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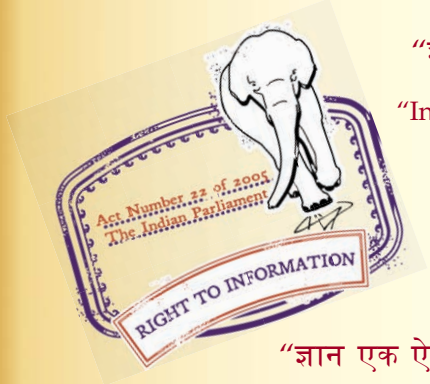
IS 6061-4 (1981): Code of Practice for Construction of Floor and Roof with Joists and Filler Blocks, Part IV: With Precast Hollow Clay Block Slab Panels [CED 13: Building Construction Practices including Painting, Varnishing and Allied Finishing]



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IS : 6061 (Part IV) - 1981
(Reaffirmed 2002)

Indian Standard

CODE OF PRACTICE FOR CONSTRUCTION OF FLOOR AND ROOF WITH JOISTS AND FILLER BLOCKS

PART IV WITH PRECAST HOLLOW CLAY BLOCK SLAB PANELS

UDC 69·024/·025 : 693·28 : 691·421-478 : 69·001·3

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

June 1982

Indian Standard

CODE OF PRACTICE FOR CONSTRUCTION OF FLOOR AND ROOF WITH JOISTS AND FILLER BLOCKS

PART IV WITH PRECAST HOLLOW CLAY BLOCK SLAB PANELS

(*Continued on page* 2)

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(*Continued on page* 12)

Indian Standard

CODE OF PRACTICE FOR CONSTRUCTION OF FLOOR AND ROOF WITH JOISTS AND FILLER BLOCKS

PART IV WITH PRECAST HOLLOW CLAY BLOCK SLAB PANELS

0. FOREWORD

0.1 This Indian Standard (Part IV) was adopted by the Indian Standards Institution on 29 December 1981, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 The construction of floor or roof using structural clay blocks is a suitable substitute for *in-situ* RCC slab construction. This type of slab is comparatively cheaper, saves serace materials like cement, steel and provides better thermal insulation. Further, with the setting up of a number of mechanised plants for the manufacture of clay blocks in different parts of the country, this type of prefabricated floor and roof would ensure quicker construction. In this type of floor or roof, the clay blocks are used to prefabricate a slab panel like a wall. It is the clay blocks that take part in the structural action by carrying the flexural compression. The shape of the structural clay blocks are so designed that the slab panels can be used to build the wall. This standard is intended to provide guidance for construction of panel type prefabricated floor or roof slab using hollow clay blocks and is one of a series of Indian Standards on construction of floor or roof with hollow clay blocks.

0.3 In the formulation of this standard assistance has been rendered by the Central Building Research Institute, Roorkee, which supplied valuable technical information.

0.4 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.

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

1. SCOPE

1.1 This standard (Part IV) covers the design and construction of panel type prefabricated floor or roof using hollow clay blocks.

2. MATERIALS

2.1 Cement Concrete — Cement concrete to be used over the support to fill the joint between two consecutive slab panels shall conform to IS : 456-1978*.

2.2 Hollow Clay Blocks (Structural Type) — Hollow clay blocks shall conform to the requirements of IS : 3951(Part II)-1975† with dimensions preferably as given in Fig. 1.

2.2.1 Average crushing strength of the blocks shall not be less than 20N/mm² on the net area with an individual minimum value of 15 N/mm² when tested in accordance with IS : 3951 (Part II)-1975†.

2.3 Mortar — Mortar used shall be either cement mortar or cement-lime mortar with a minimum compressive strength of 10 N/mm² and shall conform to IS : 2250-1981‡.

2.4 Reinforcement — These shall conform to either IS : 432 (Part I)-1966§ or IS : 1139-1966‖ or IS : 1786-1979¶.

3. PREPARATORY WORK

3.1 All supporting elements like walls, pillars, main beams, secondary beams, frames, etc, shall be completed sufficiently early and cured well before the flooring or roofing work is taken up. Plain cement concrete or mortar bed block may be provided over load-bearing walls, if necessary. The top surface of the supporting elements shall be level finished. Attention shall be paid for arrangements necessary for fixing all service pipes, conduits, fixtures, etc, passing through the floor or roof.

