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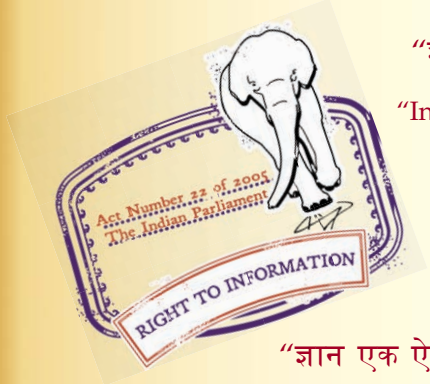

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IS : 2792 - 1964
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Indian Standard

CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF STONE SLAB OVER JOIST FLOOR

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

Gr 3 *September* 1964

Indian Standard

CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF STONE SLAB OVER JOIST FLOOR

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Indian Standard

CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF STONE SLAB OVER JOIST FLOOR

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 July 1964, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Building Division Council.

0.2 Slabs of natural stone such as granite, limestone, sandstone, etc, are largely used for floor and roof construction in parts of Andhra Pradesh, Mysore, Maharashtra, Rajasthan, Uttar Pradesh, etc, where such stones are available in plenty. This standard is intended as a guide for the design and construction of this type of work.

0.3 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 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 standards prevailing in different countries of the world.

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.

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1. SCOPE

1.1 This standard covers the design and construction of structural floors or roofs where stone slabs are supported over closely spaced joists and covered with a layer of lime concrete or cement concrete and the required floor or roof finish. The standard also specifies the material used for this construction.

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

2. TERMINOLOGY

2.1 For descriptions of various types of stones reference may be made to IS : 1805-1961*.

3. NECESSARY INFORMATION

3.1 For efficient design and construction of the work, detailed information with regard to the following is necessary:

a) Dimensions of the area to be covered;*

b) Type of supporting structures and restrictions, if any;

c) Level to which the walls or supports should be brought to receive the floor;

d) Treatment at junctions with adjacent floors, walls, etc; and

e) Provision to be made in the wall or supports themselves for floor slopes and other requirements and for fixing services, ceiling, etc.

3.2 All information as in **3.1** should be made available to those who are concerned with the design and construction. Necessary drawings and instructions for preparatory work shall be given.

3.3 Arrangements shall also be made for proper exchange of information between those engaged in laying the floor and all others whose work will affect or will be affected.

4. DESIGN CONSIDERATIONS

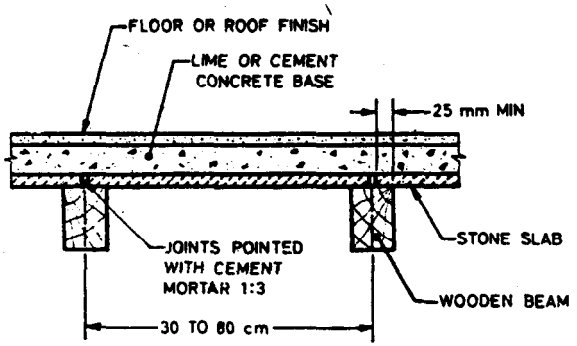
4.1 General — The stone slab and joist floor will consist of the following components. Typical details of the floor are shown in Fig. 1:

a) Joists spaced at 30 to 80 cm apart to support the floor slab.

b) Stone slabs of specified dimensions closely placed over the supporting joists so as to span between them. The slabs may either be placed on the top of the joist or in the case of joist with a bottom flange, such as a rolled steel joist, may be placed over the bottom flange. Unless special precautions for waterproofing of roof are taken, rusting of slabs on the bottom flange would not generally be suitable for roof; for floor work, this construction may be permitted as one of the alternatives at the option of the designer depending upon the requirements for appearance and also the size of the joist that is chosen.

c) A layer of lime concrete or cement concrete over the stone slabs so as to obtain insulation and waterproofing.

*Glossary of terms relating to occurrence, quarrying and dressing of building stones. Since revised).



TYPICAL SECTION OF RCC JOIST

TYPICAL SECTION OF STEEL JOIST

NOTE — Precast RCC or steel joists may be used.

FIG. 1 STONE SLAB OVER JOIST FLOOR

4.2 Strength and Stability

4.2.1 The permissible stresses in transverse bending for the various types of stone slabs shall not exceed 1/10 of the ultimate transverse strength determined in accordance with IS :1121-1957*.

