

IS : 6061 ( Part I ) - 1971  
( Reaffirmed 1992 )

*Indian Standard*

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

**PART 1 WITH HOLLOW CONCRETE FILLER BLOCKS**

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

*Indian Standard*

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JOISTS AND FILLER BLOCKS

**PART I WITH HOLLOW CONCRETE FILLER BLOCKS**

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# *Indian Standard*

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

### PART I WITH HOLLOW CONCRETE FILLER BLOCKS

#### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 18 March 1971, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** Floor and roof construction using precast reinforced or prestressed concrete joists and hollow cement concrete filler blocks is advantageous because of the durability, fire resistance, thermal insulation, lower dead load and high speed of construction. The construction of floor or roof with joists and hollow concrete filler blocks is simple and quick and also eliminates the use of shuttering. This type of floor should not be used where the floor is likely to be subjected to impact loads and/or vibration. This standard is intended to provide guidance for construction of floor and roof with hollow cement concrete filler blocks.

**0.3** In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

**0.4** This standard is one of a series of Indian Standards on construction of floor and roof with joists and filler blocks. The other standard to be published in the series is Code of practice for construction of floor and roof with joists and filler blocks : Part II With hollow clay filler blocks.

**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.

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

## 1. SCOPE

1.1 This standard covers the method of construction of floor and roof using precast reinforced cement concrete/prestressed concrete joists and hollow cement concrete filler blocks with *in situ* reinforced concrete decking at the top.

## 2. DESIGN CONSIDERATIONS

### 2.1 General

2.1.1 The floor or roof shall consist of the following components:

- a) Precast reinforced/prestressed concrete joists spaced at suitable centres;
- b) Precast cement concrete hollow blocks laid over in the space between the precast reinforced concrete joists;
- c) Structural topping concrete nominally reinforced laid *in situ*;
- d) The required floor or roof finish at the top; and
- e) A suitable ceiling finish applied to the bottom of the joists and hollow blocks subsequently, if desired.

### 2.2 Strength and Stability

2.2.1 The spacing of the joists shall be at 600 mm centres unless otherwise specified ( see B-1.4 ).

2.2.2 The maximum span of joists shall not normally exceed 6 m.

2.2.3 The design of precast reinforced concrete and prestressed concrete sections for joists shall be in accordance with the principles laid down in IS : 456-1964\* and IS : 1343-1960† respectively.

2.2.4 The joists and filler blocks shall be so shaped as to give a minimum bearing of 25 mm of the filler blocks on the joist.

2.2.5 When the design of the joists provides for T-beam action of topping concrete, then the minimum thickness of concrete shall be 50 mm.

## 3. MATERIALS

3.1 **Cement** — Cement used shall conform to IS : 269-1967‡ or IS : 455-1962§ or IS : 1489-1967||.

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

†Code of practice for prestressed concrete.

‡Specification for ordinary, rapid-hardening and low heat Portland cement ( *second revision* ).

§Specification for Portland blastfurnace slag cement ( *second revision* ).

||Specification for Portland-pozzolana cement ( *first revision* ).

**3.2 Fine Aggregate** — Fine aggregate shall conform to the relevant requirements of IS : 383-1963\*.

**3.3 Coarse Aggregate** — Coarse aggregate shall conform to the relevant requirements of IS : 383-1963\*.

**3.4 Water** — Water used shall be clean and free from oil, acid, alkali, organic or vegetable matter. Generally potable water will be suitable. In case of doubt the quality of water should be analysed to ascertain conformity with 4.3 of IS : 456-1964†.

**3.5 Precast Reinforced/Prestressed Concrete Joist** — Precast reinforced/prestressed concrete joist shall be prepared in accordance with the details given in Appendix A.

**3.6 Precast Hollow Cement Concrete Filler Blocks** — Precast hollow cement concrete filler blocks shall conform to the requirements given in Appendix B.

#### **4. PROGRAMMING THE WORK**

**4.1** All supporting elements like walls, pillars, main beams, frames, etc, shall be completed sufficiently early and cured well before the flooring or roofing work is taken up. Plain concrete 75 mm thick ( 1 : 2 : 4 mix ) bed block may be provided over load bearing walls, if necessary. The top surface of 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.

