इंटरनेट मानक

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IS 2202-1 (1999): wooden flush door shutters (solid core type): Part 1 Plywood face panels [CED 11: Doors, Windows and Shutter]

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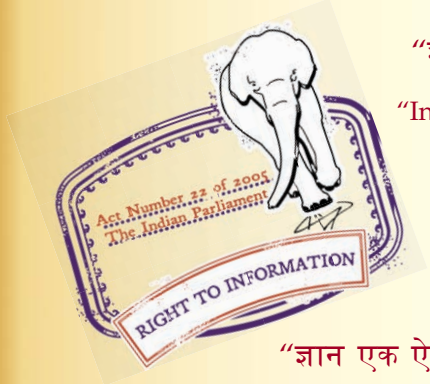

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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भारतीय मानक

लकड़ी के सपाट दरवाजे के शटर (ठोस कोर प्रकार) – विशिष्टि

भाग 1 प्लाईवुड सतहयुक्त पल्ले

(छठा पुनरीक्षण)

Indian Standard

WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE) — SPECIFICATION

PART 1 PLYWOOD FACE PANELS

(Sixth Revision)

Second Reprint MAY 2002

ICS 91.190

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

March 1999

Price Group 7

AMENDMENT NO. 1 JUNE 2003
TO
IS 2202 (PART 1) : 1999 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE) — SPECIFICATION
PART 1 PLYWOOD FACE PANELS

(Sixth Revision)

(*Page* 3, *clause* **6.2.1**) — Substitute the following for the existing:

'**6.2.1** Commercial plywood used in flush door shutters shall conform to IS 710 in respect of adhesive and grading. Species and surface requirements shall conform to Type AB of IS 303.'

(*Page* 3, *clause* **6.3.1**) — Substitute the following for the existing:

'**6.3.1** Cross-band used in flush door shutters shall conform to the requirements laid down in IS 710 for quality requirements and IS 303 for the species of veneers.'

(*Page* 3, *clause* **6.4.1**) — Substitute the following for the existing:

'**6.4.1** Commercial face veneers used in flush door shutters shall conform to the requirements laid down for veneers for marine grade plywood in IS 710 for quality requirements and to the species listed in IS 303 for veneers.'

(*Page* 4, *clause* **7.3**) — Substitute the following for the existing:

'**7.3 Stiles and Rails** — Stiles shall be made with maximum one finger or scarf type joint with the following details:

a) joint shall be located between 300 to 500 mm from the centre line of the door;

b) In case of scarf joint, it shall be diagonally cut at an angle of maximum 30° with the horizontal; and

c) The joints to both the stiles shall be located diagonally opposite to each other.

The rails shall be made without any joint.'

(*Page* 6, *clause* **7.5**, *lines* 2 *and* 3) — Substitute '0.4 to 1.5 mm' *for* '0.5 mm and 1.5 mm' and '0.35 to 1.0 mm' *for* '0.4 mm and 1.0 mm'.

(CED 1 1)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 NOVEMBER 2009
TO
IS 2202 (PART 1) : 1999 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE) — SPECIFICATION

(Sixth Revision)

(*Page* 1, *clause* **5.1**, *second sentence*) — Substitute the following for the existing:

'Sizes other than modular sizes, as agreed to between the manufacturer and the purchaser, may also be permitted; provided that the thickness of shutters in such cases shall be any of those specified in **5.2** but not less than that specified against the nearest higher modular size given in **5.2**.'

(*Page* 11, *clause* **13**) — Insert '**ADDITIONAL**' before the existing title.

(CED 11)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 3 MARCH 2012
TO
IS 2202 (PART 1) : 1999 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE) — SPECIFICATION

PART 1 PLYWOOD FACE PANELS

(Sixth Revision)

(*Page* 3, *clause* 6.7.1) — Substitute the following for the existing:

'Particle board used for the core of the flush door shutters shall conform to either FPT-1 or XPS Designation of IS 3087.'

(CED 11)

Reprography Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Doors, Windows and Shutters Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 1962 and subsequently revised in 1966, 1973, 1980, 1983 and 1991. During this period, the standard has undergone modification relating to grade of doors, spices of timbers and inclusion of slamming test. In April 1995 Amendment No. 3 was issued, making obligatory that door shutters shall be subjected to all tests covered in IS 4020 (Parts 1 to 17) : 1994. All tests specified in IS 4020 (Parts 1 to 17) : 1994 have been included and their respective requirements have been detailed therein.

In this revision, the standard is modified in lieu of modifications suggested in IS 4020 (Parts 1 to 16) : 1998.

The salient features in this revision are:

a) Requirements that are to be met with door shutters are given against the respective tests in IS 4020 (Parts 1 to 16) : 1998;
b) Requirement for differential humidity test has been deleted;
c) Important modification has been made in the requirement of stiles and rails;
d) Type tests and acceptance tests are defined;
e) Classification of tests, that is, acceptance tests and type test have been listed;
f) Number of shutters to be tested for different tests are spelt out; and
g) List of species of timber being imported is included. Due to restrictions on felling from forests in the country, a number of timber species have been imported for various timber products. Group 2B of Annex B gives a list of such species which have reportedly been used for the manufacture of doors and windows.

As per the Gazette Notification No. GSR 216(E) dated 17 05 96, published in the Gazette of India, Extra-ordinary Part II - Section 3 - Sub-Section (i), No. 170, dated 18 May 1996, the requirements of ECO Mark have been included in this revision as follows:

"A scheme of labelling environment friendly products to be known as ECO Mark is being introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 21 February 1991 published in the Gazette of India. For a product to be eligible for ECO Mark , it shall also carry the Standard Mark of the BIS besides meeting additional optional environment friendly requirements."

Technical Committee responsible for the formulation of this standard is given in Annex C.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE) — SPECIFICATION

PART 1 PLYWOOD FACE PANELS

(Sixth Revision)

1 SCOPE

This standard (Part 1) lays down requirements regarding types, sizes, material, construction, workmanship and finish, and tests of solid core wooden flush door shutters with face panels of plywood or cross-band and face veneers.

2 REFERENCES

2.1 The Indian Standards given in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 10428, IS 707 and the following shall apply.

3.1 Type Tests

Tests carried out to prove conformity with the specification. These are intended for product/type approval of a given construction or a prototype of door shutters.

3.2 Acceptance Tests

Tests carried out on sample taken from a lot passing type tests for the purpose of acceptance of the lot on a batch to batch basis.

4 TYPE AND CONSTRUCTION

Solid core flush door shutter may be of the decorative type or non-decorative (paintable) type. The nature of construction of these shutters shall, therefore, be specified based both on the type and different constructions of the core as given in Table 1.

5 SIZES

5.1 Sizes of the door shutters shall generally conform to the Modular sizes specified in Table 2 (*see* Fig. 1). Sizes other than modular sizes, as agreed to between the manufacturer and the purchaser, may also be permitted; provided, the thickness of shutters in such cases shall be equal to that specified against the nearest higher modular size given in **5.2**.

