IS 3670 (1989): Code of practice for construction of timber floors [CED 13: Building Construction Practices including Painting, Varnishing and Allied Finishing]

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IS 3670 : 1989
(Reaffirmed 2000)

Indian Standard

CONSTRUCTION OF TIMBER FLOORS — CODE OF PRACTICE

(First Revision)

भारतीय मानक

लकड़ी के फर्श डालना — रीति संहिता

(पहला पुनरीक्षण)

UDC 692·535·1 : 006·76

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

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Price Group 7

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 23 June 1989, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Civil Engineering Division Council.

Timber floors are being provided in auditoriums, gymnasiums, dancing halls, squash courts, public balconies and galleries, skating-rinks, etc, for noise retardent floor finish and in hilly areas as thermal insulating floor finish. These floors may also be used in timber framed construction to serve as structural floors. This standard is intended to serve as a guide for the selection of timber, specifications for floor boards and also as the construction criteria of floors by using suitable species of timber available in different parts of this country.

This standard was first published in 1966. The present revision updates the standard, in respect of some important additions which include construction details of basement floors, fixing details of timber flooring and floor. The revision also covers modifications in detailing of purpose made floors and sub-floors of cement concrete and wooden fillets. A few new varieties have also been added to recommended the list of species for timber floors.

Indian Standard

CONSTRUCTION OF TIMBER FLOORS — CODE OF PRACTICE

(First Revision)

1 SCOPE

1.1 This standard covers the selection of suitable timber species and their treatment for the purpose of fabrication and laying of different types of timber floors and their relevant components.

2 REFERENCES

2.1 The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 707 : 1976 along with the following shall apply.

3.2 Binders

The timber joists introduced to support the load carried by bridging joists when the span of latter becomes too large.

3.3 Bridging Joists

The timber joists that immediately support a floor boarding.

3.4 Floor Seals

In timber floor finishing, any substance used to fill the pores in standard surface so as to decrease the porosity of surface for finish coatings.

3.5 Girders

Timer joists of heavy sections introduced to support the load of bridging joist and the floor transmitted through binders.

3.6 Panels

Square portions of the parquetted floor having large areas and laid in symmetrical designs.

3.7 Parquetted Floors

A construction in which a floor consists mainly of a sub-floor of timber boards and main floor of timber parquets which are laid in variety of panel designs as well as in square edged hardwood battens.

3.8 Sleeper or Dwarf Walls

A wall constructed between two main walls at a considerable distance apart to provide intermediate support to the bridging joist. A longitudinal piece of timber is fixed on the top of sleeper wall and timber bridging joists are nailed to this piece. Dwarf walls are constructed on floor one (ground floor) only.

3.9 Solid Floors

A construction in which a floor is laid over a filling of well compacted sand, murum, earth, etc. It is thus supported over its whole area by the underlying material.

3.10 Strutting

Transverse or diagonal timber pieces between two adjacent bridging joists to stiffen the latter.

3.11 Suspended Floor or Hollow Floor

A construction in which the floor is supported only at its edges, ends or at a few well defined areas over walls, beams, wooden fillets, etc, to span across a void.

3.12 Trimmed Joists

The timber joists that are trimmed and framed into a trimmer where an opening has to be formed.

3.13 Trimmer Joists

A cross timber into which the ends of trimmed timbers are framed.

3.14 Trimming Joists

The full length timber joists on either side of trimmed joists.

3.15 Wall Plates

A timber plate laid along a continuous wall of concrete or masonry.

3.16 Wooden Fillets

A strip of timber secured to concrete base and to which flooring is fixed.

4 NECESSARY INFORMATION

4.1 Exchange of Information

Consultation and exchange of information shall be arranged at an early date between all parties concerned with the building operations so that each may have full knowledge of the particulars of work and be able to co-operate in producing the conditions required by other to complete a satisfactory job.

4.1.1 For efficient planning, design and execution of (amended) the flooring work, the following points should be taken into account:

a) The area of floor to be covered;
b) Type of timber flooring to be laid;
c) Species and grade of timber to be used;
d) Thickness of flooring;
e) Relationship of the level of finished floor to a datum;
f) Type of damp proofing, if any;
g) Type and thickness of screeded bed, if any;
h) Preservative treatment;
j) Any work consequent upon services passing through the flooring;
k) Type of underlay, if any;
m) Method of fixing;
n) Treatment of skirtings;
p) Treatment of junction with adjacent flooring;
q) Any dressing or polish required; and
r) Conditions of contract which may affect this particular work.

4.2 Time Schedule

When a time schedule is prepared, arrangements shall be made amongst other things for:

a) all services to be laid befor the base is formed;
b) any concrete in the base to have time to harden and dry before flooring is laid, in case of unventilated floor; and
c) where required, flooring to be protected on completion from damage by other trades.

4.2.1 The schedule may be made as per critical path Method (CPM) or programme evaluation and review techniques (PERT) to include the different activities of work, such as:

a) selection and sizing of the timber as per design criteria,
b) procurement of construction materials and labourers,
c) seasoning and treatment of timber,
d) commencement of work under the supervision of a highly skilled carpenter, and
e) completion of work along with necessary finishing.

5 MATERIALS

5.1 Species of Timber

5.1.1 Species of timber recommended for floor boards shall be those as given in Annex B with their percentage of indentation for hardness, taking teak as 100. Species of timber selected for girders, binders and projecting joists shall be as given in Annex C.

5.1.2 Timber selected for construction of floor boards and supporting members shall conform to the requirements specified in Annex D.

5.1.3 Different species of timber possessing different hardness shall not be used together to avoid uneven wear of the floor.

5.2 Nails

The nails shall conform to IS 723 : 1972. The dimensions and approximate count of round chequered head nails shall be those as given in Table 1 of IS 723 : 1972. The nails shall be diamond pointed.

6 DESIGNING, TREATMENT AND PROTECTION OF TIMBER

6.1 All timber members may be designed in accordance with IS 883 : 1970.

6.2 Seasoning

All timber used for timber floors shall be thoroughly seasoned in accordance with IS 1141 : 1973.

6.3 Preservation

After seasoning, the timber shall be treated with preservatives in accordance with IS 401 : 1982.

6.3.1 The timber shall be seasoned for the second time in case, the water soluble preservatives are applied.

6.3.2 Cutting, preboring, etc, should be avoided as far as possible after the application of preservatives.

6.3.3 Even for buildings with proper anti-termite measures incorporated, it is advisable to chemically treat the timber used for floors.

6.4 Protection Against Termites

The protection against termites shall be provided to timber floored houses particulary on the ground floor in accordance with IS 6313 (Part 1) : 1981.

6.5 Protection Against Dampness

The entry of ground moisture may be prevented by the inclusion of damp-proof layer at a suitable position in the building in accordance with IS 1609 : 1976. This layer should be impervious to moisture both in liquid and vapour forms and shall extend without break over the whole area of flooring.

