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Indian Standard
CODE OF PRACTICE FOR
CONSTRUCTION OF TIMBER CEILINGS
(*First Revision*)

UDC 69.025.4 : 691.11 : 006.76



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

Indian Standard

CODE OF PRACTICE FOR CONSTRUCTION OF TIMBER CEILINGS (*First Revision*)

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Indian Standard
**CODE OF PRACTICE FOR
CONSTRUCTION OF TIMBER CEILINGS**
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 February 1984, after the draft finalized by the Building Construction Practices Sectional Committee had been approved the Civil Engineering Division Council.

0.2 Timber ceilings are provided below the roofing and flooring to give decorative appearance, to conceal air conditioning or other service ducts and projections such as beams underneath the floor slab and also to obtain special acoustics effects and insulation against heat, cold and sound. These ceilings being a prominently exposed building feature, even a slight fault in its fixing and alignment will lead to unsightly appearance. Therefore care should be taken while fabricating, installing and fixing the same. This standard is intended to serve as a guide for the construction of such ceilings.

0.2.1 This code was first published in 1969 and intended to bring uniformity in the practices being followed by various organization and construction agencies in the country for fabrication and fixing of timber ceilings. This revision has been prepared to incorporate improvements found necessary in the light of usage of the standard. In this revision alternate species suitable for making planks have been added (see Appendix A) and dimensions of timber units suitable for ceiling included. Further construction of timber ceilings has been dealt in detail and finishing of the ceilings added.

0.3 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 covers the fabrication and fixing of timber ceilings.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 707-1976* and IS : 3670-1966†, and the following shall apply.

2.1.1 *Framework* — Wooden framework consisting of longitudinal bearers and cross bearers by means of which the timber planks are supported.

2.1.2 *Close Ceilings* — The ceilings in which the distances between the trusses are not greater than 1 m and the truss acts as the truss rafter.

2.1.3 *Open Ceilings* — The ceilings in which the distances between adjacent trusses are more than 1 m and deeper projecting joists, etc, are provided. They have the added advantage that necessary sound proofing material can be provided at the hollow space.

3. NECESSARY INFORMATION

3.1 *Exchange of Information* — Consultation and exchange of information shall be arranged between all parties concerned with the building operations, so that each may have full knowledge of the particulars of the work and be able to co-operate in producing the conditions required by others to complete a satisfactory job.

3.1.1 The designer shall provide all relevant information to those responsible for laying the ceiling and to others whose work may be affected. He shall specify amongst other things :

- a) type, species and grade of timber ceiling to be laid;
- b) thickness of ceilings;
- c) relationship to a datum of the level of the finished ceiling;
- d) preservative treatment, if any;
- e) any work consequent upon services passing through the ceiling;
- f) type of underlay, if any;
- g) method of fixing;
- h) treatment of junction with adjacent ceiling;

*Glossary of terms applicable to timber technology and utilization (second revision).

†Code of practice for construction of timber floors.

- j) any dressing or polish required; and
- k) general conditions of contract which may affect this particular work.

4. MATERIAL

4.1 Timber — The timber for making planks shall be from any of the species given in Appendix A and ceiling framework and beading shall conform to IS : 3629-1966*. The moisture content shall be as specified in IS : 287-1973†. The timber shall be seasoned in accordance with IS : 1141-1973‡. After seasoning the timber shall be treated with preservatives in accordance with IS : 401-1982§. In case of water soluble preservatives, timber shall be seasoned again for the second time after preservation. The timber may be protected against termite in accordance with IS : 6313 (Part 1)-1981 to IS : 6313 (Part 3)-1981||.

4.1.1 The frame to support the ceiling shall be designed for structural strength and stability, taking into consideration the spacing of truss members and the size and mass of ceiling covering to be fixed.

4.2 Nails — The nails used shall conform to IS : 723-1972¶.

4.3 Screws — The screws used shall conform to IS : 451-1972**.

4.4 Cleat — Mild steel cleats are used for fixing together the cross and main members of the ceiling framework and shall be of such size as to accommodate at least two screws or bolts on each side for connection. Alternatively, specially designed clip system may also be used to connect the cross and main members of ceiling framework. Wooden cleats may also be used where required, provided they are of adequate size.

4.5 Suspenders for Ceiling Framework — This may be fabricated from mild steel flats (*see* IS : 5986-1970†) or other metal sections. They shall

*Specification for structural timber in buildings.