Table 1 Nature of Construction of Wooden Flush Door Shutters (Solid Core Type)

(*Clause* 4)

Sl No.	Core	Type	Abbreviation
(1)	(2)	(3)	(4)
i)	Blockboard	Decorative	BD
		Non-decorative	BN
ii)	Particle board with or without blockboard	Decorative	PD
		Non-decorative	PN
iii)	Medium density fibreboard with or without blockboard	Decorative	MD
		Non-decorative	MN

Table 2 Dimensions of Flush Door Shutters

(*Clause* 5.1)

Sl No.	Designation of Doors	Width (mm)	Height (mm)	
i)	8 DS 20	700	1 905	(1 945)
ii)	8 DS 21	700	2 005	(2 045)
iii)	9 DS 20	800	1 905	(1 945)
iv)	9 DS 21	800	2 005	(2 045)
v)	10 DS 20	900	1 905	(1 945)
vi)	10 DS 21	900	2 005	(2 045)
vii)	12 DT 20	1 100[1)]	1 905	(1 945)
viii)	12 DT 21	1 100[1)]	2 005	(2 045)

NOTES

1 D – Door, S = Single shutter, and T = Double leaf shutter.

2 The designation indicates the size of door opening, the first number referring to width in modules of 100 mm and the last number the height in modules of 100 mm.

3 Standard sizes of door frames are covered in IS 4021.

4 In arriving at the standard widths and heights for flush door shutters an allowance of 60 mm has been made for door frames, 40 mm for floor finish and 5 mm for clearance all round (*see also* Fig. 1) between the door opening and door frame and 15 mm for rebate all round for the shutter into the frame. Further, a gap of 5 mm has been provided between the bottom of the shutter and the finished floor level. In case, the modular height of door opening is taken from the finished floor level, the height of the flush door shall be the one given in the bracket. In the case of double shutters, the rebate shall be as given in 7.7.

[1)] Combined width of two shutters in closed position.

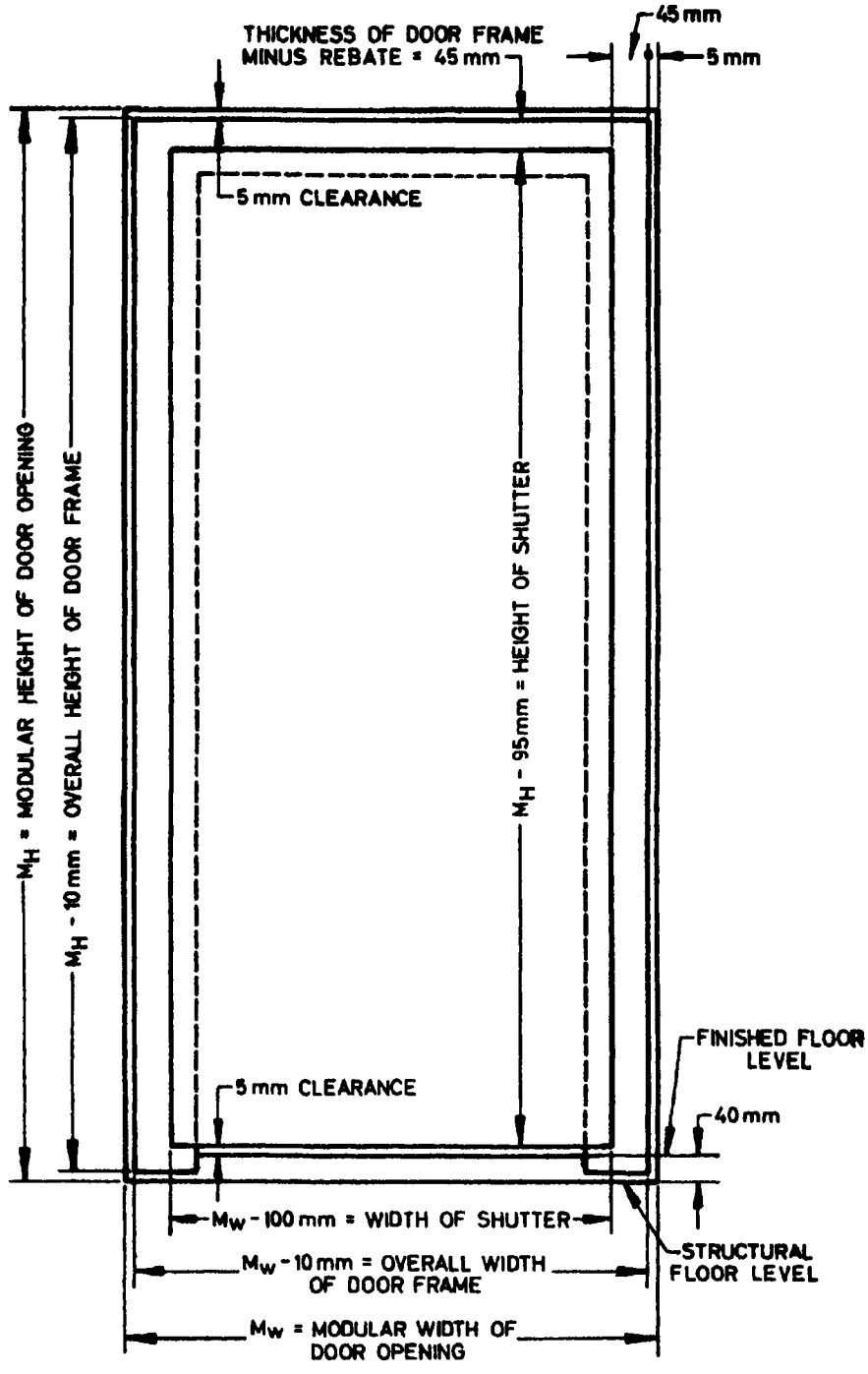


FIG. 1 SKETCH ILLUSTRATING DIMENSIONS OF SHUTTER

5.2 The nominal thickness of the shutters shall be 25 mm, 30 mm and 35 mm corresponding to each of the sizes as indicated in Table 3.

However for sizes greater than 12 DT 21, the thickness of such shutters shall be greater than 35 mm and shall be as agreed to between the manufacturer and the purchaser.

Table 3 Thickness of Door Shutters

(*Clause* 5.2)

Sl No.	Flush Door Designation	Thickness of Shutter (mm)
(1)	(2)	(3)
i)	8 DS 20 and 8 DS 21	25
ii)	9 DS 20 and 9 DS 21	30
iii)	10 DS 20 and 10 DS 21	35
iv)	12 DT 20 and 12 DT 21	35

6 MATERIAL

6.1 Timber

6.1.1 Any species of timber may be used for the core of flush door shutters. However, a list of species is given in Group 1 of Annex B for guidance.

6.1.2 For stiles, rails and lipping, only non-coniferous timber (hard-wood), given in Group 2A and Group 2B of Annex B shall be used.