7 TYPES OF TIMBER FLOORS

7.1 Generally, timber floors are of the following types:

a) Single joisted floors having bridging joist only,
b) Double joisted floors having bridging joists supported on binders,
c) Triple joisted or framed floors having bridging joists supported on binders and framed into girders,
d) Solid timber floors/wood block floor, and
e) Purpose made floors/parquet floors, etc.

8 CONSTRUCTION

8.1 Single Joisted Timber Floor for Basement/Ground Floors

This type of timber floor is constructed on ground floor, generally in theatres where dance and drama performances are regularly held. Also they are suited for buildings situated in hilly and damp areas. Timber floors are supported by bridging joists spaced 300 to 450 mm on centres with max span of 3 m. Minimum width of timber joists shall be not less than 50 mm and the depth may be 3 to 4 times the thickness so that they may not deflect by more than 1/360 of the span due to floor loadings.

Construction steps are as under:

a) The area over which the timber floor is to be constructed is first cleaned properly.

b) The cleaned ground is evenly spread and compacted and over it, a 100 mm bed of M10 cement concrete (1 cement : 3 sand : 6 coarse aggregate of 19 mm gauge) is laid and spade finished. This bed, also known as surface or site concrete, is provided to check dampness, vegetable growth and admission of ground air.

c) Honey-combed sleeper walls or dwarf walls, preferably of half brick thickness are constructed at an interval of 2 m with suitable height (*see* IS 1905 : 1980).

d) In case of basement floors, particularly for the theatres, the space between the dwarf walls may be filled up with dry sand up to the DPC level as shown in Fig. 1. DPC is placed in the external walls and at the top of the dwarf walls.

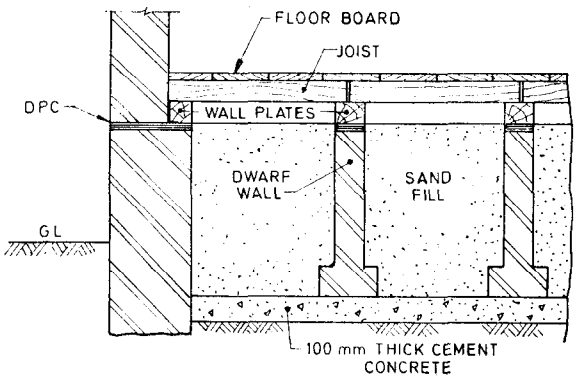


FIG. 1 BASEMENT TIMBER FLOOR

e) Over the DPC on dwarf walls longitudinal wooden members, called sleeper wall plates (generally 100 mm × 100 mm) are solidly bedded level by means of suitable lime or cement mortar.

f) The timber floor joists, called bridging joists, of size as mentioned above are then nailed to these sleeper wall plates as shown in Fig. 2.

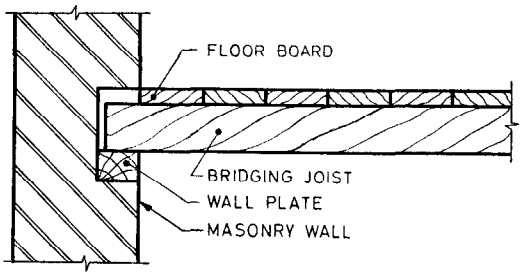


FIG. 2 SINGLE JOISTED FLOOR

g) Arrangement for air circulation under the timber floor should be there to prevent dry rot of timber. Where sand filling is not applied, the whole space on both sides of dwarf walls are kept vacant with facilities for cross-ventilation below the floor by providing honey-comb brick masonry as shown in Fig. 3.

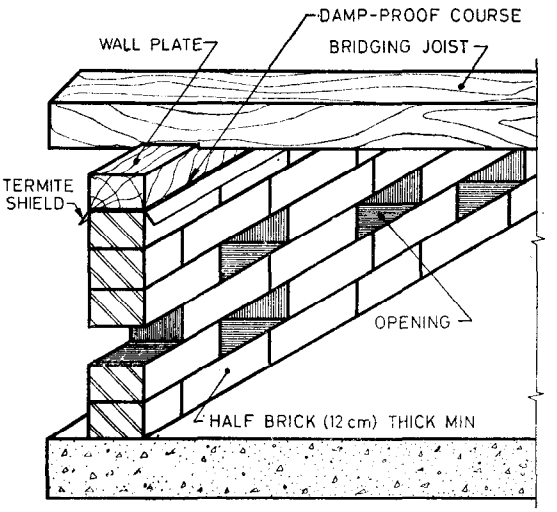


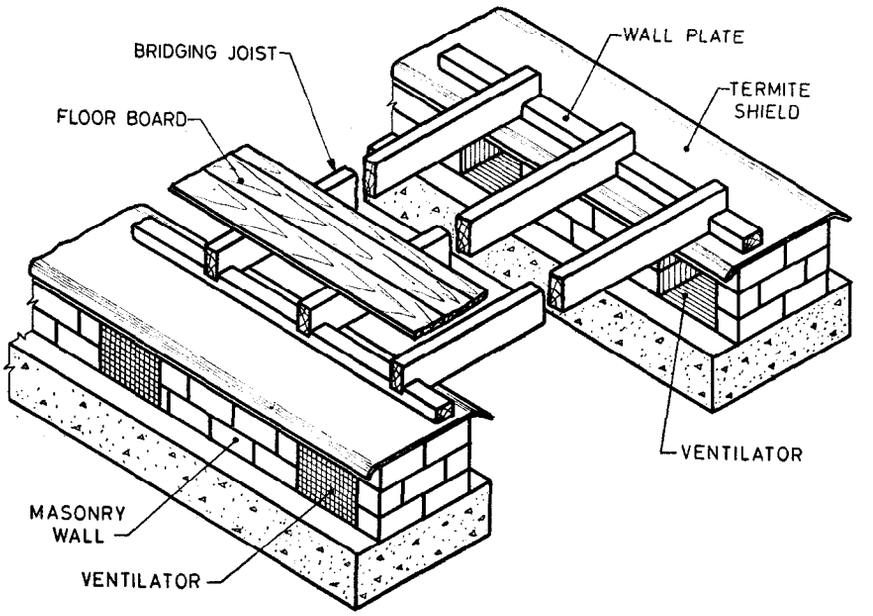
FIG. 3 HONEY COMBED SLEEPER WALL

h) The ventilated space per linear of outer foundation wall shall be provided as given below:

Climate	*Space Required* mm²
Very humid	8 500
Humid	6 500
Mild	4 500
Dry climate	2 200

