

# इंटरनेट

# मानक

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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

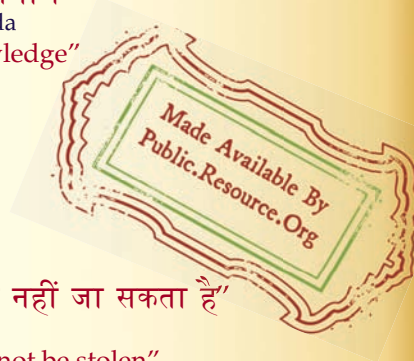
IS 1003-1 (2003): Timber Panelled and Glazed Shutters, Part 1: Door shutters - [CED 11: Doors, Windows and Shutter]



“ज्ञान से एक नये भारत का निर्माण”

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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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भारतीय मानक  
लकड़ी के दिल्लेदार तथा कांचित शटर—विशिष्टि  
( चौथा पुनरीक्षण )

*Indian Standard*  
TIMBER PANELLED AND GLAZED  
SHUTTERS — SPECIFICATION  
( *Fourth Revision* )

ICS 91.060.50

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

**AMENDMENT NO. 1 APRIL 2007  
TO  
IS 1003 (PART 1) : 2003 TIMBER PANELLED AND  
GLAZED SHUTTERS — SPECIFICATION**

**( Fourth Revision )**

(Cover page, Title) — Substitute the following for the existing title:

‘भारतीय मानक  
लकड़ी के छल्लेदार तथा कांचित शटर — विशिष्टि  
भाग 1 दरवाजे के शटर  
(चौथा पुनरीक्षण )

*Indian Standard*  
**TIMBER PANELLED AND GLAZED SHUTTERS —  
SPECIFICATION  
PART 1 DOOR SHUTTERS  
(Fourth Revision)**

(Second cover page, Foreword, first para, line 1) — Insert ‘(Part 1)’ after the word ‘Standard’.

(Page 1, clause 1.1, first sentence) — Insert ‘(Part 1)’ between ‘standard’ and ‘lays’.

(Page 10, clause 13) — Insert ‘ADDITIONAL’ before the existing title.

(CED 11)

**AMENDMENT NO. 2 NOVEMBER 2011  
TO  
IS 1003 (Part 1) : 2003 TIMBER PANELLED AND  
GLAZED SHUTTERS — SPECIFICATION**

**PART 1 DOOR SHUTTERS**

*( Fourth Revision )*

*(Page 1, clause 5.3)* — Substitute the following for the existing:

‘Blockboards used for panelling of door shutters shall conform to BWP grade of IS 1659.’

*(Page 2, clause 5.9)* — Insert the following new clauses after the clause:

**‘5.10 Bamboo Mat Board**

Bamboo mat board used for panelling of door shutters shall conform to IS 13958.

**5.11 Bamboo Mat-Veneer Composite**

Bamboo mat-veneer composite for panelling of door shutters shall conform to IS 14588.

**5.12 Laminated Veneer Lumber**

Laminated veneer lumber used for rails and stiles shall conform to IS 14616.

**5.13 Prelaminated Medium Density Fibre Board**

Prelaminated medium density fibre board used for panelling of door shutters shall conform to Grade I, Type I of IS 14587.

**5.14 Wire Gauze**

Wire gauze used for panels shall conform to IS 1568.’

*(Page 2, clause 6.1, first sentence)* — Substitute the following for the existing:

‘Timber panelled shutters shall be constructed in the form of timber or laminated veneer lumber framework of stiles and rails with panel inserts of timber, plywood, blockboard, medium density fibreboard, veneered particle board, asbestos cement sheets, prelaminated particle board, bamboo mat board, bamboo mat-veneer composite, prelaminated medium density fibre board, wire gauze or glass.’

(Page 4, *clause 6.3*) — Substitute the following for the existing:

‘Stiles, top rails, bottom rails and lock rails of shutters shall be made of one piece of timber or of laminated veneer lumber only. Intermediate rails, lock rails and bottom rails exceeding 150 mm in width may be made out of one or more pieces of timber or laminated veneer lumber, but the width of each piece shall be not less than 75 mm. Where more than one piece of timber or laminated veneer lumber is used, they shall be joined with a continuous tongued and grooved joint glued together and reinforced with metal dowels at regular intervals not exceeding 200 mm or pinned to the full thickness of the door with wooden/bamboo pin. Jointed pieces of timber shall belong to the same specie.’