NOTE -- The suitability of timber for stiles, rails and lippings is normally based on the screw holding properties of timber However, in the absence of detailed data relating to screw holding properties of all the species, the classification as given in Group 2 is based on both the density of the species and the data relating to the screw holding properties as available for some of the species.

6.1.3 The moisture content in timbers used in manufacture of flush door shutters shall be not more than 12 percent when tested according to IS 1708 (Part 1).

6.1.4 Timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members where they shall be cut out and filled in with carefully fitted glued pieces of wood of similar species and character with their grain running in the same direction.

6.1.5 Species of timber marked with an asterisk in Annex B and sapwood of all other timbers shall be preservative treated before assembly as specified in **6.1.5.1**.

6.1.5.1 For preservative treatment, the timber shall be soaked in a 1.25 percent solution of boric acid or 1.9 percent solution of borax at a temperature of 85 to 90°C for a period of 10 to 40 minutes depending upon the species and thickness, or the timber may be dipped in a 2 to 3 percent solution of boric acid or 3 percent solution of borax for 2 minutes and then block stacked for at least two hours. Alternatively, it may be soaked at ambient temperature in a 2 percent solution of sodium pentachlorophenate in water for a period of 2 minutes and then stacked for at least half an hour before drying. The timber should be dried to a suitable moisture content before bonding. Qualitative test shall be conducted according to IS 401 for determining the presence of preservative used.

6.2 Plywood

6.2.1 Commercial plywood used in flush door shutters shall conform to IS 710 with surface requirements conforming to Type AB of IS 303.

6.2.2 Decorative plywood used in flush door shutters shall conform to Type 1 of IS 1328.

6.3 Cross-Bands

6.3.1 Cross-band used in flush door shutters shall conform to the requirements laid down in IS 710.

6.4 Face Veneers

6.4.1 Commercial face veneers used in flush door shutters shall conform to the requirements laid down for veneers for marine grade plywood in IS 710.

6.4.2 Decorative face veneers used in flush door shutters shall conform to the requirement of decorative veneers specified for Type 1 decorative plywood in IS 1328.

6.5 Plywood, cross-band and face veneers made from species of timber marked with an asterisk in Annex B and sapwood of all other timbers used shall be preservative treated before assembly as specified in **6.1.5.1**.

6.6 Adhesives

6.6.1 Adhesive used for bonding plywood or cross-band and face veneers to core shall be phenol formaldehyde synthetic resin adhesive conforming to BWP grade specified in IS 848.

6.6.2 Only synthetic resin adhesive shall be used for bonding core members to one another, including, core-frame, and for lipping, glazing frame, venetian frame and other exposed parts where such bonding is done.

6.7 Particle Board

6.7.1 Particle board used for the core of the flush doors shall be of either FPT-1 or XPS designation of IS 3087. The swelling of the particle board in thickness and length, when tested in accordance with IS 2380 (Part 17) shall not exceed 5 percent.

6.8 Medium Density Fibre (MDF) Board

Medium density fibre board used for the core of flush doors shall be EGSB conforming to IS 12406.

7 CONSTRUCTION

7.1 Blockboard Core (*see* Fig. 2)

The blockboard core shall conform to the requirements specified in **7.1.1**. A frame constructed of stiles and rails shall be provided for holding the core. The width of the frame including lipping, where provided, shall not be less than 45 mm and not more than 75 mm.

7.1.1 The wooden strips for core shall be cut out from the timbers and seasoned to a moisture content not exceeding 12 percent. The width of each strip of wood shall not exceed 30 mm. These strips may consist of pieces of small lengths placed end to end with the end

joints staggered. In any one blockboard, the core strips shall be of one species of timber only. The strips of wood may be laid separately or spot glued or otherwise jointed to form a core which is glued between two or more outer veneers with the direction of the grain of core blocks running at right angles to that of the adjacent veneer.

7.2 Particle Board or Medium Density Fibre (MDF) Board Core with or without Blockboard (*see* Fig. 3 and Fig. 4)

The core shall be either particle board or MDF board or a combination of blockboard and particle board or blockboard and MDF board. In a combined construction, the width of blockboard construction shall extend at least 150 mm from inner edge of the stile, on either side, and the rest shall be particle board or MDF board. Blockboard shall conform to the requirements specified in 7.1.1 and the particle board and MDF board shall be as specified in 6.7 and 6.8 respectively. The frame for holding the core, including lipping where it occurs, shall be not less than 45 mm and not more than 100 mm in width.

7.3 Stiles and Rails

Stiles and rails shall be made of one piece, without any joint.

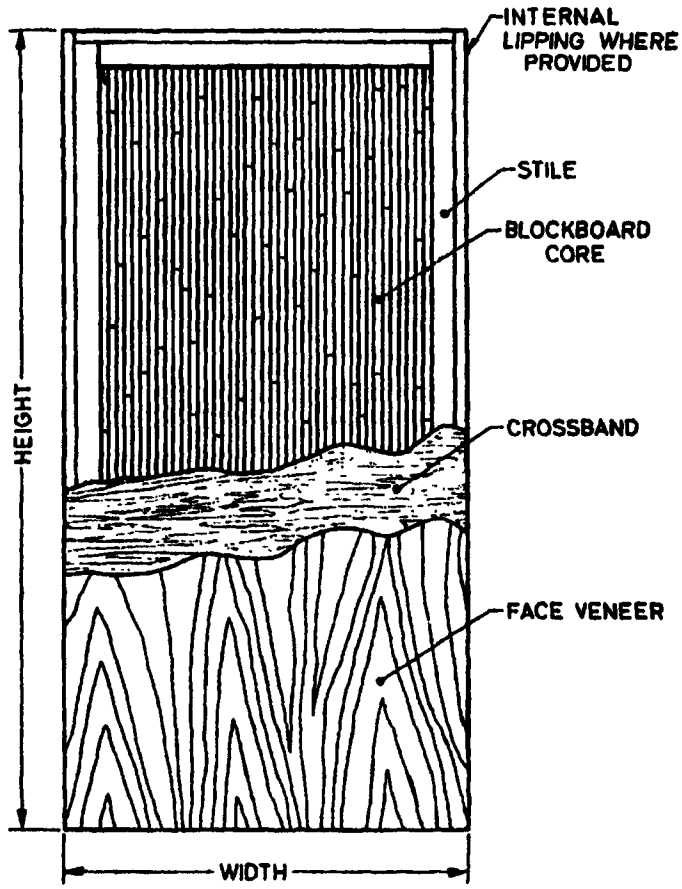
7.4 Levelling

Levelling, not necessarily by planing of surfaces, shall be carried out during each stage of construction, that is, fabrication of core and bonding of cross-bands and face veneers. The thickness of core shall be checked for uniformity before bonding the plywood or crossbands and face veneers as the case may be.

NOTE – In a blockboard construction the impressions of the core strips on the outside face may be minimized to a large extent by following the provisions of 7.4 but cannot be eliminated altogether because of the nature of construction.