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

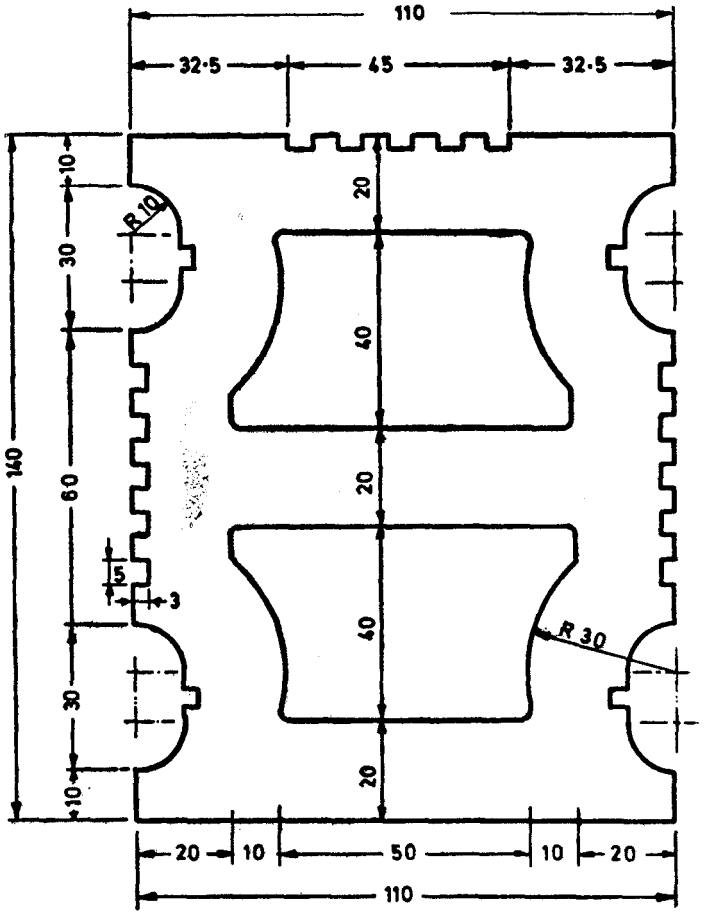
†Specification for structural hollow clay tiles for floors and roofs: Part II Structural type (*first revision*).

‡Code of practice for preparation and use of masonry moutar (*first revision*).

§Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part I Mild steel and medium tensile steel bars (*second revision*).

‖Specification for hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcements (*revised*).

¶Specification for cold worked steel high strength deformed bars for concrete reinforcement (*second revision*).



All dimensions in millimetres.

FIG. 1 TYPICAL STRUCTURAL CLAY BLOCK FOR PANEL SCHEME.

4. CASTING CURING AND MATURING OF SLAB PANEL

4.1 The slab panels shall be cast with hollow structural clay blocks on a level platform protected from direct sun as well as quick drying action of strong wind.

4.2 The construction of slab panel is like building a brick wall. The slab panel shall be precast by placing thoroughly soaked and skin-dry hollow clay blocks in a row up to the desired length and jointing them with 10 mm thick 1 : 3 (1 cement : 3 sand) or equivalent cement-lime mortar. The blocks shall be placed with the short face on the platform. A layer mortar shall then be applied over the top surface and reinforcing bar shall be placed in one of the longitudinal, oval-shaped grooves. Next, a layer of mortar shall again be applied so that total thickness of the mortar joint is about 10 mm. Another coarse of clay blocks shall then be laid as before and this operation shall be repeated up to a maximum height of 600 mm (*see* Fig. 2). Vertical joints shall be broken in each successive coarse by using half units of clay blocks. The face towards which the main reinforcement is placed shall be made to plumb and this face shall form the ceiling face.

4.3 After casting, the slab panel shall be cured with water for a minimum period of 14 days and further air cured for another 14 days.

4.4 The slab panel shall be lifted from the precasting platform only after 28 days to a stacking yard or to the building site for placement. While transporting, the slab panels shall be transported in a vertical position or horizontally with the plumb face containing reinforcement towards the bottom.

4.5 The slab panels shall not be stacked directly on the ground to avoid contamination with clay, etc. The slab panels may be stacked in vertical or horizontal position with the plumbed face towards the bottom. If stacked horizontally one above another, all the props shall be in the same vertical plane.

5. GENERAL DESIGN REQUIREMENTS

5.1 The design of structural clay block slab shall be based on general structural analysis and requirements laid down in **5.2** to **5.8.**

5.2 Design Load — Live load shall be taken as given in IS : 875-1964*.

5.3 Design for Two Stages of Loading — Being a prefabricated scheme, clay block slabs shall be designed for two different stages of loading conditions as given in **5.3.1** and **5.3.2.**

*Code of practice for structural safety of buildings: Loading standards (*revised*).