NOTE — The following values for permissible stresses may be used in calculations for granite, sandstone and limestone:

Granite	15 kg/cm²
Sandstone	8 kg/cm²
Limestone	8 kg/cm²

4.2.1.1 In the absence of specific data regarding the particular type of stone used, the unit weight for stone to be used in calculations shall generally be 2 700 kg/m³.

4.2.2 The bearing width of joists carrying the slab shall not in any case be less than 25 mm nor more than half the width of the joist. For bearing over the wall, the stone slabs shall be bedded over a layer of mortar of thickness not less than 12 mm.

4.2.3 The joists shall be designed as beams supporting the floor laid over them. In designing the joists the dead load of stone floor, concrete

*Methods of determination of compressive transverse and shear strengths of natural building stones.

and finishing and the live loads shall be taken into consideration (*see* IS : 875-1964*) and the design shall conform to the relevant Indian Standards as below:

Precast reinforced cement concrete beams	IS : 456-1964† and IS : 1343-1960‡
Steel beams	IS : 800-1962§
Timber beams	IS : 883-1961‖

4.2.4 The slope provided for roof drainage in stone slab floor construction shall not be less than 1 in 48, and this slope may be provided either in the lime-brick-jelly concrete layer or in the joists.

5. MATERIALS

5.1 Cement — shall conform to the requirements of ordinary portland cement as laid down in IS : 269-1958¶ or blast furnace slag cement conforming to IS : 455-1962**.

5.2 Lime — shall conform to IS : 712-1956††.

5.3 Surkhi — shall conform to IS : 1344-1959‡‡.

5.4 Aggregate — shall generally conform to IS : 383-1963§§. Where brick aggregate is used it shall conform to Appendix B of IS : 2119-1962‖‖.

5.5 Water — shall be free from earthy, vegetable or organic matter and from salts or other substances likely to interfere with the setting of mortar or otherwise prove harmful to the work.

5.6 Rolled Steel Sections — shall conform to IS : 226-1962¶¶.

5.7 Structural Timber — shall conform to IS : 883-1961‖.

*Code of practice for structural safety of buildings; loading standards.

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

‡Code of practice for prestressed concrete.

§Code of practice for use of structural steel in general building construction.

‖Code of practice for use of structural timber in building (material, grading and design) (*revised*). (Third revision issued).

¶Specification for ordinary, rapid-hardening and low heat portland cement (*revised*). (Third revision issued).

**Portland blast furnace slag cement (*revised*). (Since revised).

††Specification for building limes. (Second revision issued).

‡‡Specification for surkhi for use in mortar and concrete. (Since revised).

§§Specification for coarse and fine aggregates from natural sources for concrete. (Second revision issued).

‖‖Code of practice for construction of brick-cum-concrete composite (Madras terrace) floor or roof.

¶¶Specification for structural steel, standard quality (*revised*). (Fourth revision issued).

5.8 Stone Slab — may be generally of one of the following types of natural building stones:

a) Granite,

b) Sandstone including quartzite,

c) Limestone, and

d) Slate.

5.8.1 Stone slabs as obtained from the quarry shall be hard, durable and tough. They shall be free from decay, sand holes, flaws, cracks and other defects. They shall be quarried in such a way as to be suitable for the floor slabs.

5.8.2 The thickness of a slab at every point shall not be less than what is specified for use in accordance with structural calculations, subject to a minimum of 3 cm. The tolerance on stone dimensions shall be the same as given in IS : 1127-1957*.

5.8.3 The slabs may be flat chisel dressed to a smooth or rough surface according to the requirements of finishes at top and bottom of the floor.

5.8.4 The slabs shall not absorb more than 5 percent of water. The toughness and durability of a newly quarried stone may be improved by seasoning and dressing. When tested for transverse strength in accordance with the procedure laid down in IS : 1121-1957†, the stone shall have a strength of not less than 55 kg/cm^2.

5.9 Lime Concrete — The lime concrete for use over the stone slab flooring shall be prepared in accordance with the requirements specified in IS : 2541‡.

5.10 Cement Concrete — The cement concrete for use over the stone slab flooring shall be prepared in accordance with the requirements specified in IS : 456-1964§.

6. PROGRAMMING THE WORK

6.0 The facilities mentioned in **6.1** and **6.2** are necessary and shall be provided to the person entrusted with the stone slab floor construction for carrying out his work satisfactorily.