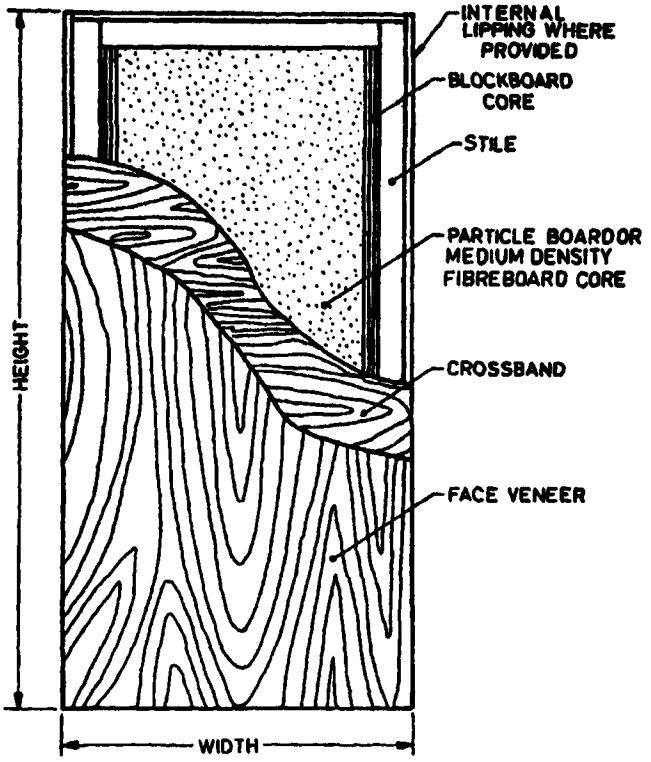
7.5 Face Panel

The face panel shall be formed by gluing (*see* 6.6) on both faces of the core either plywood or crossbands and face veneers by the hot press process. The thickness of the crossbands as such or in the plywood shall be between 1 mm and 3 mm. The thickness of



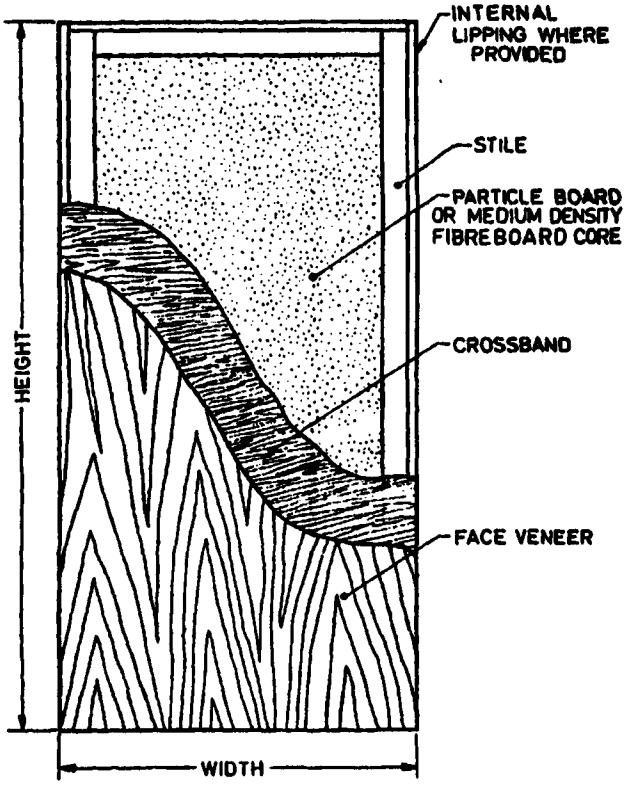
(Width and Height in accordance with Table 2)

FIG. 2 TYPICAL BLOCKBOARD CORE FLUSH DOOR SHUTTER



(Width and Height in accordance with Table 2)

FIG. 3 TYPICAL PARTICLE BOARD MEDIUM DENSITY FIBREBOARD AND BLOCKBOARD CORE FLUSH DOOR SHUTTER



(Width and Height in accordance with Table 2)

FIG. 4 TYPICAL PARTICLE BOARD MEDIUM DENSITY FIBREBOARD CORE FLUSH DOOR SHUTTER

the face veneer as such or in the plywood shall be between 0.5 mm and 1.5 mm for commercial veneers and between 0.4 mm and 1.0 mm for decorative veneers, provided that the combined thickness of both is not less than 2.2 mm. The plywood conforming to these requirements shall be glued under pressure on both faces of the core. When the panel consists of cross-bands and faceveneers glued separately, the cross bands shall be laid with their grains at right angles to those of the core and glued to its both faces. Face veneer shall then be laid with their grains at right angles to those of the crossbands. Where it is desired to have wooden strips in the blockboard core horizontal rather than vertical, this shall be permitted only if 3-ply panel is pressed on both sides of the core and the total is a 7-ply construction. Application of a decorative face veneer on a finished face panel having veneer in the same direction as the facing veneer shall be avoided. Where, however, this unavoidable due to special circumstances the already existing veneer, whether commercial or decorative, shall be so sanded that the total thickness of both the existing and the approved face veneers together shall not exceed the maximum thickness specified; the thickness of decorative veneer after finishing is, in no case, less than 0.4 mm.

7.6 Lipping

7.6.1 Lipping shall be provided, if so desired by the purchaser. Lipping, where provided, may be internal or external as specified by the purchaser. Joints shall not be permitted in the lipping. Some typical ways of lipping are shown in Fig. 5 for guidance.

7.6.2 Internal lipping shall have a total depth of not less than 25 mm (*see also* 7.7). It may be provided separately, when it is of a species different from that of backing or as one piece with the stile, designated as frame-cum-lipping, when internal lipping and backing are of the same species. The overall width shall be as given in 7.1 unless specifically asked for by the purchaser.

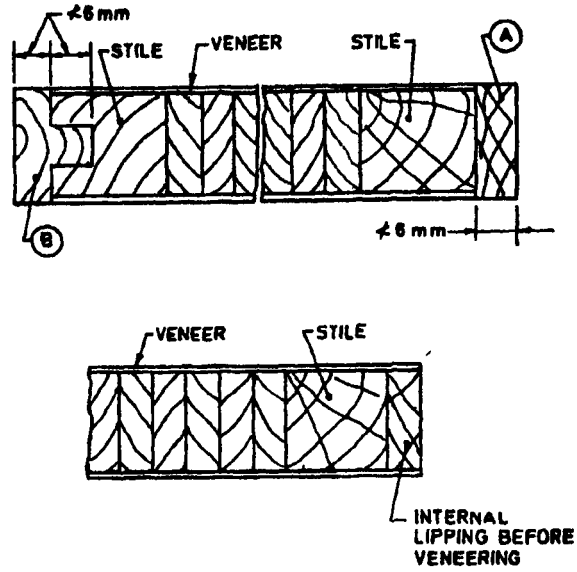
7.6.3 External lipping, where provided, shall be solid and shall measure at least 6 mm on the face of the door.