#### **5. STORAGE, TRANSPORT AND HANDLING OF MATERIALS**

**5.1** Necessary precautions shall be observed in the storage, transport and handling of precast concrete joists and cement concrete hollow filler blocks. Cement, coarse and fine aggregates and other construction materials shall be stored at site in accordance with the recommendations given in IS : 4082-1967‡

#### **6. LAYING THE FLOOR OR ROOF**

**6.1** The precast reinforced concrete joists shall be placed in position at the designed spacing so as to span between the supporting elements, such as walls and beams.

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\*Specification for coarse and fine aggregates from natural sources for concrete ( *revised* ).

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

‡Recommendations on stacking and storage of construction materials at site.

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**6.2** The joists, if so designed, shall be temporarily supported at the points stipulated by the designer and the supports shall be left in position for at least 7 days from the date of laying the topping concrete.

**6.3** Space, if any, between the ends of adjacent joists occurring over walls or beams shall be filled with the same masonry or concrete as the supporting element so as to be flush with the top of joist to present an even bearing surface for the wall above.

**6.4** The hollow blocks shall be placed in between the joists with their ends resting on the projecting lips of the joists in a manner indicated in Fig. 1.

**6.5** Nominal reinforcement shall be provided for the structural topping concrete slab in accordance with the relevant provisions given in IS : 456-1964\*. At least 0.15 percent reinforcement along the joists and 0.20 percent reinforcement across the joists shall be provided for the structural topping concrete slab. The spacing of reinforcement bars shall not exceed 300 mm. The top reinforcement in the slab over the supports ( joists ) should be tied to the stirrups projecting from the joists. Welded wire mesh may be used for the reinforcement as an alternate to mild steel bars.

**6.6** The structural topping concrete shall be of grade M-150 ( refer to IS : 456-1964\* ). It shall be laid over the hollow blocks to a minimum thickness of 50 mm. The top surface should be finished smooth if no further flooring treatment is required; otherwise the surface should be finished rough for providing bond with the subsequent treatment.

**6.7** The *in situ* concrete shall be suitably cured for at least one week.

## 7. FINISHING

**7.1** The concrete topping laid as in 6, may be further finished with the specified roof, floor or ceiling finish in accordance with the relevant Indian Standards mentioned in 7.1.1. The ceiling may be rendered or plastered, as desired. The waterproofing of the roof may be done according to IS : 1346-1966† or IS : 3036-1965‡ or IS : 4365-1967§.

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

†Code of practice for waterproofing of roofs with bitumen felts ( *first 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.