(Page 6, *clause 6.14*) — Insert the following after the clause and renumber the subsequent clauses:

**‘6.15 Bamboo Mat Board Panelling**

Panels shall be made up of one piece of bamboo mat board. The thickness of the boards used shall not be less than 12 mm.

**6.16 Bamboo Mat-Veneer Board Panelling**

Panels shall be made up of one piece of bamboo mat-veneer board. The thickness of the boards used shall not be less than 12 mm.

**6.17 Prelaminated Medium Density Fibre Board Panelling**

Panels shall be made up of one piece of prelaminated medium density fibre board. The thickness of the boards used shall not be less than 12 mm.’

(Page 12, Annex A) — Substitute the following for the existing entries:

<i>IS No.</i>	<i>Title</i>
'848 : 2006	Synthetic resin adhesives for plywood (phenolic and aminoplastic) — Specification ( <i>second revision</i> )
1659 : 2004	Blockboards — Specification ( <i>fourth revision</i> )
3087 : 2005	Particle boards of wood and other lignocellulosic materials (medium density) for general purposes — Specification ( <i>second revision</i> )
3097 : 2006	Veneered particle boards — Specification ( <i>second revision</i> )
4351 : 2003	Steel door frames — Specification ( <i>second revision</i> )'

(Page 12, Annex A) — Add the following new entries at the appropriate place:

<i>IS No.</i>	<i>Title</i>
'1568 : 1970	Specification for wire cloth for general purposes ( <i>first revision</i> )
13958 : 1994	Bamboo mat board for general purposes — Specification
14587 : 1998	Prelaminated medium density fibre board — Specification
14588 : 1999	Bamboo mat-veneer composite for general purposes — Specification
14616 : 1999	Laminated veneer lumber — Specification'

(CED 11)

## FOREWORD

This Indian Standard (Fourth 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 1957 and subsequently revised in 1966, 1977 and 1991. The major modifications made in this revision are:

- a) Requirements that are to met by door shutters, when tested as per relevant parts of IS 4020 (Parts 1 to 16) : 1998 'Door shutters—Methods of tests (*third revision*)' have been specified.
- b) 'Spot test' for determination of penetration and identification of preservatives used for treatment of timber has been included.
- c) Other modifications based on the prevailing practices in the country have been made.

'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 the Government 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.'

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

## TIMBER PANELLED AND GLAZED SHUTTERS — SPECIFICATION

### ( *Fourth Revision* )

#### 1 SCOPE

**1.1** This standard lays down the requirements regarding material, sizes, construction, workmanship, finish, inspection and testing of timber door shutters with timber, plywood, blockboard, veneered particle board, asbestos cement sheet, wire gauge and glass panels used in domestic buildings, offices, schools, hospitals, etc. The shutters could be single panelled or multi-panelled with or without glazing.

**1.2** This standard does not cover timber door shutters for industrial and other special buildings, such as, workshops and garages.

#### 2 REFERENCES

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

#### 3 TERMINOLOGY

For the purpose to this standard, the definitions given in IS 10428 and IS 707 shall apply (*see also* Fig. 1 for illustrations of components of doors).

#### 4 HANDING

Handing and direction of closing of doors shall be designated in accordance with IS 4043.

#### 5 MATERIAL

##### 5.1 Timber

**5.1.1** Timber suitable for manufacture of door shutters shall be in accordance with IS 12896. Each class of species stand in the same footing functionally (irrespective of cost). Timber used for rails and stiles shall be of the same species. All the panels where they are of solid wood shall be of one species which may or may not be the same species as that of rails and stiles.

##### 5.1.2 Moisture Content

The maximum permissible moisture content in timber shall be as specified in IS 287.

##### 5.1.3 Seasoning and Treatment

All timbers shall be kiln-seasoned by a suitable process conforming to IS 1141 before being planed to the required dimensions. Sap-wood of durable species and heartwood and sapwood of non-durable species shall be treated with suitable preservative (except the water soluble leachable type) as specified in IS 401. The finished components shall also be given suitable preservative treatment in places where these have been cut for joinery work. Spot test according to Annex B shall be carried out for determination of penetration and identification of preservatives.

##### 5.1.4 Defects Prohibited

The timber shall be free from decay, fungal growth, boxed heart, splits, pitch pockets or streaks on the exposed faces.