7.7 Rebating

In the case of double-leaved shutters, the meeting of the stiles shall be rebated by 8 mm to 10 mm. The rebating shall be either splayed or square type as shown in Fig. 6. Where lipping is provided, the depth of lipping at the meeting of stiles shall not be less than 30 mm.

7.8 Opening for Glazing

When required by the purchaser, opening for glazing shall be provided and, unless otherwise specified, the opening provided shall be 250 mm in height and 150 mm or 200 mm in width. Unless otherwise specified by the purchaser, the bottom of the opening shall be at a height of 1.4 m from that of the bottom edge of the shutter (*see* Fig. 7). The opening for glazing shall be lipped internally with solid timber.



A — External lipping after veneering

B — External lipping with tongue and grove for single or double leaf shutters

FIG. 5 TYPICAL FIGURES SHOWING DIFFERENT WAYS OF LIPPING

7.9 Venetian

When required by the purchaser, a venetian opening shall be provided and, unless otherwise specified, the height of the opening shall be 350 mm from the bottom of the shutter. The width of the opening shall be as specified by the purchaser but shall provide for a clear space of at least 75 mm between the edge of the door and the venetain opening.

8 FITTINGS

8.1 Locks

Shutters shall be shop-prepared for taking mortice locks or latches as may be agreed to. Shop-preparing the door with mortised holes for lock fixing shall be done only when desired, suitable blocks of wood may be provided for fixing the hardware; in the absence of specific requirements, the sizes of blocks shall preferably correspond to the maximum size of lock covered in IS 2209.

9 WORKMANSHIP AND FINISH

9.1 All the four edges of the door shutter shall be square.

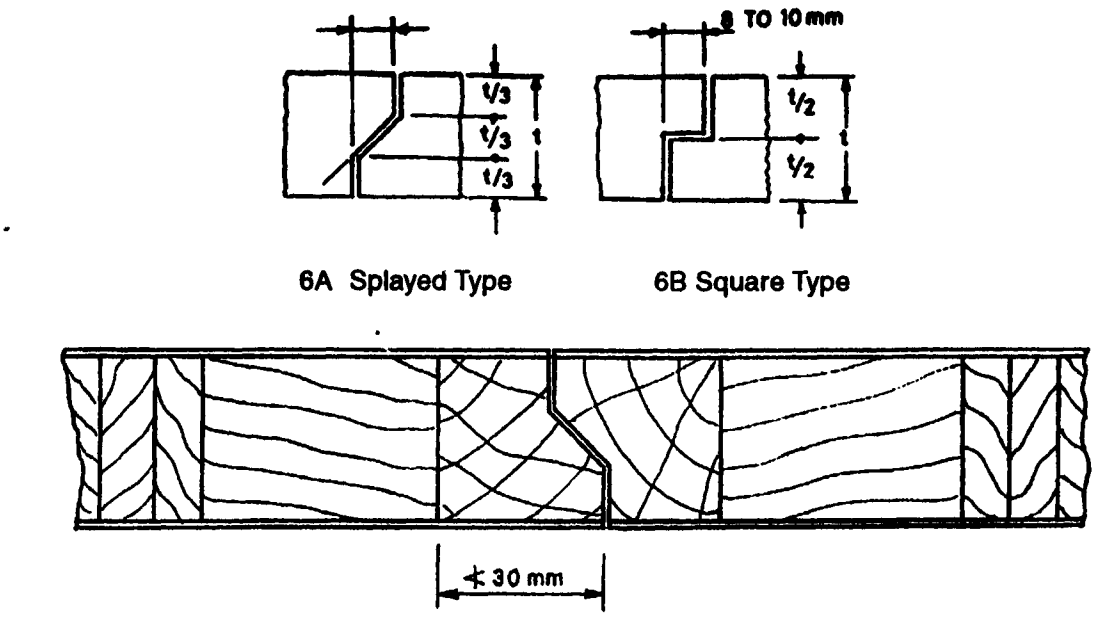


FIG. 6 MEETING OF STILES FOR DOUBLE-LEAVED DOOR SHUTTER

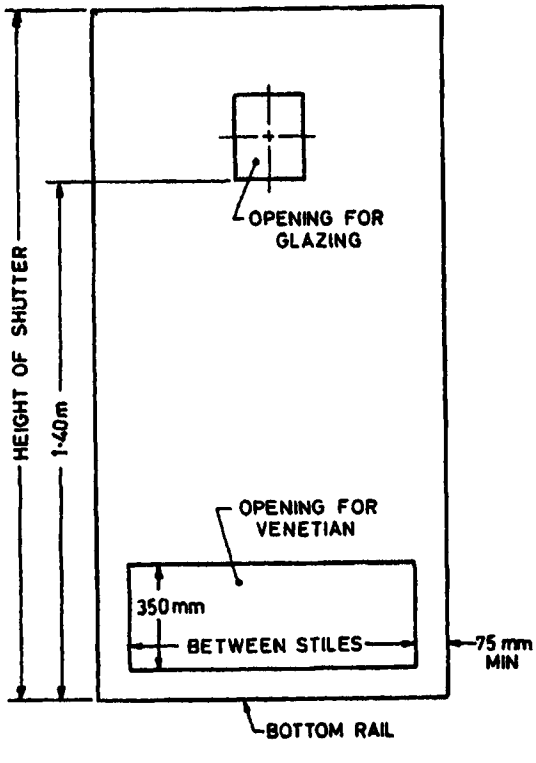


FIG. 7 TYPICAL LOCATION OF OPENINGS FOR GLAZING AND VENETIAN

9.2 Both faces of the door shutter shall be sanded to a smooth even texture. If required by the purchaser, all the surfaces of shutters which are required to be painted ultimately shall be covered evenly by brush painting with suitable priming coat as may be ordered by the purchser [*see also* IS 2338 (Part 1)]. However, only unpainted doors shall be subjected to the tests mentioned under 10.

9.3 Workmanship and the finish of the face panels shall be in conformity with those specified in IS 303 for non-decorative type and IS 1328 for decorative type.

10 TESTS

10.1 Classification of Tests

10.1.1 *Acceptance Tests*

The following shall constitute the acceptance (product identification) tests:

i) Dimensions and squareness test,
ii) General flatness test,
iii) Local planeness test,
iv) Slamming test,
v) End immersion test,
vi) Knife test, and
vii) Glue adhesion test.

10.1.2 *Type Tests*

The following shall constitute type (product approval) tests:

i) Dimensions and squareness test,
ii) General flatness test,
iii) Local planeness test,
iv) Impact indentation test,
v) Flexure test,
vi) Edge loading test,
vii) Shock resistance test,
viii) Buckling test,
ix) Slamming test,
x) Misuse test,
xi) Varying humidity test,
xii) End immersion test,
xiii) Knife test,
xiv) Glue adhesion test, and
xv) Screw withdrawal test.