†Recommendations for maximum permissible moisture content for timber used for different purposes (*second revision*).

‡Code of practice for preservation of timber (*first revision*).

§Code of practice for seasoning of timber (*third revision*).

||Code of practice for anti-termite measures in buildings:

Part 1 Constructional measures (*first revision*).

Part 2 Pre-constructional chemical treatment measures (*first revision*).

Part 3 Treatment for existing buildings (*first revision*).

¶Specification for steel countersunk head wire nails (*second revision*).

**Specification for technical supply conditions for wood screws (*second revision*).

††Specification for hot-rolled plates and flats for cold-forming and flanging operations.

preferably be in two pieces so that the length of the suspenders may be adjusted during fixing of the ceiling frames. The shape at the top end shall facilitate a firm suspension from the structural floor with proper anchorage. Where mild steel flats are used as suspenders they shall be of 35 to 65 mm length and 6 mm thickness.

5. DIMENSIONS

5.1 The thickness and width of the timber scantling for ceiling framework beading and planks may be as given in Table 1.

TABLE 1 COMMON DIMENSIONS OF TIMBER UNITS FOR CEILING

All dimensions in millimetres.

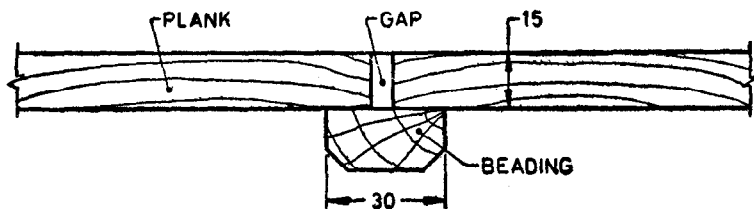
SL No.	PURPOSE	THICKNESS	WIDTH
(1)	(2)	(3)	(4)
i)	Timber scantling for ceiling framework	60 to 75	50
ii)	Timber planks	15 to 20	100 to 150
iii)	Beading	12	30

NOTE — Tolerance to above dimension is —0
+3.

6. JOINTING OF TIMBER PLANKS

6.1 The longitudinal edges of the planks shall be jointed to each other in one of the following ways.

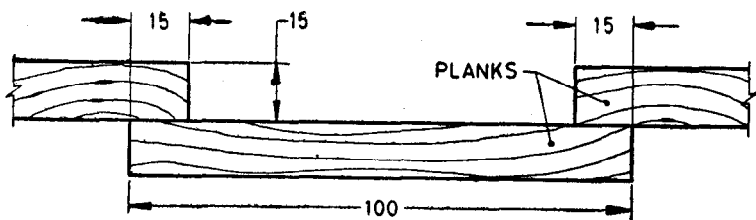
6.1.1 *Butt and Beading Type* — The planks shall be butted together lengthwise and a beading 30 mm wide is provided below and the beading is jointed through nails (see Fig. 1).



All dimensions in millimetres.

FIG. 1 BUTT AND BEADING TYPE JOINT

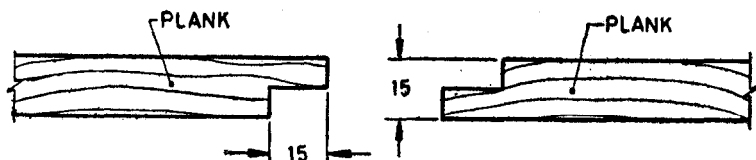
6.1.2 *Overlap Type* — Each plank shall overlap the adjoining plank by at least 15 mm on both sides such that any of two adjoining planks are in two levels and the effective width of a single plank is reduced by at least 30 mm (see Fig. 2).



All dimensions in millimetres.

FIG. 2 OVERLAP TYPE JOINT

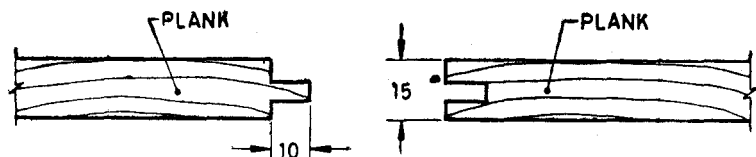
6.1.3 Half Lap Type — The adjoining planks shall be half lapped having upper lap in one plank and lower lap in the adjoining plank lengthwise such that when jointed together, they sit on one another (see Fig. 3).



All dimensions in millimetres.