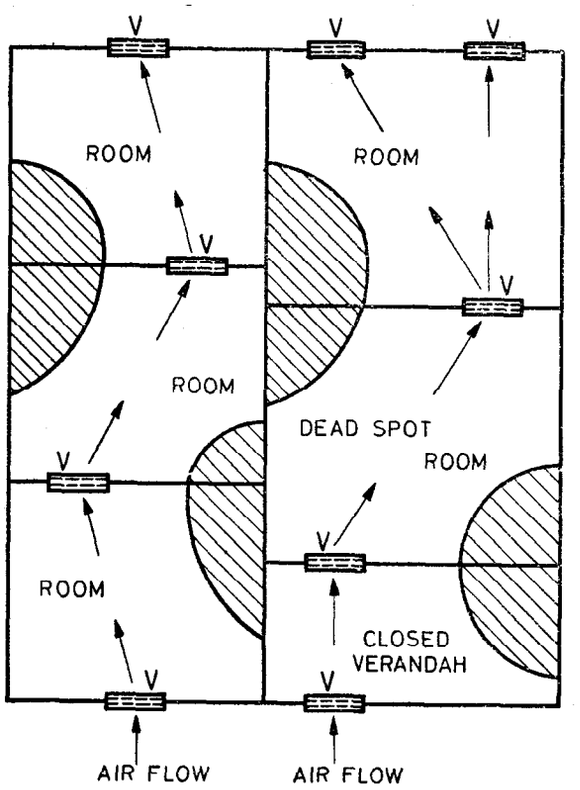
j) Ventilators provided on the outer walls shall be covered with wire gauge (Fig. 4A and Fig. 4B) or other such effectual methods to prevent possible entry of sparrows, rats, reptiles, etc.

k) There should be a gap between the underside of every joist/girder of the ground floor and the top surface of the sand filling or site concrete.



Cover with wire gauge

4A Cross Ventilation Under Timber Floor



V denotes ventilator

4B Foundation Lay Out of a Building Showing Dead Spots and Air Space in Intermediate Walls for Cross Ventilation

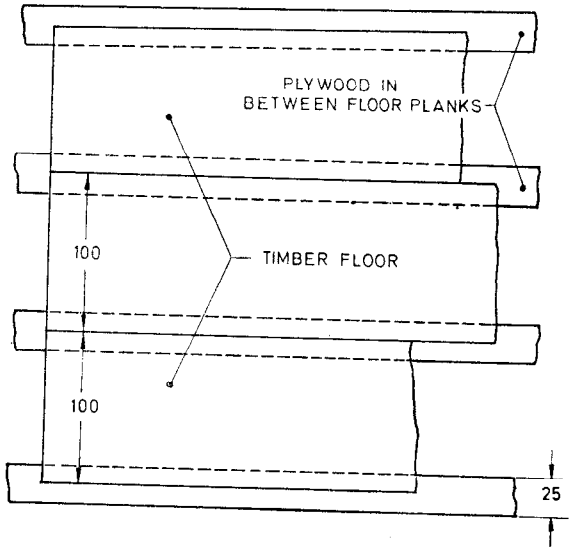
FIG. 4 VENTILATION UNDER TIMBER FLOOR AT GROUND LEVEL

m) The ends of joists are fixed with sleeper wall plates by driving nails through their sides into them.

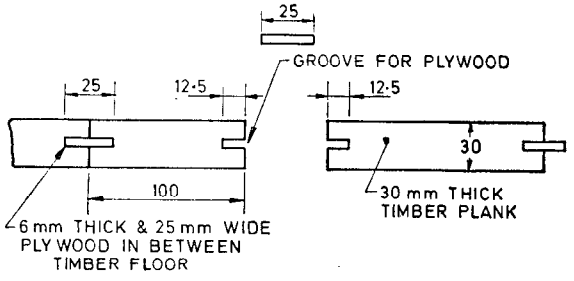
n) Walls-plates and ends of the joists should not be built into the side walls. A separate slipper wall may be constructed to avoid possible early decay of the timber.

p) Spacing of bridging joists may usually be 300 to 450 mm on centres spanning in the shorter direction. Sizes will vary according to loads.

q) On the properly fixed and levelled joists 25-30 mm thick wooden boards 100-150 mm wide and 3 m long, generally widened by ploughed and tongued joints are carefully laid and fixed by nailing/screwing (Fig. 5A and Fig. 5B).



5A



5B

FIG. 5 TYPICAL DETAIL OF FIXING OF TIMBER FLOORING

r) The surface on the boards are then carefully levelled and rubbed smooth with glass paper and finally oiled or waxed and polished.

8.1.1 *Timber Floors for Upper Floors*

These may be of (a) single joisted, (b) double joisted (c) triple joisted floors depending on the span of joists and the loads to be supported upon. This type of floors should also be strong and rigid enough to take loads and check vibrations due to walking on them. The approximate depth of bridging joists may be equal to ($4 \times$ *span in* meter $+5$) cm. On the underside of this types of floors, ceiling joists may be fixed to accommodate ceilings, wherever desired.

Construction procedure for this type of wooden floors is as follows:

a) Wooden joists called bridging joists shall be placed at about 300 to 400 mm centre, spanning the room in the shorter direction which should not exceed 4 m (*see* Fig. 6).

b) The joists are supported on wall plates of 100 mm × 70 mm and 120 mm × 70 mm size duly placed on specially built off sets by brick works. They should be bedded in the way as stated earlier. No wall plate shall be built into solid walls as it causes decay. When joists are directly built into walls without wall plates, their ends bedding into the wall shall be treated with suitable preservatives in accordance with IS 401 : 1982 and gaps at the end and top should be kept as shown in Fig. 2 and Fig. 7.

c) In case the span of the bridging joists is more than 2·5 m, they should be stiffened by providing cross-bracings or strutting in between them in continuous rows at intervals of not more than 2 m apart to prevent buckling or vibrations due to walking.

d) Strutting shall normally be of herring bone type, formed by timber pieces of size 50 mm × 30 mm crossing each other between the bridging joists. The ends of struts are splayed and secured to the sides of the joists by means of mild steel nails. The ends of the struts are generally kept about 6 to 12 mm away from the top and bottom of the joists as shown in Fig. 8.

Solid strutting, usually provided for heavy floors should have the depth of strutting member as three-fourth of the depth of joists and breadth should be one-third to one-fourth the depth as shown in Fig. 9.

e) Ceiling joists are to be fitted, if necessary, below the bridging joist or ceiling may be fixed with the solid strutting exposing the bridging joists.

f) Trimming or framing of timbers around openings in timber floors due to provision of fire place, wooden stairs, etc, shall consist of trimming joists, trimmer joists and trimmed joists as shown in Fig. 6.

8.2 Double Joisted Timber Floors

These are stronger than the single joisted floors and are used where the span of the bridging joists is between 3·5 and 5 m.