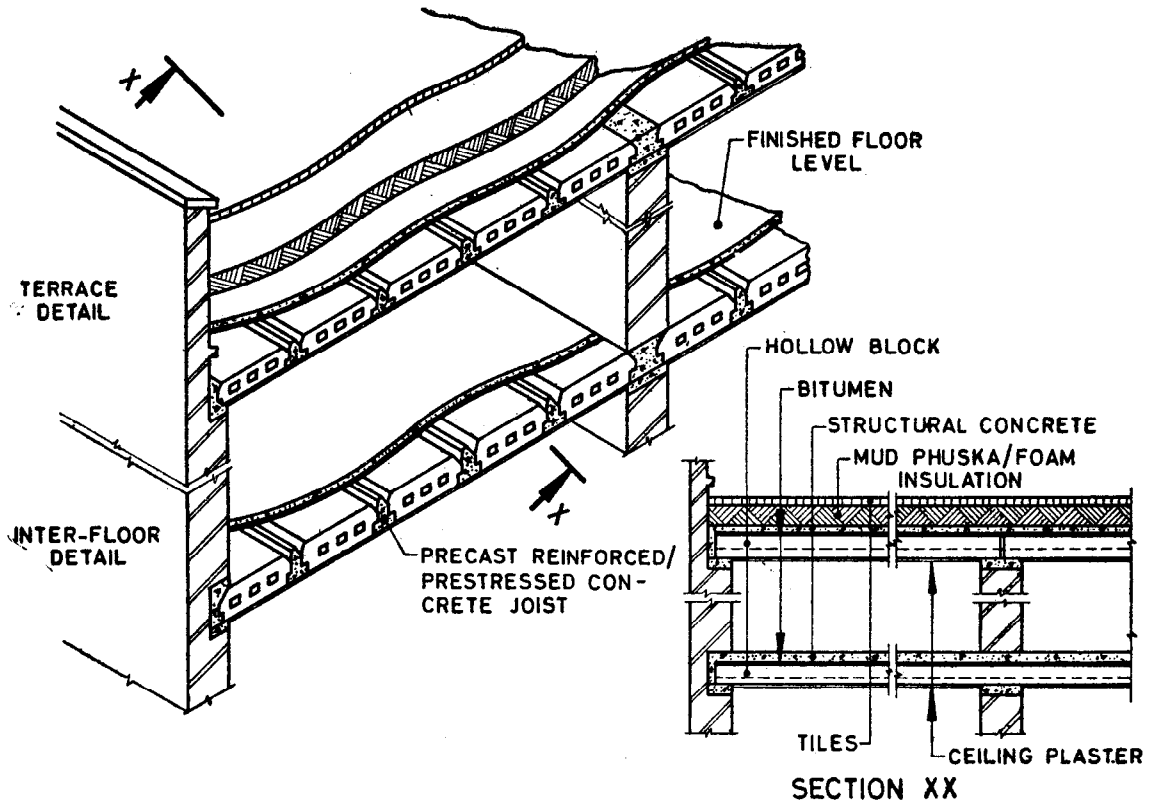


FIG. 1 PRECAST CONCRETE JOISTS AND HOLLOW FILLER BLOCK FLOORING AND ROOFING



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7.1.1 Indian Standards covering floor finishes are listed below:

<i>Sl No.</i>	<i>Type of Finish</i>	<i>IS No.</i>
1)	Cement concrete tiles	1443-1959*
2)	Terrazzo	2114-1962†
3)	Rubber	1197-1970‡
4)	Linoleum	1198-1958§
5)	PVC	5318-1969
6)	Magnesium oxychloride	658-1962¶
7)	Epoxy resin	4631-1968**
8)	Bitumen mastic	1196-1968††

## APPENDIX A

( Clause 3.5 )

### PRECAST REINFORCED CONCRETE JOISTS

#### A-1. GENERAL

**A-1.1** All precast reinforced concrete joists shall be of uniform width, the length and depth shall vary according to the span. The recommended depth of the precast reinforced concrete joists is 150 mm for spans up to 4.2 m and 200 mm for spans 4.2 to 6 m.

**A-1.2** The joists shall have stirrups projecting to be bent into the topping concrete slab to give composite action.

#### A-2. MIX

**A-2.1** The concrete for the joists shall be of grade M-200 as specified in IS : 456-1964‡‡.

\*Code of practice for laying and finishing of cement concrete flooring tiles.

†Code of practice for laying *in situ* terrazzo floor finish.

‡Code of practice for laying of rubber floors (*revised*).

§Code of practice for laying and maintenance of linoleum floors.

||Code of practice for laying of flexible PVC sheet and tile flooring.

¶Code of practice for magnesium oxychloride composition floors (*revised*).

\*\*Code of practice for laying of epoxy resin floor toppings.

††Code of practice for laying bitumen mastic flooring (*first revision*).

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

### A-3. REINFORCEMENT

**A-3.1** The reinforcement for joists shall be provided according to IS : 456-1964\* for reinforced cement concrete joists and according to IS : 1343-1960† for prestressed concrete joists.

### A-4. CASTING

**A-4.1** The mould should be made of suitable material which is rigid enough to withstand vibrations during casting.

**A-4.2** The joists shall be cast on a level platform protected from direct sun as well as from the quick drying action of strong winds.

**A-4.3** Before filling concrete in the moulds, the inner surfaces of the mould and the bottom shall be thoroughly treated to aid the casting and removal of the precast unit without damage and to ensure a smooth surface finish of the concrete. The reinforcement skeleton should be placed and secured in the mould in the correct position so as to ensure proper cover of concrete over the reinforcement. The concrete shall be gradually filled into the moulds and kept continually filled and compacted by suitable vibration.

NOTE — Even when the mould is full, the top ends of the stirrups and the stirrup holder bar are purposely left projecting out the mould so that the joist will bond with the reinforced concrete topping and function as T-beams.

**A-4.4** Releasing of the sides of mould shall not be done earlier than four hours after casting. The mould shall be very carefully released without disturbing or causing any shock to the casting.

### A-5. CURING AND MATURING

**A-5.1** After removal of the sides of the moulds, the joists shall be kept damp for 24 hours by spraying water on them at the same location, unless adequate arrangements are made for shifting the base plate without disturbing the joists. After the concrete has developed sufficient strength to withstand handling stresses the joists shall be removed to a curing yard and shall be kept continually moist for at least 7 days from the date of casting.

**A-5.2** After the curing of the joists is completed, these shall be stored in a shady place and allowed to dry gradually for at least three weeks before these are used in the construction.