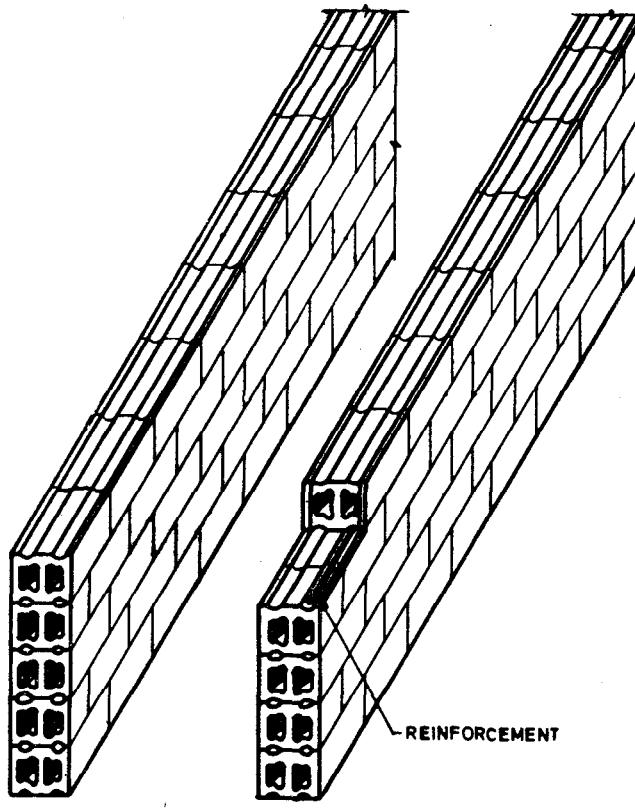


FIG. 2 SLAB PANELS BUILT LIKE A WALL USING CLAP BLOCK

5.3.1 *First Stage of Loading* — In the first stage of loading, the slab panel shall have to sustain, as a simply supported member, the load due to its own weight and some incidental live load. A properly designed slab panel for the second stage of loading shall be able to sustain this load and, hence, no checking for the first stage of loading will be needed.

5.3.2 *Second Stage of Loading* — The slab panel shall resist the design load as follows:

a) Self weight of slab panel as simply supported, and

b) Other superimposed load like floor finish and live loads under appropriate end conditions.

5.4 Effective Span — The effective span of the slab shall be taken as the clear span plus the effective depth of the slab or centre to centre distance between the two supports, whichever is less.

5.5 Span to Depth Ratio — The effective span to depth ratio of slab shall satisfy the requirements as given in IS : 456-1978*.

5.6 Loading Arrangement — In case of continuous slab over several spans, consideration may be limited to the following combinations of loading:

a) Bending moment due to self weight of slab simply supported,
b) Moment due to superimposed dead load on all spans with full design live load on two adjacent spans, and
c) Moment due to superimposed dead load on all spans with full design live load on alternate spans.

5.6.1 *Moment and Shear Coefficients for Continuous Slabs* — Unless more exact estimates are made, the slabs which support uniformly distributed load over three or more spans and which do not differ by more than 15 percent of the longest, the bending moments and shear forces used for design shall be obtained by using the coefficients given in Table 1 and Table 2 respectively.

5.6.1.1 For moments at supports, where two unequal span meets or in case where the spans are not equally loaded, the larger of the two values for negative moment at the support shall be taken for design.

5.7 The average crushing strength of structural hollow clay blocks shall be reduced by 20 percent for design purposes to take into account the non-uniformity of fired clay products. Based on this crushing strength, permissible stresses shall be taken in accordance with IS : 456-1978*.

5.8 Shear — Structural hollow clay block slab shall be checked for resistance to shear stress resulting from transverse shear.

5.8.1 *Shear Stress Due to Transverse Shear* — The shear stress q at any section shall be calculated from the following equation:

$$q = \frac{V}{b \cdot d}$$

where

V = shear force at the section under consideration due to design load,

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

b = width of the web, and

d = effective depth.

5.8.2 Shear stress in structural clay block slab shall be within the permissible value.

6. ASSEMBLY OF FLOOR OR ROOF

6.1 The slab panels shall be placed side by side abutting each other, over support finished level and the joints between two adjacent slab panels shall be finished with 1 : 2 (1 cement : 2 sand) cement mortar rule pointed. Any gap between the two adjacent panels shall be filled with mortar from the top.

6.2 Bearing — Bearing for the slab shall be minimum 75 mm in the direction of spanning and minimum 20 mm at the end.

6.3 It is difficult to provide continuity of slab panels in adjacent spans. Where continuity is desired, negative reinforcement may be provided by embedding up to the required length in the longitudinal groove which comes on the top face of the slab panel. This reinforcement shall be kept projecting from the slab panel end by 60 mm. Reinforcement, thus projecting from both sides, shall be lap welded at site. Alternatively, 120 mm wide *in-situ* concrete may be laid in between the two adjacent slab panels and thus partial continuity may be obtained by providing negative reinforcement over the support to the required length on either side within that *in-situ* concrete.