11 REQUIREMENTS

11.1 Dimensions and Squareness Test

Door shutters, when tested in accordance with IS 4020 (Part 2), the dimensions of nominal width and height shall be within a limit of ± 5 mm. The door shutter shall not deviate by more than 1 mm on a length of 500 mm. The thickness of the door shutter shall be uniform throughout with the permissible variation of not more than 0.8 mm between any two points. The nominal thickness of the shutter shall be within a limit of ± 1 mm.

11.2 General Flatness Test

Door shutters, when tested in accordance with IS 4020 (Part 3), the twist, cupping and warping shall not exceed 6 mm.

11.3 Local Planeness Test

Door shutters, when tested in accordance with IS 4020 (Part 4), the depth of deviation measured at any point shall not be more than 0.5 mm.

11.4 Impact Indentation Test

Door shutters, when tested in accordance with IS 4020 (Part 5), shall have no defects such as cracking, tearing or delamination and the depth of indentation shall not be more than 0.2 mm.

11.5 Flexure Test

Door shutters, when tested in accordance with IS 4020 (Part 6), there shall not be any residual deflection of more than one tenth of the maximum deflection. The residual deflection shall not be more than one tenth of the maximum deflection. The deflection at the maximum load shall not be more than one thirtieth of the length and one fifteenth of the width, whichever is less.

11.6 Edge Loading Test

Door shutters, when tested in accordance with IS 4020 (Part 7), the deflection of the edge at the maximum load shall not be more than 5 mm. On removal of the loads, the residual deflection shall not be more than 0.5 mm, failing which the test may be repeated on the other edge in the reverse direction. Also there shall be no lateral buckling by more than 2 mm during loaded condition and no residual lateral buckling after removal of the load.

11.7 Shock Resistance Test

11.7.1 Door shutters, when tested in accordance with 2.1 of IS 4020 (Part 8), there shall be no visible damage in any part of the door after twentyfive blows on each end.

11.7.2 Door shutters, when tested in accordance with 3.1 of IS 4020 (Part 8), the normally hung shutter, with hangings, fixings and fastenings should with stand without any significant permanent deformation and without deterioration the five impacts on both sides of the shutter.

11.8 Buckling Test

Door shutters, when tested in accordance with IS 4020 (Part 9), shall not show any detoriation and any residual deformation more than 5 mm after 15 minutes of unloading and the initial deflection also shall not be more than 50 mm.

11.9 Slamming Test

11.9.1 Anyone of the following tests given in 11.9.2 and 11.9.3 shall be used.

11.9.2 Door shutters, when tested in accordance with 2.1 of IS 4020 (Part 10), shall not have any visible damage in any part of the door at the end of 50 successive impacts.

11.9.3 Door shutters, when tested in accordance with 3.1 of IS 4020 (Part 10), shall not have any visible damage in any part of the door at the end of 100 successive impacts.

11.10 Misuse Test

Door shutters, when tested in accordance with IS 4020 (Part 11), there shall not be any permanent deformation of the fixing or any other part of the doorset in hindering its normal working after the test.

11.11 Varying Humidity Test

Door shutters, when tested in accordance with IS 4020 (Part 12), there shall not be any visible warping, twisting or delamination and where precision is required the maximum departure from the general planeness shall not be more than 1.0 mm. The recovery of the original size after subjecting the door to high and low humidity shall be at least 90 percent of the change in dimensions.

11.12 End Immersion Test

Door shutters, when tested in accordance with IS 4020 (Part 13), shall have no delamination at the end of the test. This test shall be carried out on door shutters only after they pass in glue adhesion test.

11.13 Knife Test

11.13.1 Door shutters, when tested in accordance with IS 4020 (Part 14), the results of adhesion shall be reported as follows.

11.13.2 The adhesion is excellent when it is difficult to find the glue line and impossible to keep the tool within it for more than 6 mm without cutting into adjuncent wood. On prising upwards, the veneer/ facing sheet usually breaks off over a width only slightly greater than that of the tool. Example of 'excellent bond' is illustrated in Fig. 8.

11.13.3 Example of minimum pass standard bond is illustrated in Fig. 9.

11.13.4 The adhesion is poor when the knife meets little opposition into the glue line and the prise results in the easy removal of almost all the veneers/facings sheets from one side of the tests specimen. The separated veneers/facing sheets are usually almost free from adjacent fibre. Example of "Poor bond" is illustrated in Fig. 10. Door shutter designated as poor shall be declared as unsatisfactory.

11.14 Glue Adhesion Test

Door shutters, when tested in accordance with IS 4020 (Part 15), shall be considered to have passed the test if no delamination has occurred in the glue lines in the plywood or if no single delamination of more than 50 mm in length and more then 3 mm in depth has occurred in the assembly glue lines between the plywood faces and stile and rail. Delamination at a knot, knot hole, a pitch pocket and worm hole or other permissible wood defects shall not be considered in assessing the sample. A door shutter shall be deemed to have passed the test if both the specimen tested passed the test.

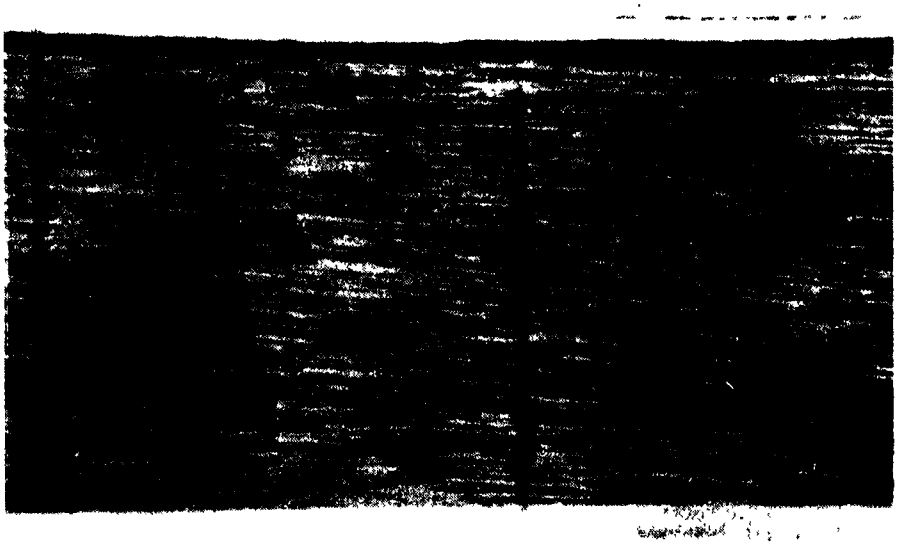


FIG. 8 EXAMPLE OF 'EXCELLENT' ADHESION

FIG 9 EXAMPLE OF 'MINIMUM PASS STANDARD' ADHESION

FIG 10 EXAMPLE OF 'POOR' ADHESION

11.15 Screw Withdrawal Resistance Test

Door shutters, when tested in accordance with IS 4020 (Part 16), the required load to withdraw the screw completely shall not be less than 1 000 N. On withdrawal, there shall be no visible damage to the surface either by delamination or extra chipping off at the points of withdrawal.