### A-6. PRECAUTIONS FOR LIFTING AND HANDLING OF JOISTS

**A-6.1** Lifting of joists from the platform shall be done with care. Subsequent handling shall be done without causing any damage to the joist

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

†Code of practice for prestressed concrete.

and from points indicated by the designer. While stacking and transporting, temporary supports shall be given at the points indicated by the designer. Joists should be stacked on firm and even ground or platform. If stacked in more than one row all the props should be in the same vertical plane.

## **A P P E N D I X B**

*( Clause 3.6 )*

### **PRECAST HOLLOW CEMENT CONCRETE FILLER BLOCKS**

#### **B-1. SIZE AND SHAPE**

**B-1.1** The blocks shall be so prepared that at any point it shall have a wall thickness of not less than 25 mm.

**B-1.2 Tolerance** — The maximum variation in the dimensions shall be not more than  $\pm 1.5$  mm for height and breadth and  $\pm 3.00$  mm for length.

**B-1.3** The blocks shall be so prepared so as to have a bearing of not less than 25 mm on the joists.

**B-1.4** A typical section of the hollow cement concrete filler block to span between joists kept at 600 mm centres is shown in Fig. 2.

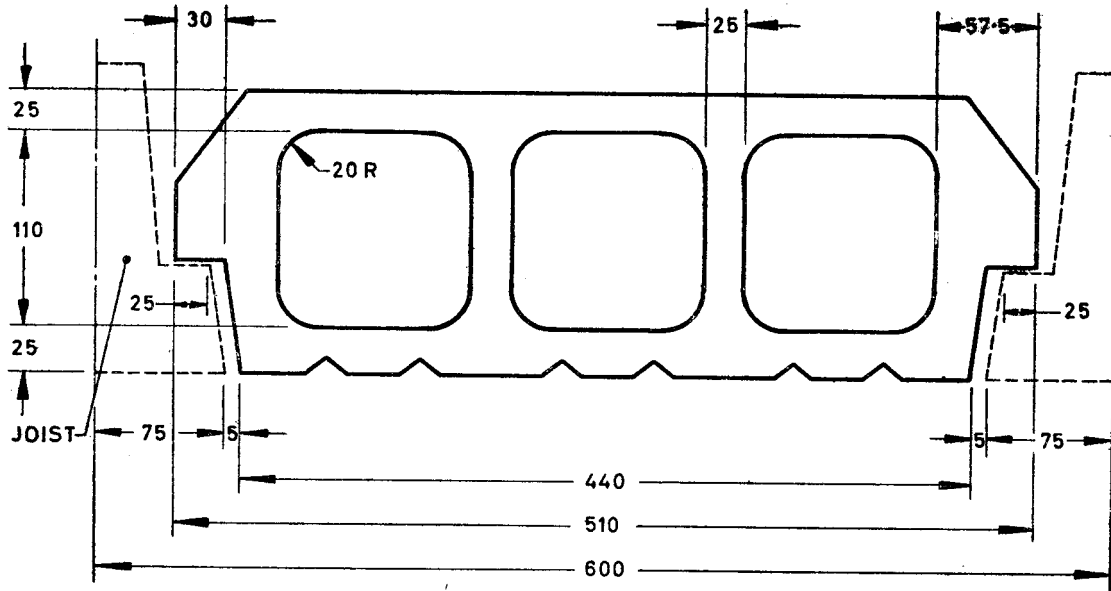
**B-1.5** If the hollow cement concrete filler block has to span between joists kept at 750 mm centres or above, the block should be suitably reinforced.

#### **B-2. BREAKING STRENGTH TEST ON HOLLOW CEMENT CONCRETE FILLER BLOCK**

**B-2.1** The block shall be suitably and simply supported without any mortar at the supports and having a bearing of at least 25 mm on the supports placed at 600 mm centre to centre. A load of 300 kg shall be applied on a steel plate 20 mm wide kept centrally over the entire width of the block and parallel to the supports. The strip load of 300 kg is applicable only for blocks having width of 250 mm and for wider blocks the load should be increased in proportion to the actual width and 250 mm.

**B-2.1.1** The block under the loading as explained in **B-2.1** shall not break or crack or show any type of deformation.

**B-2.1.2** At least two blocks from the lot manufactured in a day, or two blocks from 1 000 blocks whichever is less should be tested for dimensions and breaking strength.



All dimensions in millimetres.

FIG. 2 TYPICAL HOLLOW CONCRETE FILLER BLOCK

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