6.4 Constructional Details

6.4.1 Structural clay blocks shall be immersed in water for about 20 to 30 minutes and skin-dry at the time of use. The thickness of mortar joint shall not be more than 12 mm.

6.4.2 Fixtures like junction boxes, floor traps, etc, shall be fixed in solid precast concrete block of same size as the clay block. While building the slab panel, the precast concrete block containing the fixture shall be laid at the appropriate position instead of the clay block. Concealed electrical conduit shall be placed inside the hollow of the clay block along the direction of spanning.

6.4.3 Splicing of reinforcement shall be avoided and minimum cover to reinforcement shall be 12 mm.

7. FINISHING

7.1 The roof or floor may be further finished with the specified roof or floor in accordance with the relevant Indian Standards mentioned in **7.1.1**.

TABLE 1 BENDING MOMENT COEFFICIENTS

(*Clause* 5.6.1)

Sl No.	Loading	Span Moments		Support Moments	
		At Middle of End Span	At Middle of Interior Span	At First Interior Support	At All Other Interior Supports
(1)	(2)	(3)	(4)	(5)	(6)
1.	Moments due to dead load and imposed load (fixed)	$+\frac{1}{12}$	$+\frac{1}{24}$	$-\frac{1}{10}$	$-\frac{1}{12}$
2.	Moment due to imposed load (not fixed)	$+\frac{1}{10}$	$+\frac{1}{12}$	$-\frac{1}{9}$	$-\frac{1}{9}$

NOTE — For obtaining the bending moments, the coefficient shall be multiplied by the total design load and effective span.

TABLE 2 SHEAR FORCE COEFFICIENTS

(*Clause* 5.6.1)

Sl No.	Loading	At End Support	First Interior Support		At All Other Interior Supports
			Outer Side	Inner Side	
(1)	(2)	(3)	(4)	(5)	(6)
1.	Dead load and imposed load (fixed)	0·4	0·6	0·55	0·5
2.	Imposed load (not fixed)	0·45	0·6	0·6	0·6

NOTE — For obtaining the shear force, the coefficient shall be multiplied by the total design load.

7.1.1 Indian Standards covering floor or roof finishes so far published are enlisted below:

Sl No.	*Type*	*IS :*
1.	Magnesium oxychloride	658-1962*
2.	Bitumen mastic	1196-1978†
3.	Rubber	1197-1970‡
4.	Linoleum	1198-1958§
5.	Cement concrete tiles	1443-1972‖
6.	Terrazzo	2114-1962¶
7.	Mud *PHUSKA*	2115-1980**
8.	*In-situ* cement concrete	2571-1970††
9.	Epoxy resin	4631-1968‡‡
10.	PVC	5318-1969§§
11.	Brick	5766-1970‖‖

7.2 The ceiling may be rendered (*see* IS : 2402-1963¶¶) or plastered (*see* IS : 1661-1972***) as may be necessary. The blocks shall be thoroughly wetted before rendering or plastering.

7.3 The waterproofing of the roof may be done in accordance with either IS : 1346-1976††† or IS : 3036-1965‡‡‡or IS : 4365-1967§§§ or IS : 7290-1973‖‖‖.

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*Code of practice for magnesium oxychloride composition floors (*revised*).
†Code of practice for laying bitumen mastic flooring (*second revision*).
‡Code of practice for laying of rubber floors (*first revision*).
§Code of practice for laying and maintenance of linoleum floors.
‖Code of practice for laying and finishing of cement concrete flooring tiles (*first revision*).
¶Code of practice for laying *in-situ* terrazzo floor finish.
**Code of practice for flat-roof finish: Mud *PHUSKA* (*second revision*).
††Code of practice for laying *in-situ* cement concrete flooring (*first revision*).
‡‡Code of practice for laying of epoxy resin floor toppings.
§§Code of practice for laying of flexible PVC sheet and tile flooring.
‖‖Code of practice for laying burnt clay brick flooring.
¶¶Code of practice for external rendered finishes.
***Code of practice for application of cement and cement-lime plaster finishes (*first revision*).
†††Code of practice for waterproofing of roofs with bitumen felts (*second revision*).
‡‡‡Code of practice for laying lime concrete for a waterproofed roof finish.
§§§Code of practice for application of bitumen mastic for waterproofing of roofs.
‖‖‖Recommendation for use of polyethylene film for waterproofing of roofs.

(*Continued from page* 2)

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