##### 5.1.5 Defects Permitted

The timber shall be graded as First Grade and Second Grade on the basis of the permissible defects in the timber as given in Table 1. For both the grades, knot should be avoided where it is over or touching a place of joint. Surface checks not exceeding 2 mm in depth may be permitted.

##### 5.2 Plywood

Plywood used for panelling of door shutters shall be BWR grade conforming to IS 303.

##### 5.3 Blockboards

Blockboards used for panelling of door shutters shall confirm to Grade 1 (exterior grade) of IS 1659.

##### 5.4 Veneered Particle Board

Veneered particle boards used for panelling of door shutters shall conform to IS 3097. Particle boards used for core of veneered particle board shall be FPT-1 conforming to IS 3087 and shall have been bonded with BWP type of synthetic resin adhesive conforming to IS 848.

##### 5.5 Asbestos Cement Sheets

Asbestos cement sheets used for panels shall conform to IS 2096.

##### 5.6 Glass

Glass for glazing shall conform to IS 2835 or IS 2553

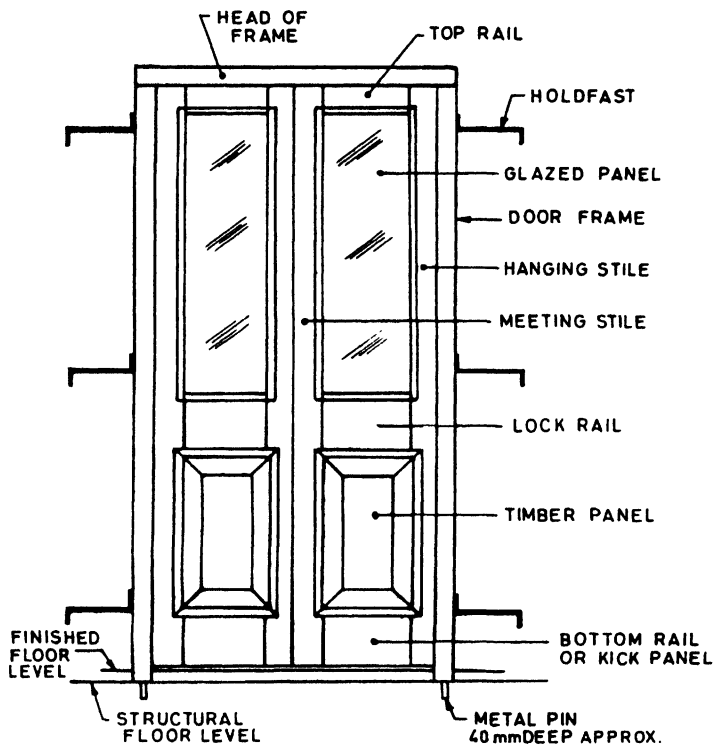


FIG. 1 TYPICAL ILLUSTRATION OF DOUBLE PANELLED DOOR WITH  
TIMBER AND GLAZED PANELS

(Part 1). The users may also specify the type of glass to be used, such as frosted glass, wire glass and coloured glass and the requirements for them.

#### 5.7 Medium Density Fibre Board

Medium density fibre board used for panelling of door shutters shall conform to Grade I to IS 12406 and shall be bonded with BWP type adhesive conforming to IS 848.

#### 5.8 Prelaminated Particle Board

Prelaminated particle boards used for panelling of door shutters shall conform to Grade I, Type I (PLB-II) of IS 12823. Particle boards used for core of prelaminate particle board shall be FPT-1 conforming to IS 3087 and shall have been bonded with BWP type of synthetic resin adhesive conforming to IS 848.

#### 5.9 Wood Particle Board (Medium Density)

Medium density wood particle boards used for panelling

of doors shutters shall conform to grade FPT-1 of IS 3087 and shall be bonded with BWP type of synthetic resin adhesive conforming to IS 848.

### 6 CONSTRUCTION AND WORKMANSHIP

6.1 Timber panelled shutters shall be constructed in the form of timber framework of stiles and rails with panel inserts of timber, plywood, blockboard, medium density fibreboard, veneered particle board, asbestos cement sheets, prelaminate particle board wire gauze or glass. The panels shall be fixed by either providing grooves in the stiles and rails or beading or both (see 6.2). The stiles, top rails and lock rails shall be joined to each other by mortice and tenon joints (see Fig. 2). Figure 3 shows alternate figures showing typical illustrations of tenon and haunched tenon in joinery. The bottom rails shall have haunched plain double tenon joints and other single tenon joints. The bottom, lock and top rails shall be inserted  $25 \pm 3$  mm short of the width of the stiles to form a stub mortice and tenon joint.