FIG. 3 HALF LAP TYPE JOINT

6.1.4 Tongued and Grooved Type — The adjoining planks shall be joined together through tongued and grooved joints having tongue in one plank and groove in the adjoining (see Fig. 4).



All dimensions in millimetres.

FIG. 4 TONGUED AND GROOVED TYPE JOINT

7. MANNER OF FIXING OF CEILINGS

7.1 In respect of manner of fixing, ceilings may be of the following type as described in 7.1.1 to 7.1.3. The design of timber ceilings shall be carried out according to IS : 883-1970*.

*Code of practice for design of structural timbers in buildings (*third revision*).

7.1.1 Sloping Ceilings Fixed Immediately Below the Roofing — If a ceiling is required to be added to an existing roof with common rafter construction, it may be fixed to the underside of the rafters.

7.1.2 Horizontal Closed Ceiling Below Roofs and Floors — In this type ceiling may be fixed to the underside of the floor or roof framework by one of the methods given in 7.1.2.1 and 7.1.2.5.

7.1.2.1 Ceiling planks fixed direct below the floor joists — The ceiling planks, shall be fixed directly to the underside of the floor joists or to the underside of the ceiling joists fixed to the roof trusses or to the underside of trussed rafters of the roofing (see Fig. 5).

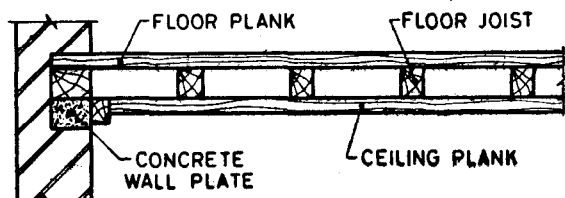


FIG. 5 CLOSED CEILING WITH PLANKS FIXED DIRECT BELOW FLOOR JOISTS

7.1.2.2 Ceiling joists and planks fixed just below the floor joists — The ceiling joists are connected to every fourth or fifth floor joist which provided deeper than the others for sound proofing. The ceiling planks are then fixed to the underside of ceiling joists (see Fig. 6).

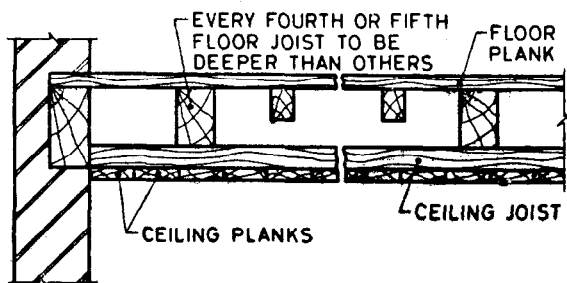


FIG. 6 CLOSED CEILING WITH JOISTS AND PLANKS FIXED JUST BELOW FLOOR JOISTS

7.1.2.3 Ceiling joists and planks fixed to binders of double joisted floors — Ceiling joists are fixed to the binders of the double joisted floors and finally the planks are fixed to the ceiling joists (see Fig. 7).

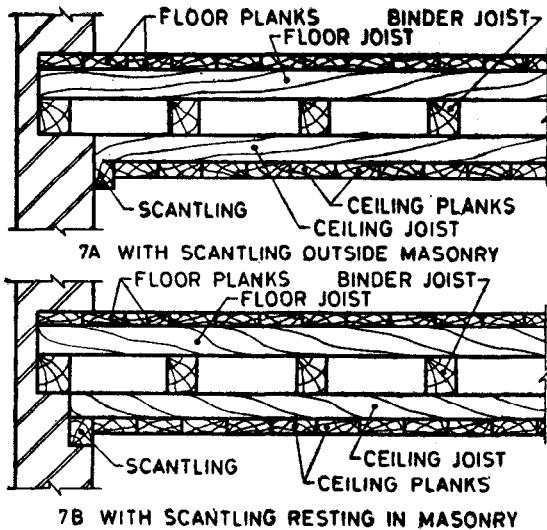


FIG. 7 CLOSED CEILING CONNECTING TO BINDERS OF DOUBLE JOISTED FLOORS

7.1.2.4 Ceiling joists and planks suspended by wooden or iron straps— Ceiling joists are hung by wooden or iron straps from the floor joists (see Fig. 8) instead of being fixed direct to the underside of the floor joists. Each ceiling joist shall be connected to the floor joist above through individual wooden or iron straps. If the straps are to be wooden, the sections shall not be reduced at the end, otherwise bigger sections may be provided at the centre. Ceiling joists may be also hung separately by wooden or iron straps from the tie beam of the trusses instead of being fixed direct to the underside of the tie beams of the trusses (see Fig. 9).

