tile shall not be less than 41 kg for 60 mm, 29 kg for 50 mm and 18 kg for 40 mm tiles thickness.

8 MARKING

8.1 Each tile shall be suitably marked as under:

- a) Source of manufacture, and
- b) Size with thickness.

8.2 The tiles may also be marked with the Standard Mark.

ANNEX A
(Clause 7.1)

TEST FOR FLEXURAL STRENGTH OF MANUFACTURED TILE

A-1 SAMPLE

A-1.1 For ascertaining the conformity to the requirements for flexural strength test, one tile from each lot of 500 shall be selected at random and tested.

A-2.1 It shall be considered conforming to the requirements of the flexural strength test if the sample passes the requirements of the test. In case it fails to satisfy the requirements of the test, two more tiles shall be selected at random from the same lot and tested for the requirements of flexural strength. If any of these two tested fails to satisfy the strength requirements the lot shall be rejected.

A-2 TEST

A-2.1 The specimen shall be immersed in potable water for 24 hours and then taken out and wiped dry.

A-2.2 The specimen shall be placed horizontally on roller bearers 150 mm apart with their length parallel to bearers. The load shall be applied at mid-span by means of steel bar parallel to the bearers. The length of the bearers and that of the loading bar shall be longer than the length of the specimen and their contact shall be rounded to a diameter of 25 mm. A plywood packing 3 mm thick and 25 mm wide shall be placed between the specimen and the bearers and between the specimen and the loading bar. The loading bar and the bearers shall be self-aligning (see Fig. 1).

A-2.3 Starting from zero, the load shall be increased steadily and uniformly at a rate not exceeding 2 kg/cm length (measured along with the bearers) per minute up to the load specified in 7.1, which shall be maintained for at least 1 minute. There shall not be any visual crack in the tile.

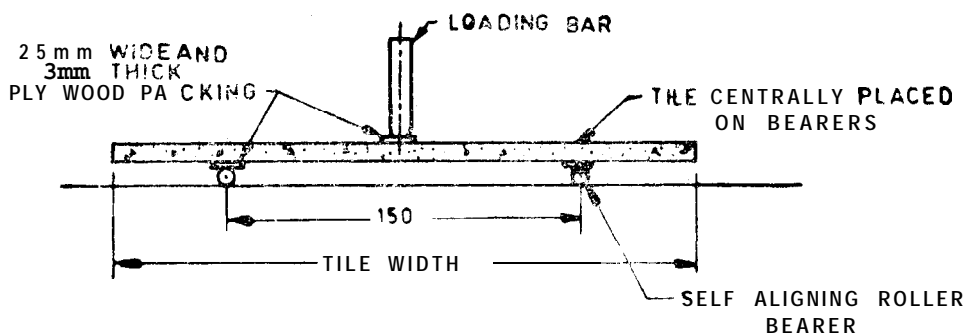


FIG. 1 METHOD OF TEST FOR FLEXURAL STRENGTH OF TILE

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.

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Doc : No. **RVD 13 (71)**

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700054

Northern : **SCO** 445-446, Sector 35-C, CHANDIGARH 160036

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113

Western : Manakalaya, **E9** MIDC, Marol, Andheri (East)
BOMBAY 400093

{ Telephone

311 01 31
331 13 75

37 86 62

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AMENDMENT NO. 1 JUNE 1992
TO
IS 10646 : 1991 CANAL LININGS — CEMENT
CONCRETE TILES — SPECIFICATION

(First Revision)

(Page 1, clause 2) — Substitute the following for the existing IS 269, IS 455, IS 1344 and IS 1489 respectively:

‘IS 269 : 1989 Specification for 33 grade ordinary **portland** cement (*fourth revision*)

IS 455 : 1989 Specification for **portland** slab cement (*fourth revision*)

IS 1344 : 1981 Specification for calcined pozzolana (second revision)

IS 1489 (Parts 1 and 2): 1991 Specification for **portland** pozzolana cement:
Part 1 **Fly** ash based and Part 2 **Calcined** clay based (*third revision*).’

(Page 1, clause 3, line 7) — Substitute ‘IS 3812 : 1981’ for ‘IS 3912 : 1981’.

(Page 2, clause A-2.3, line 5) — Substitute ‘**7**’ for ‘7.1’.

(RVD13)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 SEPTEMBER 2000
TO
IS 10646 : 1991 CANAL LININGS — CEMENT
CONCRETE TILES — SPECIFICATION

(First Revision)

(*Page* 1, *clause* 2) — **Insert** of the following Indian Standard at the appropriate place:

‘456 : 1978 Code of practice for plain and reinforced concrete (*third revision*)’

(*Page* 1, *clause* 3) — Insert the following at the end of the existing clause:

‘Concrete mix used in title shall conform to M-15 grade specified in IS 456.’

(*Page* 1, *clause* 5) -*Substitute* the following for the existing clause:

‘Tolerance in length and breadth shall be ± 3 mm and thickness + 2.0 mm.’

(*Page* 1, *clause* 7) — Substitute the following for the existing matter:

‘Samples for **flexural** shall be cured for 24 hours in shade and 21 days in water prior to testing. When tested according to the method given at Annex A, minimum breaking load per cm **weight of** the tile shall not be less than 41 kg for 60 mm, 29 kg for 50 mm and 18 kg for 40 mm **tiles** thickness.’

(WRD 13)