**Table 1 Permissible Defects for Various Grades of Timbers**  
(Clause 5.1.5)

Sl No.	Defects	First Grade	Second Grade
(1)	(2)	(3)	(4)
i)	Cross-grain	Not steeper than 1 in 15	Not steeper than 1 in 10
ii)	Sound knots and live knots	1) <i>Stiles and rails</i> a) <i>Short exposed face</i> — Not more than 20 mm size and not more 1 knot/m  b) <i>Long exposed face</i> — Not more than 20 mm size and not more than 1 knot/m <sup>2</sup> than 1 knot/m <sup>2</sup> No knot shall occur within 20 mm of the edges  2) <i>Panels</i> — Not more than 20 mm size and not more than 2 knots/m <sup>2</sup> No knot shall occur on edge of any component of a panel	1) <i>Stiles and rails</i> a) <i>Short exposed face</i> — Not more than 20 mm size and not more than 3 knots per stile and 1 knot per rail  b) <i>Long exposed face</i> — Not more than 25 mm size and not more than 3 knots per stile and 1 knot per rail  2) <i>Panels</i> — Not more than 20 mm size and not more than 4 knots/m <sup>2</sup> No knot shall occur on edge of any component of a panel
iii)	Dead and loose knots (Plugged)	1) <i>Stiles and Rails</i> — Not more than 10 mm size centrally located and not more than 1 knot/m  2) <i>Panels</i> — Not more than 15 mm size and not more than 2 knots/m <sup>2</sup> No knot shall occur on edge of any component of a panel	1) <i>Stiles and Rails</i> — Not more than 10 mm size, centrally located and not more than 3 knots per stile and 1 knot per rail  2) <i>Panels</i> — Not more than 15 mm size and not more than 4 knots/m <sup>2</sup> No knot shall occur on edge of any component of a panel
iv)	Pitch pockets or streaks	None	Permissible except on exposed edges, provided that they are clean and filled up with suitable putty or filler When pitch pockets or streaks are located on the exposed edges of the core, they shall be cut out and filled with piece of wood of similar species with grain running in the same direction The piece shall be well glued
v)	Sapwood	Total not exceeding 5 mm wide and 150 mm long per metre (This restriction applies only to supper group)	Total not exceeding 10 mm wide and 200 mm long per metre (This restriction applies only to supper group)
vi)	Pin holes	Permitted provided they are not in clusters	Permitted
vii)	Worm holes	None	Permitted provided they are not more than 10 mm in diameter and not more than one per metre and provided such worm holes are plugged with similar timber in such a manner that the plugging merges with the surrounding area both as to colour and grain

## NOTES

1 Dead and loose knots are permitted only if they are suitably plugged

2 Knot shall not occur where hinges or locks are to be fixed

**6.1.1** All members of the door shutters shall be straight, smooth and well planed faces at right angles to each other. Any warp or bow shall not exceed 1.5 mm. The right angle for the shutters shall be checked by measuring the two diagonals from one extreme corner to the opposite one and the difference between the two diagonals shall be not more than 3 mm.

## 6.2 Beading

Timber panels shall be fixed only with grooves but additional beading may be provided either on one side or on both sides, if so desired. Plywood, blockboard, medium density fibre board, veneered particle board and prelaminate particle board shall have either grooves or beading or both. In so far as glass, wire gauge and asbestos panels are concerned, beading shall always be provided without grooves. In such cases, that is where beading is provided without the grooves the beading shall be only on one side, the other side being supported by rebate from stiles

(see Fig. 4). The beading shall have a size not less than 15 mm × 10 mm. It can be fixed by suitably nailing or screwing.

**6.3** Stiles, top rails, bottom rails and lock rails of shutters shall be made out of one piece of timber only. Intermediate rails, lock rails and bottom rails exceeding 150 mm in width may be made out of one or more pieces of timber, but the width of each piece shall be not less than 75 mm. Where more than one piece of timber is used, they shall be joined with a continuous tongued and grooved joint glued together and reinforced with metal dowels at regular intervals not exceeding 200 mm or pinned to the full thickness of the door with wooden/bamboo pins. Jointed pieces of timber shall belong to the same species.