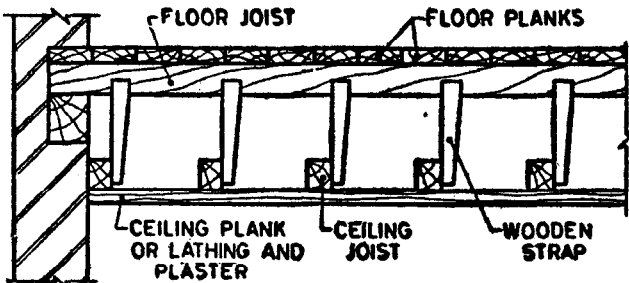


FIG. 8 CLOSED CEILING JOISTS AND PLANKS SUSPENDED FROM FLOOR JOISTS

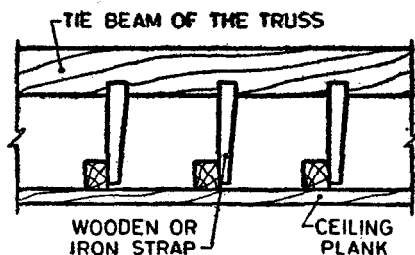


FIG. 9 CLOSED CEILING JOISTS AND PLANKS
SUSPENDED FROM THE TIE BEAM

7.1.2.5 Ceiling joists and planks independent from floor — When the underside of the roof frame is too high and the ceiling is to be put up at a lower level or when it is desired that ceiling should be independent of the roof frames. The ceiling planks are independently fitted without affecting the tied members of the roof frames above (see Fig. 10 and 11).

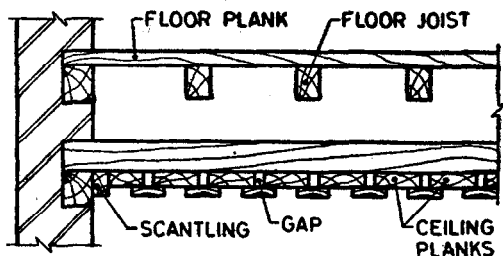


FIG. 10 CLOSED CEILING INDEPENDENT BELOW FLOOR JOISTS

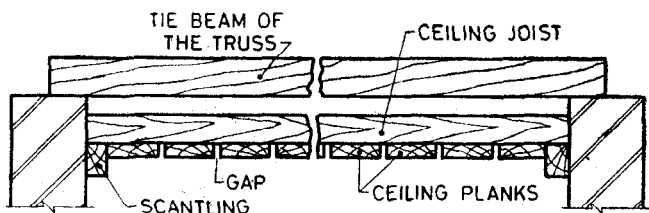


FIG. 11 CLOSED CEILING INDEPENDENT BELOW TIE
BEAM OF THE TRUSS

7.1.3 Horizontal Open Ceiling Below Roofs and Floors — Pieces of timber called 'fillets' (about 400 mm²) are nailed to the sides of the bridging joists of floors or tie beams of the timber frames, planks are then nailed to the fillets from below (see Fig. 12, 13 and 14).