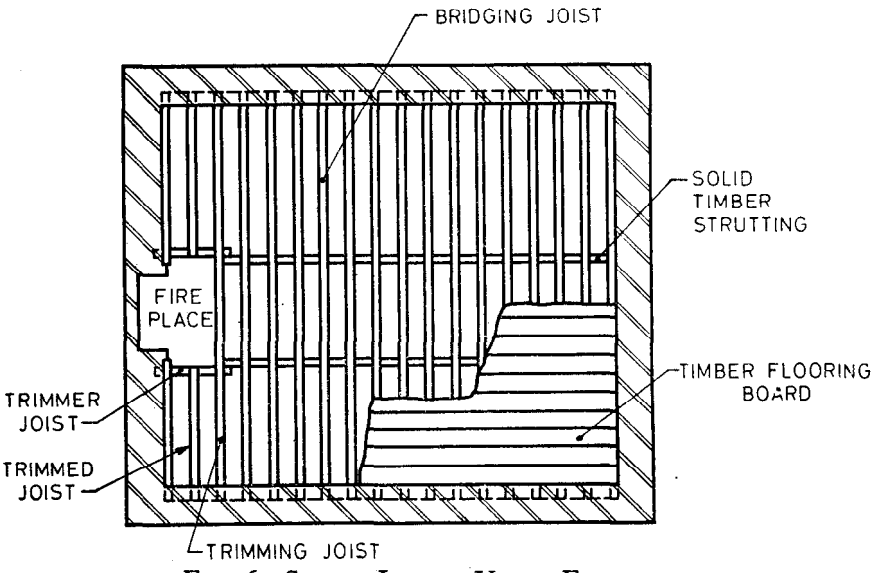
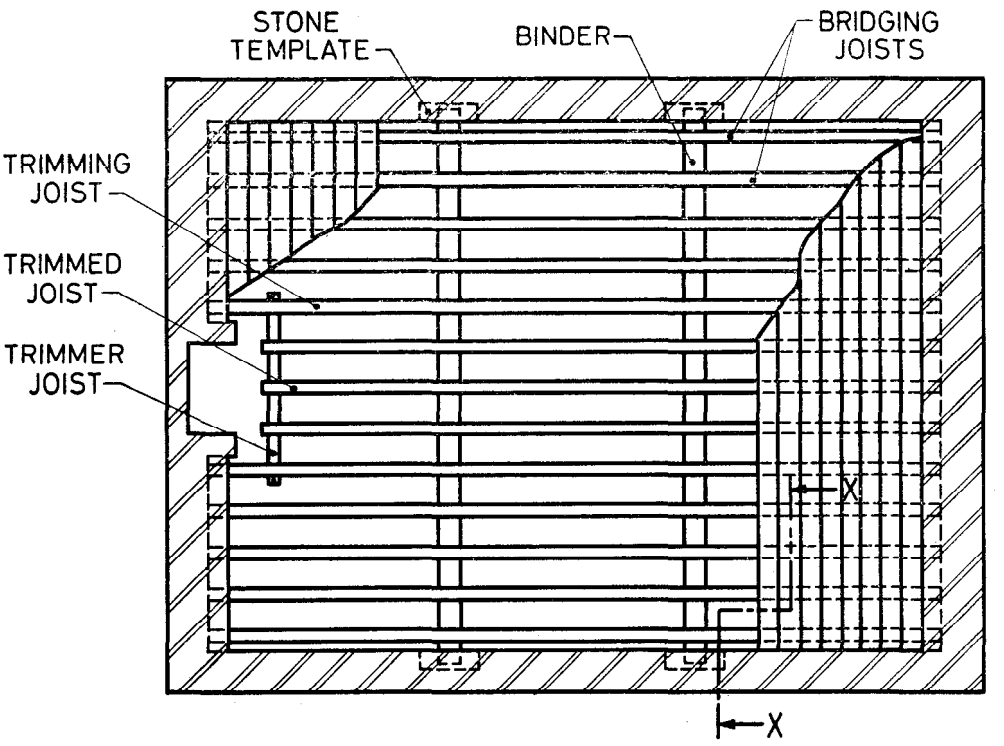
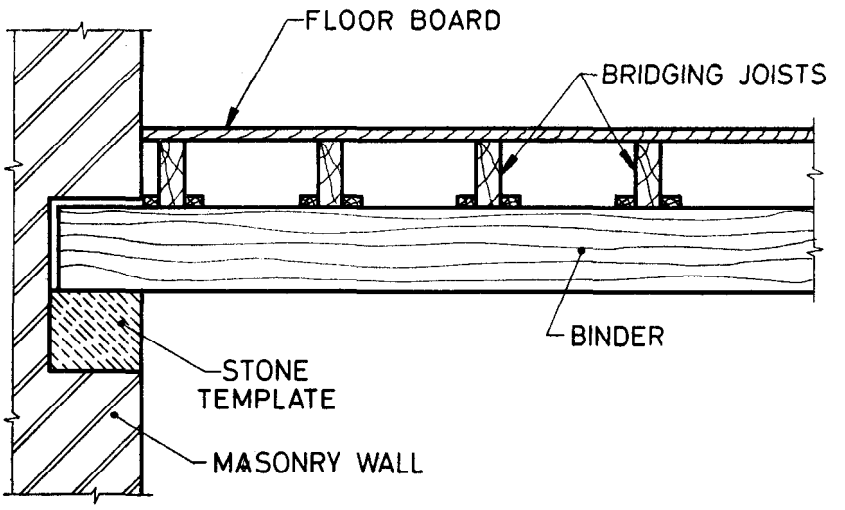