12 SAMPLING AND CRITERIA FOR CONFORMITY

12.1 Lot

In any consignment, all the shutters of the same type and manufactured under similar conditions of production shall be grouped together to constitute a lot.

12.2 Sample Size

12.2.1 The number of specimens to be taken for testing of shutters for dimensions and squareness, flatness, and local planeness shall be in accordance with col 2 of Table 4.

12.2.2 For knife test, glue adhesion test, slamming test and end immersion test the number of shutters shall be as per col 4 of Table 4.

12.2.3 For impact test, and screw withdrawal resistance test, shutters shall be tested on production of 1 000 shutters of the same size and type.

Table 4 Sample Size and Criteria for Conformity

(*Clause* 12.2.2)

Lot Size	Sample Size	Permissible No. of Defective	Sub-sample Size
(1)	(2)	(3)	(4)
26 to 50	8	0	1
51 to 100	13	1	2
101 to 150	20	1	2
151 to 300	32	1	3
301 to 500	50	2	4
501 and above	80	2	5

NOTE — For lot size 25 or less, number of samples to be taken for testing shall be as agreed to between the manufacturer and the purchaser.

12.2.4 For flexure edge loading, shock resistance, misuses and buckling test the shutters shall be tested once a year.

12.3 Criteria for Conformity

The lot shall be declared as conforming to the requirements of the standard when the number of defective samples does not exceed the permissible number given in col 3 of Table 4.

13 REQUIREMENTS FOR ECO MARK

13.1 Door shutters shall be manufactured from wood from sources other than natural forests such as timber from industrial and social forestry plantations, shade trees from tea and coffee estates, etc, as applicable to various components under 6 and such doors shutters shall conform to the requirements of quality and performance as specified in this standard as well as the requirements of ECO Mark for all the referred standards.

NOTES

1 The manufacturers shall provide documentary evidence by way of certificate or declaration to Bureau of Indian Standards which applying for ECO Mark.

2 The manufacturer shall provide to BIS environmental consent clearance from the concerned State Pollution Control Board as per the provisions of the *Water (Prevention and Control of Pollution)* Act 1974 and *Air (Prevention and Control of Pollution) Act* 1981 along with the authorization, if required under the *Environment (Protection) Act* 1986, while applying for ECO Mark.

14 MARKING

14.1 Each shutter shall be legibly and indelibly marked on any of its edges with the following information:

a) Name of the manufacturer or trade-mark, if any;
b) Abbreviation indicating the nature of construction of the shutter (*see* Table 1);
c) Whether the size of the shutter is 'Modular' or 'Non-modular';
d) Designation as specified in Table 2 of the standard for modular sizes; or the actual size (width and height) for non-modular sizes along with appropriate designation for door shutters as given in Table 2;
e) Thickness of door shutters (*see* **5.2**);
f) Species of timber, in case of ECO Mark; and
g) The criteria for which the product has been labelled as ECO Mark

14.2 The shutter may also be marked with the Standard Mark.

14.2.1 The use of Standard Mark is governed by the provision of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
303 : 1989	Specification for plywood for general purposes (*third revision*)
401 : 1982	Code of practice for preservation of timber (*third revision*)
707 : 1976	Glossary of terms applicable to timber technology and utilization (*second revision*)
710 : 1976	Specification for marine plywood (*first revision*)
848 : 1974	Specification for synthetic resin adhesives for plywood (phenolic and aminoplastic) (*first revision*)
1328 : 1982	Specification for veneered decorative plywood (*second revision*)
1659 : 1990	Specification for block boards (*third revision*)
1708 (Part 1) : 1986	Method of testing of small clear specimens of timber: Part 1 Determination of moisture content (*second revision*)
2209 : 1976	Specification for mortice locks (vertical type) (*third revision*)
2338 (Part 1) : 1967	Code of practice for finishing of wood and wood based materials: Part 1 Operation and workmanship
2380 (Part 17) : 1977	Methods of test for wood particle boards and boards from other lignocellulosic materials : Part 17 Determination of swelling in water
3087 : 1985	Specification for wood particle boards (medium density) for general purposes (*first revision*)
4020 (Parts 1 to 16)	Wood and other lignocellulosic materials based door shutters — Methods of tests (*third revision*)
4021 : 1983	Specification for timber door, window and ventilator frames (*second revision*)
4351 : 1976	Specification for steel door frames (*first revision*)
10428 : 1983	Glossary of terms relating to doors
12406 : 1988	Specification for medium density fibreboard for general purposes

ANNEX B

(*Foreword, Clauses* 6.1.1, 6.1.2 *and* 6.1.5)

SPECIES OF TIMBER SUITABLE FOR THE MANUFACTURE OF FLUSH DOOR SHUTTERS

Group 1 Species Suitable for Core

Sl No.	Standard Trade Name	Botanical Name	Abbreviated Symbol
1.	Alder	*Alnus* spp.	ALD
2.	Chatian	*Alstonia scholaris*	CHT
3.	Chir	*Pinus roxburghii* (Syn.P.*longifolia*)	CHR
4.	Cypress	*Cupressus torulosa*	CYP
5.	Debdaru (Nedunar)	*Polyalthia* spp.	DEB
6.	Deodar	*Cedrus deodara*	DEO
7.	Fir	*Abies* spp. (other than *Abies densa*)	FIR
8.	Gendelipoma	*Dysoxylum hamiltonii*	GEN
9.	Gokul	*Ailanthus integrifolia* (Syn. *A. grandis*)	GOK
10.	Jathikai	*Knema* spp.	JAT
11.	Kadam	*Anthocephalus chinensis* (Syn. *A. cadamba*)	KAD
12.	Kail	*Pinus wallichiana* (Syn.*P.exceisa*)	KAL
13.	Kattucheru	*Holigarna arnottiana*	KCH
14.	Lampati	*Duabanga grandiflora* (Syn. *D. sonneratioides*)	LAP

Sl No.	Standard Trade Name	Botanical Name	Abbreviated Symbol
15.	Maharukh	*Ailanthus* spp. (other than *Ailanthus integrifolia*)	MAH
16.	*Maina	*Tetrameles nudiflora*	MAI
17.	Makai	*Shoera assamica*	MAK
18.	Malabar Neem	*Melia composita*	MNE
19.	Narikel	*Pterygota alata*	NAR
20.	Poplar	*Populus doltoides*	
21.	Red Dhup	*Parishia insignis*	RDH
22.	Rubber		
23.	Rudrak	*Elaeocarpus* spp.	RUD
24.	Salai	*Boswellia serrata*	SAA
25.	Silver		
26.	Siris	*Albizia chinensis* (Syn. A *stipulata*)	SIR
27.	Spruce	*Picea smithiana* (Syn. P. *morinda*)	SPR
28.	Tanaku	*Gyrocarpus jacquinii* (Syn. G. *americanus*)	TAN
29.	Toon	*Toona ciliata* (Syn. *Cedrela toona*)	TOO
30.	Vatica	*Vatica* spp.	VAT
31.	*White Dhup	*Canarium* spp.	WOH