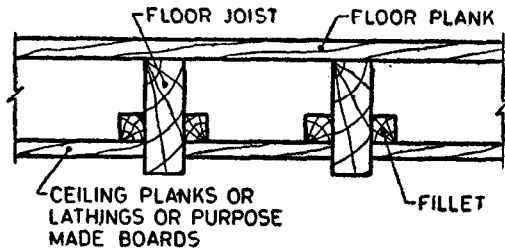


FIG. 12 OPEN CEILING BELOW FLOOR JOISTS

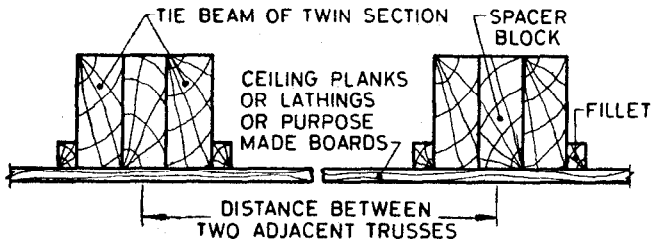


FIG. 13 OPEN CEILING BELOW TIE BEAM OF TWIN SECTION

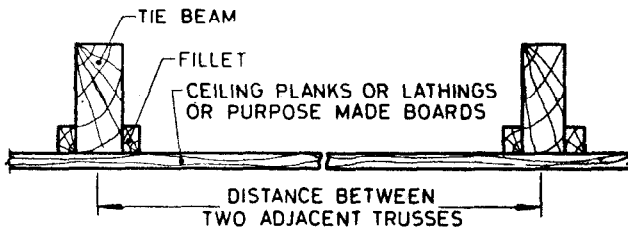


FIG. 14 OPEN CEILING BELOW TIE BEAM OF SINGLE SECTION

8. CONSTRUCTION

8.1 Fixing of timber planks to ceiling framework.

8.1.1 Timber Frames — Suspenders used for supporting timber framework for false ceiling to RCC slab shall be of length sufficient to reach ceiling frame and shall be anchored adequately to structural concrete above so as to obtain the required support for the ceiling. When the members of the ceiling framework span more than 900 mm centre, additional gross battens shall be provided to stiffen them. Further the frame shall be given two coats of preservative before planks are

screwed on. The bottom surface of the frame shall be checked and corrected to true planes and slopes.

8.1.2 Fixing of Planks to Timber Frames — The outer line of planks shall be accurately fixed in straight line joints. The plank joints shall be parallel and in perfect line. The first plank next to the wall shall be fixed carefully and accurately very close to the wall. Subsequent planks shall be carefully jointed up as described in 6.1.1 to 6.1.4. The longitudinal joints of the planks shall preferably be tongued and grooved, while the beading joints shall be of the square butt type and shall occur under the centre line of the supporting joists. Beading joints in adjacent planks shall not be placed over the same joints, those in alternate planks being arranged in the same line except where joints are to be concealed by beadings. Planks shall be planed true on the exposed side and shall be fixed to the frame above with two screws at each end joist of frame and two at every intermediate joist.

The screws shall be countersunk and the screw holes filled with putty or slopping. The maximum length of planks in finished work shall be 1.8 m and the minimum length shall be such that it will span at least two spacings of the supporting framework except where shorter length are unavoidable depending on arrangement of the lines of beading joints which shall be carried out to the pattern ordered. The unexposed face of planks shall be painted with wood preservative before fixing.

8.1.3 Ceiling planks may also be fixed for a sloping or flat roof in the manner described in 7.

8.1.4 Beadings shall be fixed to the ceiling in accordance with IS : 2441-1984*

9. FINISHING

9.1 Exposed side of the planks shall be truly level and plane. The joints shall be truly parallel and/or perpendicular to the walls.

*Code of practice for fixing ceiling coverings (*first revision*).

A P P E N D I X A

(Clauses 0.2.1 and 4.1)

SPECIES OF TIMBER RECOMMENDED FOR TIMBER CEILINGS

A-1. The following species of timber are recommended for use in ceiling boards :

- Anjan (*Hardwickia binata* Roxb.)
- Axlewood (Bakli) (*Anogeissus latifolia* Wall.)
- Bijasal (*Pterocarpus marsupium* Roxb.)
- Chir (*Pinus wallichiana* AB Jacks)
- Cypress (*Cupressus torulosa* D. Don)
- Deodar London (*Cedrus deodara*)
- Fir (*Abies pindrow* Royle)
- Gurjan (*Dipterocarpus spp.*)
- Jarul (*Lagerstroemia speciosa* Pers)
- Kail (*Pinus excelca* Wall)
- Kalasiris (*Albizia odoratissima* Benth.)
- Kasi (*Bridelia retusa* Spreng.)
- Kindal (*Terminalia peniculata* Roth.)
- Kokko (*Albizia lebbek* Benth.)
- Laurel (*Terminalia komentos* Weight et Arn.)
- Lendi (*Lagerstroemia parviflora* Roxb.)
- Machilus (*Machilus macrantha* Nees.)
- Maniawga [*Carallia brachiata* (Lour.) Merr.]
- Pali [*Palaquium ellipticum* (Dalz) Engler.]
- Piney (*Hardwickia pinnata* Roxb.)
- Rohini (*Soyimida febrifuga* A. Juss.)
- Rosewood (*Dalbergia latifolia* Roxb.)
- Satinwood (*Chloroxylon swietenia* DC.)
- Sissoo (*Dalbergia sissoo* Roxb.)
- Teak (*Tectona grandis* Linn, f.)
- White cedar (*Dysozybum malabaricum* Bedd.)
- White chuglam (sapwood) (*Terminalia bialata* Steud.)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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