FIG. 6 SINGLE JOISTED UPPER FLOOR





ENLARGED SECTION XX

FIG. 7 DOUBLE JOISTED FLOOR

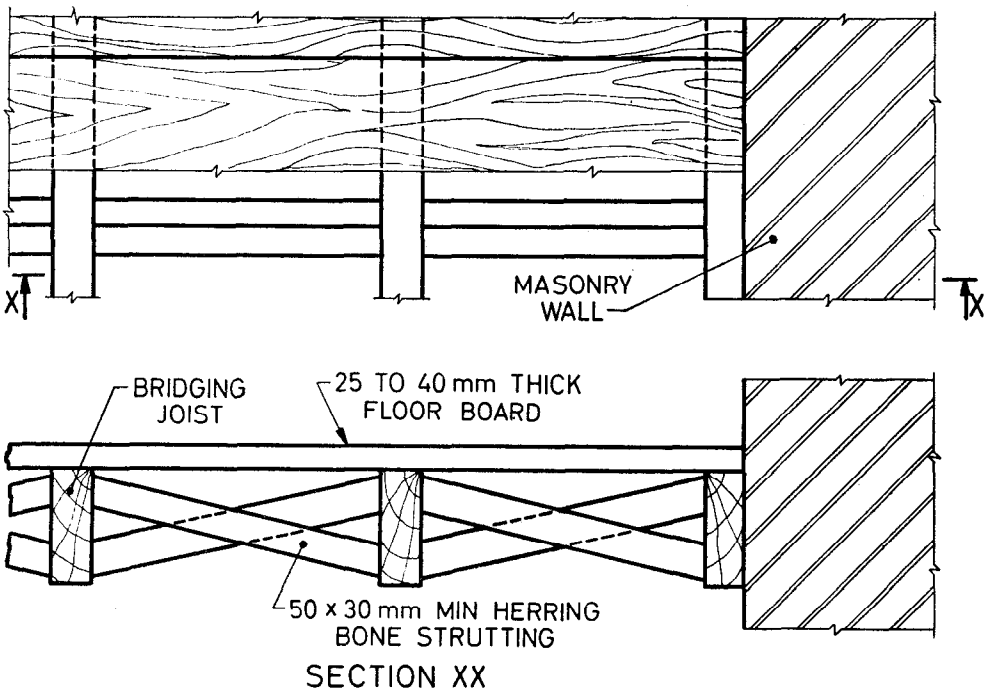


FIG. 8 HERRING BONE TYPE TIMBER STRUTTING

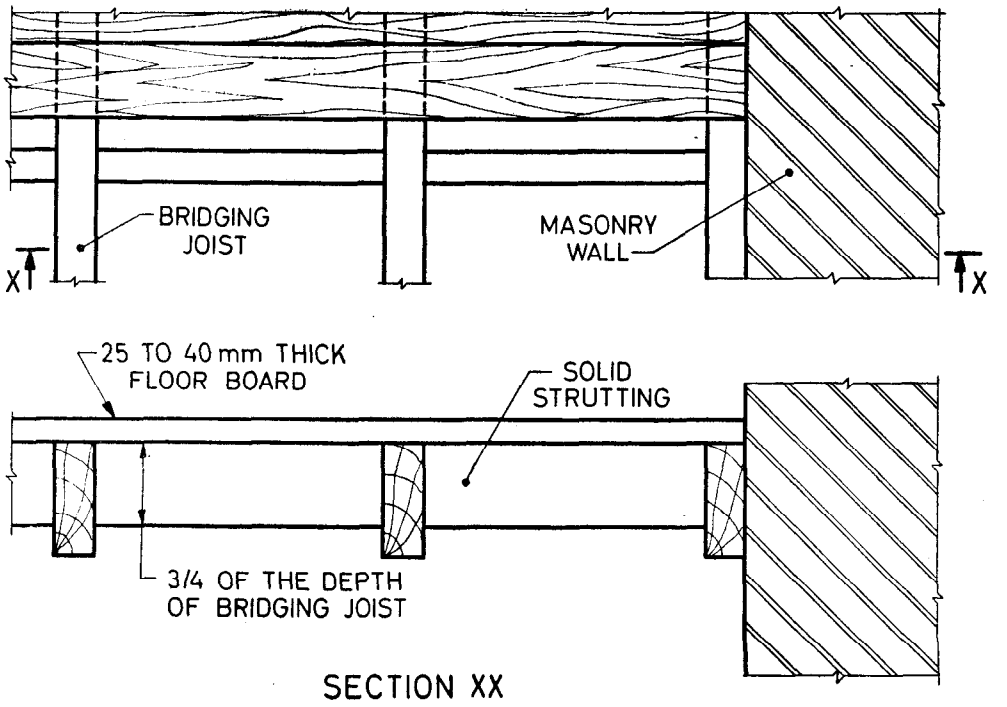


FIG. 9 SOLID TYPE STRUTTING BETWEEN BRIDGING JOISTS

8.2.1 To make a more sound proof rigid type of flooring, the construction procedure is as follows:

a) The bridging joists instead of spanning from wall to wall are supported by larger horizontal members called binders at suitable intervals.

b) Floor boards, as usual, are to be supported by bridging joists.

c) Binders are to be spaced 2 m on centres spanning in the shorter direction of the room preferably not exceeding 5 m. The binders shall not be placed over door or window openings unless well designed lintels or beams are placed there to support the binders with respective loads. The ends of binders if embedded into walls are to be kept on wooden or stone blocks with necessary gaps at top and end to avoid contact with masonry as shown in Fig. 7.

d) Ceilings may be fixed to the bottom of the binders by fixing ceiling joists to binders.

8.3 Triple Joisted/Framed Floors

This type of timber floor is used where the span of binders generally 5 to 10 m and the superimposed load is relatively heavy.

8.3.1 Framed floor (*see* Fig. 10) consists of three sets of joists and the construction procedure is as follows:

a) Bridging joists carrying the floor boards as usual are supported on binders or binding joists which in turn will rest on timber girders.

b) Timber binders or binding joists are connected to girders by tusk and tenon joints. The line of binders in each section (that is, in between the girders) shall be staggered to avoid tenons coming directly opposite to each other and this weakening the girders.

c) Timber girders are to be supported on walls in shorter direction preferably not exceeding 5 m. The ends of girders duly creosoted or tarred are put on stone or concrete templates in the wall.

d) Ceilings can be fixed directly to the binders or by employing ceiling joists.