6.1 Completion of Preceding Work — All supporting elements like walls, pillars, main beams, etc, shall be completed sufficiently early and

*Specification for dimensions and workmanship of natural building stones. (Since revised).

†Methods for determination of compressive, transverse and sheer strength of natural building stones.

‡Code of practice for use of lime concrete in buildings (*under preparation*). (Since published and revised in 1974).

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

cured well before the flooring work is taken up. The top surface of supporting elements shall be finished level.

6.2 Marking of Levels — The exact levels of the bearing surface of the joist shall be previously checked and marked.

7. PREPARATORY WORK

7.1 Storage, Transport and Handling of Materials — Necessary precautions shall be observed in storage, transport and handling of stone slabs so that they are not broken or seriously damaged before laying on the floor. Other construction materials such as cement, lime, sand, etc, shall be stored and handled in accordance with the provisions given in the relevant Indian Standard specifications for the materials.

7.2 Preparation of Stone Slabs — All the edges shall be chiseled square so that the mortar joints will be of even thickness.

7.3 Treatment of Joists Before Erection — All steel work shall be painted with one coat of primer before fixing.

In the case of timber joists the portion that is set in masonry, shall be given protective finish with two coats of hot boiled tar conforming to IS : 212-1961*. Before fixing joists one coat of primer paint shall also be applied to the exposed portion of the joists.

8. FIXING OF JOISTS

8.1 The joists shall be fixed in position at the designed spacing so as to span between the supporting elements, such as walls, beams, etc.

8.2 The space between the ends of adjacent joists shall be filled with the same masonry or concrete as the one on which they rest, so that the filled in masonry or concrete and the joists present an even and level surface at top for bearing of the floor.

9. LAYING OF STONE SLABS

9.1 The stone slabs shall be placed over the beams. The bearing of the slabs over the joists shall be in accordance with **4.2.** The slabs shall be set in rows close to each other and the joints grouted with cement-sand mortar of mix 1 : 3. The mortar shall be of stiff consistency and shall be pressed into the joints. It may be desirable to treat the mortar with crude oil, the ratio of crude oil being 5 percent that of the weight of the cement. On the underside the joints may be pointed or other types of ceiling finish applied as specified.

*Specification for crude coal tar for general use (*revised*).

10. LAYING OF CONCRETE LAYER OVER THE STONE SLAB

10.1 Lime Concrete — After the stone slabs have been laid and grouted, a layer of lime concrete of mix 1 : 1 : 2 shall be laid so as to ensure adequate waterproofing, such as in the case of roofs. However, for situations where exposure to weather is not much, or where additional waterproofing finish is provided, the mix may be of 1 : 1½ : 3. The mix shall be so laid as to form a level surface and have a uniform thickness. The lime concrete shall, after laying, be well beaten with wooden hand beaters so that it is consolidated evenly to a level surface. The consolidated thickness shall be not less than 7·5 cm.

10.1.1 The beating shall continue until the concrete hardens and the beater makes no impression on the concrete and readily rebounds from the surface when struck on it. Care shall be taken not to beat the concrete so hard as to crack the slabs, particularly where slabs of low strength are used. The whole surface shall be subsequently wetted by sprinkling lime water. If the surface during the process of beating becomes so uneven that water collects in pools, the surface shall be picked up and fresh concrete added and reconsolidated as necessary. The concrete shall be cured by sprinkling water and allowed to harden for a period of not less than six days before laying the floor or roof finish.

10.2 Cement Concrete — This shall be laid in the same manner as the base for a floor finish (*see* for example, IS : 2114-1962*).

11. FINISHING

11.1 The stone floor may be finished with either cement plaster of mix 1 : 3, 20 mm thick or other types of floor or roof finish as required in accordance with the relevant Indian Standards (*see* Note).

NOTE — Indian Standards covering suitable finishes over stone slab floor are enlisted below:

Finish with cement tiles	IS : 1443-1959†
Terrazzo flooring	IS : 2114-1962*
Mud *PHUSKA*-roof finish	IS : 2115-1962‡
Mastic asphalt flooring	IS : 1196-1958§

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

†Code of practice for laying and finishing of cement concrete flooring tiles. (Since revised).

‡Code of practice for flat roof finish : mud *PHUSKA*. (Since revised).

§Code of practice for laying mastic asphalt flooring. (Since revised).

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