Group 2A Species Suitable for Stiles, Rails and Lipping

1.	Aini	*Artocarpus hirsutus*	AIN
2.	Arjun	*Terminalia arjuna*	ADJ
3.	*Bahera	*Terminalia bellirica*	BAH
4.	Birch	*Betula* spp.	BIR
5.	Bonsum	*Phoebe* spp.	BON
6.	Carallia Maniawga	*Carallia brachiata* (Syn. C. *integrrima*)	CAR
7.	Champ	*Michelia* spp.	CHM
8.	Chaplash	*Artocarpus chaplasha*	CHP
9.	Chickrassy	*Chukrasia velutina* (Syn. C. *tabularis*)	CHI
10.	Chilauni	*Schima wallichii*	CHL
11.	Cinnamon	*Cinnamomum* spp.	CIN
12.	*Debdaru (Nedunar)	*Polyalthia* spp.	CEB
13.	Devdam	*Dysoxylum binectariferum*	DEV
14.	Dillenia	*Dillenia* spp.	DIL
15.	Dipika (Lapse)	*Mansonia dipikae*	DIP
16.	Ebony	*Diospyros* spp. (other than *Diospyros marmorata*)	EBO
17.	Gamari	*Gmeli arborea*	GAM
18.	Garcinia	*Garicina spicata*	—
19.	Gurjan	*Dipterocarpus* spp. (other than *D. macrocarpus*)	GUR
20.	Haldu	*Adina* (Cordifolia)	HAL
21.	Hathipaila	*Pterospermum accerifolium*	HAT
22.	Hollock	*Terminalia myriocarpa*	HOL
23.	Hollong	*Dipterocarpus macrocarpus*	HGN
24.	Jaman	*Symvgium* spp.	JAM
25.	Jathikal	*Knema* spp.	JAT
26.	Jhingan	*Lannea coromandelica* (Syn. *Lannea grandis*)	JHI
27.	Kaim	*Mitragyna parvifolia* (Syn. *Stephengyne parvifolia*)	KAI
28.	Kala-Siris	*Albizia odoratissima*	KSI
29.	Kanju	*Holoptelea integrifolia*	KAN
30.	*Karani	*Cullenia rosayroana* (Syn. *C. excelsa*)	KAR
31.	Kathal	*Artocarpus heterophyllus* (Syn *A. integrifolus*)	
32.	Kindal	*Terminalia paniculata*	KIN
33.	Kokko	*Albizia lebbeck*	KOK
34.	Lakooch	*Artoscarpus lakoocha*	LAK
35.	Lampati	*Duabanga grandiflora* (Syn. *D. sonneratioides*)	LAP
36.	Laurel	*Terminalia alata* (Syn *T. coriacea* & *T. crenulata*)	LAU
37.	Machilus	*Machilus* spp.	MAC
38.	Mango	*Mangifera* spp.	MAN
39.	Maple	*Acer* spp.	MAP
40.	Mullilam	*Zanthoxylum rhetsa* (Syn. *Fagara budrunga*; *Z. Budrunga*; *Z. limonella*)	MUI
41.	*Mundani	*Acrocarpus fraxinifolius*	MUN
42.	Padauk	*Pterocarpus dalbergicides*	PAA
43.	Pali	*Palaquium ellibticum*	PAL
44.	*Piney	*Kingiodendron pinnatum* (Syn. *Hardwickia pinnata*)	PIN
45.	Poon	*Calophyllum* spp.	POO
46.	Pussur	*Xylocarpus* spp.	PUS
47.	Pyinma	*Lagerstroemia hypoleuca*	PYI
48.	Red Bombwe	*Planchonia valida* (Syn. *P. andmanica*)	RBO
49.	Rosewood	*Dalbergia latifolia*	ROS

*These species of timber are to be treated.

*These species of timber are to be treated.

Sl No	Standard Trade Name	Botanical Name	Abbreviated Symbol
50	Safed-Siris	*Albizia procera*	SSI
51	Silver Oak	*Grevillea robusta*	SOA
52	Sissoo	*Dalbergia sissoo*	SIS
53	Teak	*Tectona grandis*	TEA
54	Toon	*Toona ciliata* (Syn. *Cedrela toona*)	TOO
55	*Vellapine	*Vateria indica*	VEL
56	Walnut	*Juglans regia*	WAL
57	White Bombwe	*Terminalia procera*	WBO
58	White Cedar	*Dysoxylum malabaricum*	WCE
59	White Chuglam	*Terminalia bialata* (sapwood)	WCH
60	White Dhup	*Canarium* spp	WDH
61	Ywegi	*Adenanthera pavonina*	YWE
62	Mahogany	*Swietenia* spp	MAG

* These species of timber are to be treated

Group 2B List of Species of Timber being Imported for Door Shutter and considered Suitable from the Foreign Literature available

Sl No	Trade Name	Botanical Name	Country Name from where Imported
1	Abura	*Mitragyna stipulosa*	Africa (A)
2	Afrormosia$	*Afrormosia angolensis*	A
3	Alan Batu*	*Shorea albida*	Malaysia(M)
4	Amoora*	*Ammore cucullata*	Papua New Guinea (PNG)
5	Bintangor	*Calophyllum* spp	M
6	Dark Red Meranti*	*Shorea* spp	M
7	Durian	*Coelostegia* spp *Duria* spp and *Neesia* spp	M
8	Iroko$	*Chlorophora excelsa*	A
9	Keruing	*Diapterocorpus* spp	M
10	Kwila*	*Insita bijuga*	PNG
11	Light Red Meranti*	*Shorea* spp	M
12	Merawan*	*Hopea* spp	M
13	Merbau*	*Intsia palembanica*	M
14	Nyatoh*	*Ganua* spp *Palaquium* spp & *Payuena* spp	M
15	Nyatoh Kuring*	*Planchonella* spp & *Pouteria* spp	M
16	Sapela*	*Entandophragma cylindrium*	A
17	Terminalia red brown group*	*Terminalia* spp	PNG
18	Utile*	*Entandophragma utile*	A
19	Vitex*	*Vitex cofassus*	PNG

NOTE Above imported species shall be used for shutters only after proper treatment as prescribed in IS 401 and concerned clause of this standard, as suitable and sufficient information regarding their durability is not available and whatever is available may not fully hold good in Indian conditions However, heartwood of species marked '$' to be very durable Further, where sufficient retention/absorption/penetration of preservative is not obtained as per IS 401due to poor treatability character of the species, the door shall be treated with PCP solvent system after complete fabrication to ensure minimum penetration of preservative to the depth of 2 mm in the finished products Such species which are refractory to treatment are marked *

ANNEX C
(*Foreword*)

COMMITTEE COMPOSITION

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Central Warehousing Corporation, New Delhi

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(*Continued on page* 16)

(*Continued from page* 15)

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Wood and Other Lignocellulosic Materials Based Doors, Windows and Shutters Subcommittee CED 11 1

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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