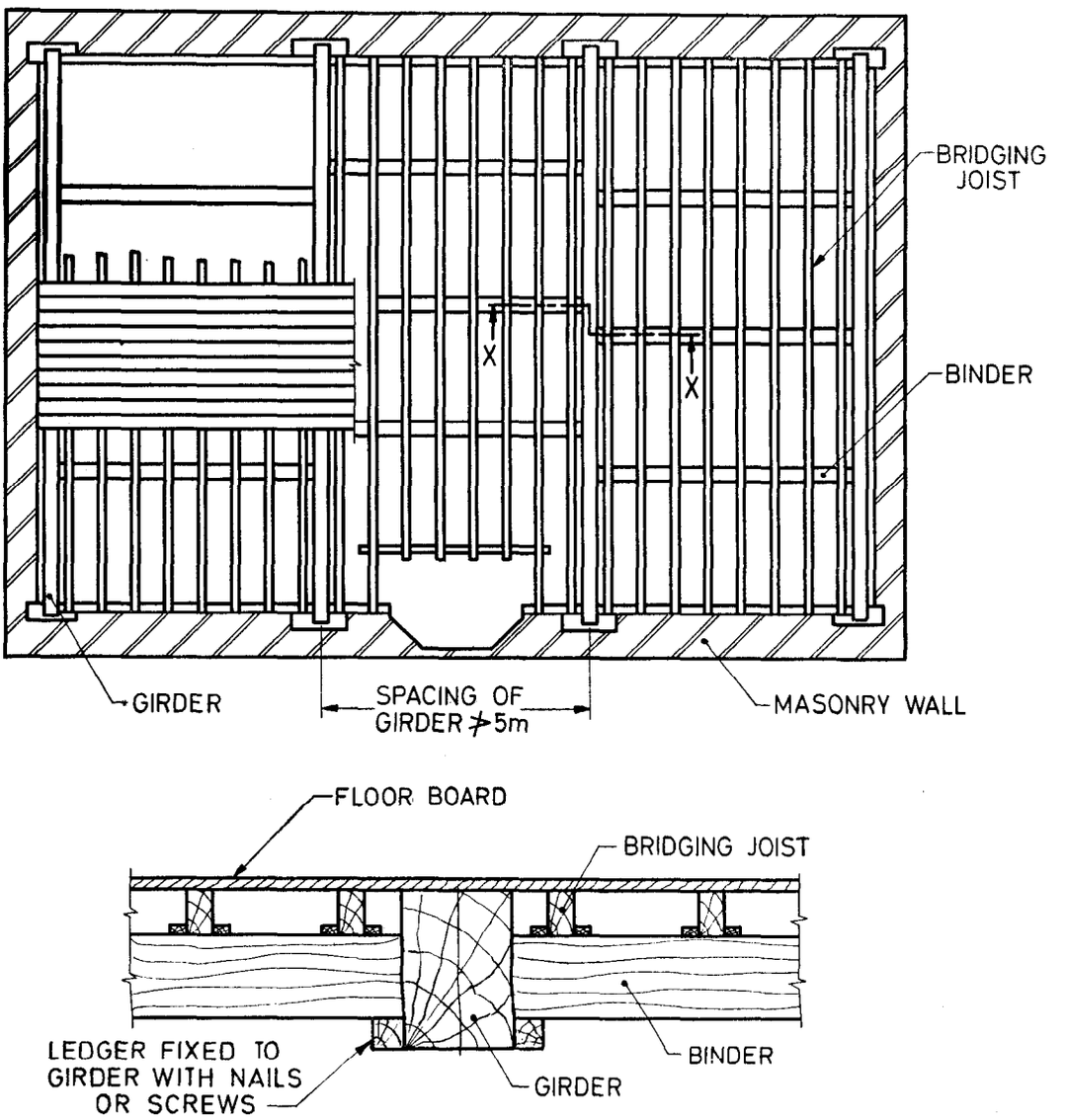


FIG. 10 FRAMED OR TRIPLE JOISTED FLOOR

8.4 Solid Timber Floors

As described earlier, this type of floors are for basement/ground floors. Solid flooring consists of a sub-floor of cement concrete (1 : 3 : 6) and the main floor of timber planks. Floor laying procedure is as follows:

a) Sub-floor of cement concrete about 100 mm in thickness is casted in the usual way.

b) *Wooden Fillets*

When the cement concrete sub-floor is still wet and has not hardened, well treated timber fillets of size 100 mm × 40 mm made from heartwood of hardwood species shall be flushed with the top of the sub-floor. For floors where springing effect is desired, for example, in dance floors, the timber fillets shall be raised by about 8 mm above the level of the sub-floor.

The fillets shall be laid along the short span, spaced 600 mm on centres and shall be embedded minimum up to one-third of the depth of sub-floor as shown in Fig. 11 to protect planks from dampness.

c) *Coating of Bitumen*

One coat of bitumen shall be applied on the exposed top of the sub-floor above which 8 mm gap is provided.

d) *Main Floor*

It shall be of timber planks at least 25 mm in thickness and shall be supported on timber fillets as shown in Fig. 11.

8.5 Purpose-made Floors

8.5.1 These are not generally made solid. Floors are primarily hollow floors with bridging joists, binders, etc. These are named according to the purpose they serve, such as:

a) Skating rink floor,

b) Badminton floor, and

c) Squash floor, etc.

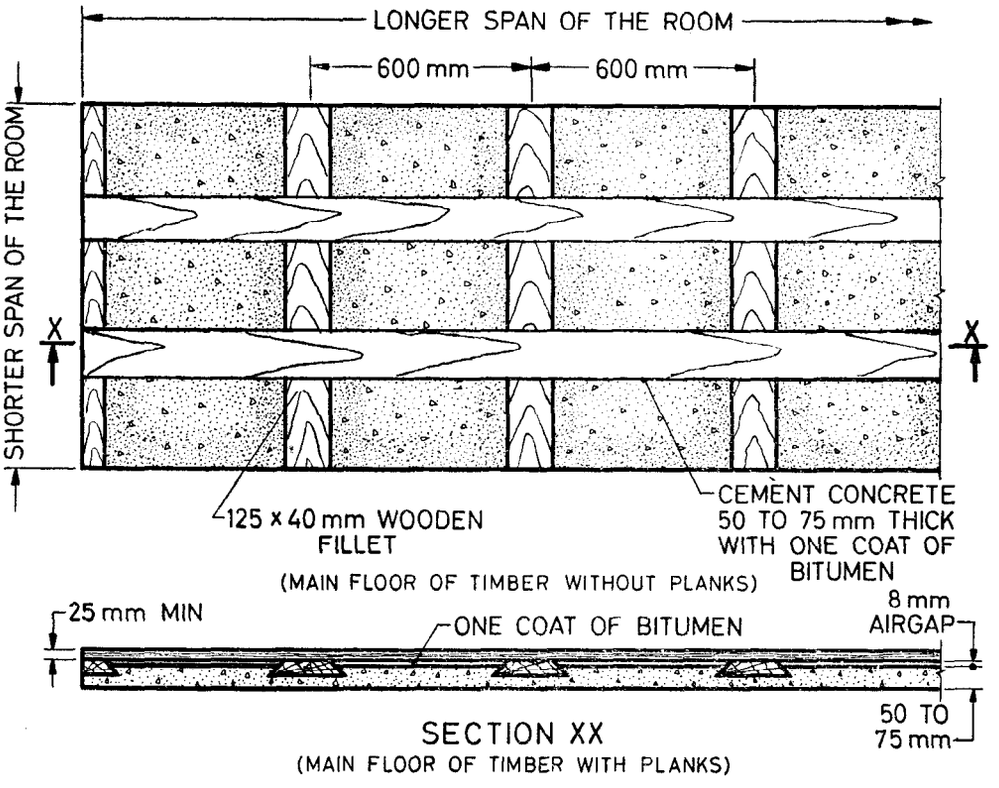


FIG. 11 ROOM SHOWING SUB-FLOOR OF CEMENT CONCRETE AND WOODEN FILLETS

8.5.2 Laying details are:

a) Timber fillets or plugs about 100 mm deep, bolts about 200 mm long and of 12 mm dia shall be embedded at suitable points in the cement concrete floor during its casting.

b) The timber fillets or plugs or bolts shall be at a maximum distance of one m centre to centre along the longer length of the wall of the room.

c) Timber floor joists properly creosoted/tarred are laid over the concrete by fixing them with the fillets/extended mild steel bolts as the case may be (*see* Fig. 12A, 12B and 12C).

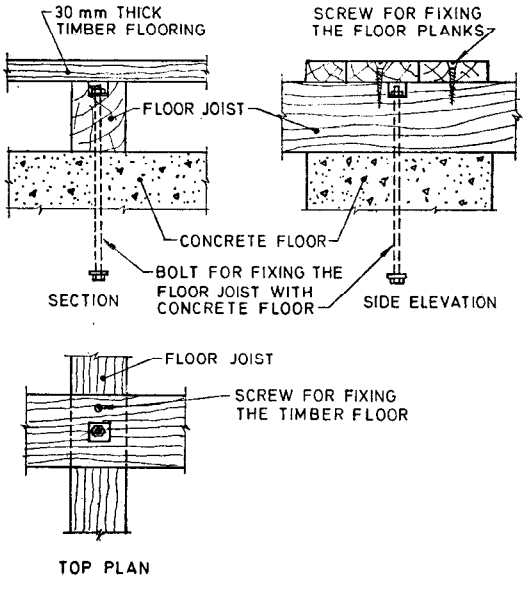


FIG. 12 TYPICAL DETAIL OF FIXING OF FLOOR JOIST AND TIMBER FLOOR

d) An iron screw shall pass through the joists and the wooden fillet. In case of mild steel bolts, they are inserted into the prebores on the joists from bottom. On the top face, a groove 20 mm × 20 mm is cut up to 25 mm deep where the bolt is tightened by nuts and then the groove is covered by small wooden blocks having their grains in similar directions as on the joists.

e) For fixing the floor boards with the joists, timber runners of type shown in Fig. 13B may be inserted into the grooves suitably cut on the vertical side of the joist as shown in Fig. 13A & 13B. These runners are then screwed with the boards from the bottom so that the screws remain invisible from the top of the board. There may be another joint called '*BILLI* joint' which is made by a piece of timber of harder species, one end of which is loosely screwed with the timber board from the bottom and the other end is inserted into the groove cut along the side of the joist as shown in Fig. 13B and 13C. The floor boards can be properly fixed with each other and also with the joists as shown in Fig. 5 and Fig. 12. Jointing of floor boards by fillets, joists by screws, etc, for squash court which are more convenient from the point of construction and maintenance are also shown in the above figures.

9 TIMBER FLOOR BOARDS

9.1 The floor boards, 25 to 30 mm thick, 100 to 150 mm wide and 2 to 3 m long are jointed with each other by widening joints as detailed below and fixed with the joints by nailing/screwing which are kept concealed from the top by putty or small wooden blocks inserted into the groove over and around the nails/screws as stated above.

10 JOINTING DETAILS FOR FLOOR BOARDS

10.1 The following types of widening joints (*see* Fig. 14) listed in the order of their efficiency shall generally be used for the jointing of floor boards:

a) Ploughed and tongued joints;

b) Splayed, rebated, tongued and grooved joints;

c) Rebated, tongued and grooved joints;

d) Tongued and grooved joints;

e) Rebated joints;

f) Rebated and filleted joints;

g) Splayed joints; and

h) Square or butt joints.

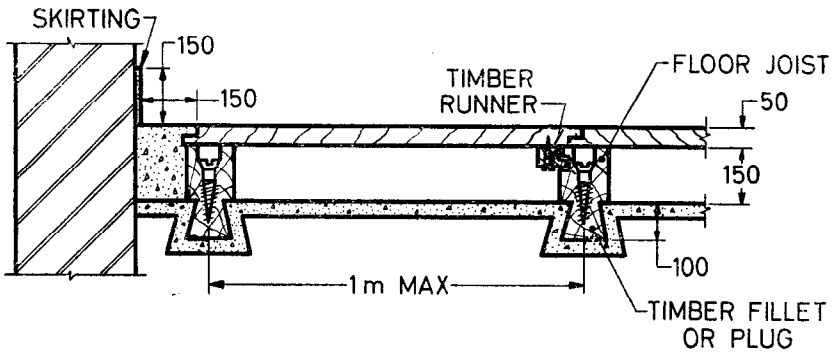
10.2 For all the joints detailed above, the screw shall be driven from the top of the floor boards down to the timber joist below. Generally, these are concealed by putty, etc, and then the floor surface is level finished.

11 FLOOR SEALS

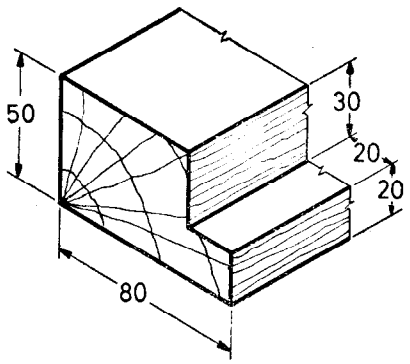
11.1 The pores of timber floor shall be sealed with an efficient type of floor seal. The type of floor seal shall depend upon the purpose of the floor.

11.2 Choice of Floor Seal

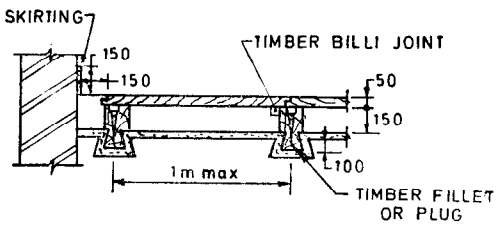
Depending upon the appearance and wearing characteristics needed, a floor seal of traditional oils, paste, wax, button polish, etc, or synthetic resin floor polishes may be used. Where appearance is a special consideration, special type of floor seals which are foreign products and as given in Annex E shall be used.



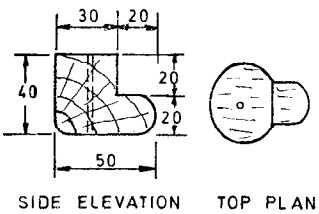
13A Section Through the Floor



13B Enlarged Detail of Timber Runner



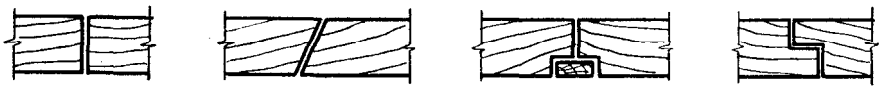
13C Section Through Floor



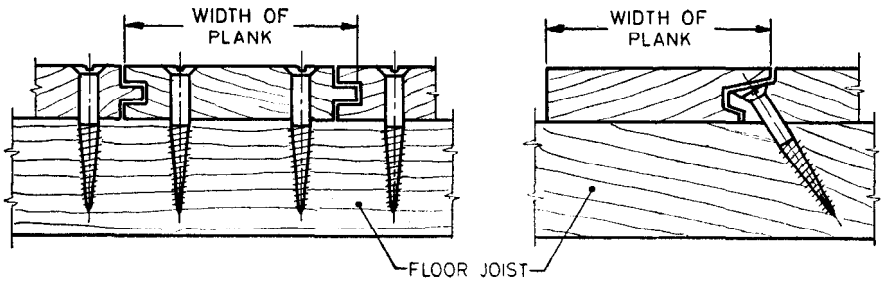
13D Enlarged Detail of Timber Billi Joint

All dimensions in millimetres.

FIG. 13 SPECIAL FLOORS



14A Square or Butt | 14B Splayed | 14C Rebated and Filleted | 14D Rebated



With screw visible | With screw invisible

14E Tongued and Grooved

14F Rebated Tongued and Grooved | 14G Splayed, Rebated, Tongued and Grooved | 14H Ploughed and Tongued

FIG. 14 DIFFERENT TYPES OF JOINTS IN TIMBER FLOORING BOARDS

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
IS 401 : 1982	Code of practice for preservation of timber (*third revision*)	IS 1609 : 1976	Code of practice for laying damp-proof treatment using bitumen felts (*second revision*)
IS 707 : 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)	IS 1905 : 1980	Code of practice for structural saftey of buildings : Masonry wells (*second revision*)
IS 723 : 1972	Specification for steel countersunk head wire nails (*second revision*)	IS 3629 : 1986	Specification for structural timber in building (*first revision*)
IS 833 : 1970	Code of practice for design of structural timber in buildings (*second revision*)	IS 6313 (Part 1) : 1981	Code of practice for anti termite measures in buildings: Part 1 Constructional measures (*first revision*)
IS 1141 : 1973	Code of practice for seasoning of timber (*first revision*)		

ANNEX B

(*Clause* 5.1.1)

SPECIES OF TIMBER, RECOMMENDED FOR TIMBER FLOORS

B-1 SPECIES OF TIMBER

B-1.1 The following species listed according to the percentage of indentation for hardness; taking teak (*tectona grandis*) as 100, may be used for floor boards.

Sl No.	*Trade Name*	*Botanical Name*	*Relative Hardness*
1	Gurjan	*Dipterocarpus indicus* Bedd	135
2	Rohini	*Soymida febrifuga* A Juss	130
3	Padauk	(*Pterocarpus dalbergiolides* Roxb.)	130
4	Satinwood	*Chloroxylon swietenia* DC	130
5	Maniawga	*Carallia brachiatta*	125
6	Axlewood	*Anogeissus latifolia* Wall	120
7	Kalasiris	*Albizia odoratissima* Benth	120
8	Bijasal	*Pterocarpus marsupium* Roxb	100
9	Laurel	*Terminalia tomer tosu* Weghtel Am	100
10	White chuglam	*Terminalia bialata* Steudel	100
11	Teak	*Tectona grandis* Linn.f	100
12	Haldu	*Adina cordifolia* Roxb H.K.F.	100
13	Lendi	*Lagerstroemia parviflora* Roxb	95
14	White cedar	*Dysoxylum malabaricum* Bedd	95
15	Kindal	*Terminalia paniculata* Roth	95
16	Pali	*Palagium ellipticum*	90
17	Kokko	*Albizia lebbeck* Benth	90
18	Rosewood	*Dalbergia latifolia* Roxb	90
19	Kassi	*Bridelia retusa* Spreng	85
20	Sissoo	*Dalbergia sissoo* Roxb	85
21	Piney	*Kingiodendron pinnatum* (syn. Hardwickia Pinnata)	85
22	Silver oak	*Grevillea robusta* A. cunn	85
23	Jarul	*Lagerstroemia speciosa* Pers	80
24	Hollock	*Terminalia myriocarpa* Heurck & Muell. Arg.	75
25	Anjan	*Hardwickia binata* Roxb	70
26	Fir	*Abies pindrow* Royle	65
27	Cypress	*Cupressus torulosa* Don	60
28	Machilus	*Machilus macrantha* Mees	55

B-1.2 For detailing the species of timber of timber suitable for floor boards (listed in order of strength in hardness), other important characteristics, namely, shock resisting ability, strength as a beam and retention of shape have also been taken into account.

ANNEX C

(*Clause* 5.1.1)

SPECIES OF TIMBER RECOMMENDED FOR GIRDERS AND PROJECTING JOISTS

For girders, binders, and bridging joists, the following species may be used:

a) For spans of 12 m and greater, all the species of Group 'Super' specified in IS 3629 : 1986.

b) For spans greater than 6 m but less than 12 m, all the species of Group 'Standard' specified in IS 3629 : 1986, and

c) For spans up to and including 6 m, all the species of Group 'Ordinary' specified in IS 3629 : 1986.

ANNEX D

(*Clause* 5.1.2)

SPECIFICATION OF TIMBER FOR WOODEN FLOOR BOARD

D-1 TIMBER FOR FLOOR BOARD

D-1.1 The appearance of timber shall be a matter for agreement between the purchaser and the vendor.

D-1.2 The abrasion (hardness) resistance shall be sufficient to withstand constant wear and tear.

D-1.3 The species should preferably be of non-refractory nature so that it is easily seasoned in open air and sun with systematic stacking.

D-1.4 Thickness of floor boards should be from 25 to 40 mm.

D-1.5 Depending upon the availability and strength, any of the species given in **B-1** may be used as floor boards.

D-2 TIMBER FOR FLOOR JOISTS, BINDERS AND GIRDERS

D-2.1 The modulus of elasticity E, of the species should not be less than 5 625 N/mm^2.

D-2.2 The extreme fibre stress f_t, of the species should not be less than 8·5 N/mm^2.

D-2.3 The species shall be such as to be rapidly seasoned and free from defects.

NOTE — Depending upon the availability and strength desired, the species for floor joists, binders and girders shall be selected from IS 3629 : 1986 and as specified in Annex C.

ANNEX E

(*Clause* 11.2)

TYPES OF FLOOR SEALS (FOREIGN PRODUCTS)

E-1 FLOOR SEALS

E-1.1 The floor seals given in **E-1.1.1** to **E-1.1.9** may generally be used.

E-1.1.1 *Oleoresinous*

This type shall be made by cooking dry oils (often tung oil) with a resin (often a phenolic resin). This is easily applied, is soft and does not dry very quickly.

This type is of high viscosity as well as of low viscosity.

E-1.1.2 *Epoxy Ester*

This type is harder wearing and more glossy.

E-1.1.3 *Resin Solutions*

This type consists of solutions of resins (for example, nitrocellulose, cresol resin) in volatile solvents. It dries rapidly.

E-1.1.4 *Urea Formaldehyde, Self Cure*

This type has superior transparency and wear properties to oleoresinous seals. It is a better adhesive.

E-1.1.5 *Urea Formaldehyde, Unmodified*

These products have a hard-wearing finish of good appearance. They take long time to harden. These are water-sensitive and thus unsuitable near exterior doors. They have good adhesive properties.

E-1.1.6 *Urea Formaldehyde, Modified, Organic Solvent*

These products are hard-wearing but have some difficulty in refinishing. An acid hardener is mixed with the finish before use and it has a limited pot life.

E-1.1.7 *Epoxy Resin*

The hardener is mixed in before use. Excellent results are obtained but the drying time is rather long.

E-1.1.8 *Polyurethane*

These products have excellent wear and stain resistance with slow drying.

E-1.1.9 *Resin Emulsions*

These products may be used as a regular maintenance treatment to prolong the life of the seal.

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