**6.4** Muntings and glazing bars shall be stubtenoned to the maximum depth which the size of the member would permit or to a depth of 25 mm, whichever is less.

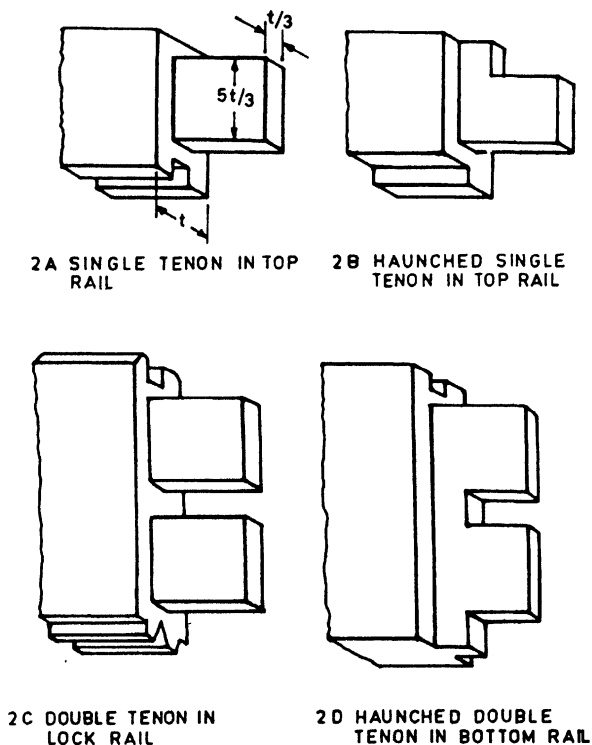
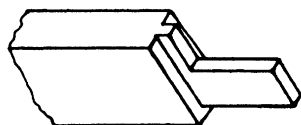


FIG. 2 TYPICAL ILLUSTRATIONS OF TENON AND HAUNCHED TENON IN JOINERY

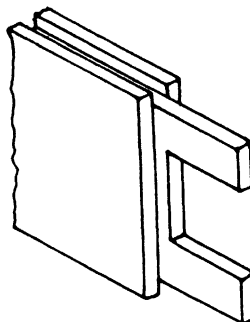
**6.5** Some of the common methods for jointing of panels with stiles/rails are shown in Fig. 4. The minimum depth of grooves of stiles and rails shall be 12 mm for all types of panelling. The panels shall be framed into grooves to the full depth of groove leaving an air space of 1.5 mm and the faces shall be closely fitted to the sides of the groove. The rest of the details shall be as given in 6.6 to 6.11 for respective panel materials.

#### 6.6 Timber Panelling

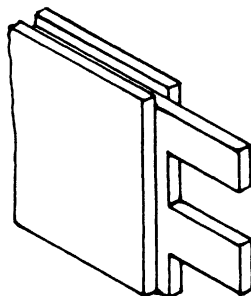
Timber panels shall be preferably made of timber of larger width; the minimum width and thickness of a panel shall be 100 mm and 15 mm respectively. When made from more than one piece, the pieces shall be jointed with a tongued and grooved joint, depth of joint extending to one-third of thickness of panel and the thickness of joint also as one-third of panel. The grains of timber panels shall run along the longer dimensions of the panels. The panels shall be designed such that no single panel exceeds 0.5 m<sup>2</sup> in area. Beading may be done as 6.2.



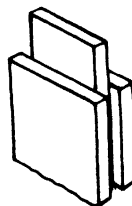
3A SINGLE HAUCHED TENON  
ON A TOP RAIL



3B MIDDLE OR LOCK RAIL WITH  
PAIR OF SINGLE TENON AND  
HAUNCH IN CENTRE



3C PAIR OF SINGLE HAUCHED  
TENON ON BOTTOM RAIL



3D STUB TENON ON A MUNTING  
(IT DOES NOT GO THROUGH  
THE RAIL)

FIG. 3 TYPICAL ILLUSTRATIONS OF TENON AND HAUCHED TENON IN JOINERY  
(ALTERNATIVE FIGURE)

#### 6.7 Plywood Panelling

Each plywood panels shall be of one piece of not less than 9 mm thickness for 2 or more panel construction and 12 mm thickness for single panel construction. There shall be no restriction on the size of the panel.

#### 6.8 Blockboard Panelling

Each blockboard panel shall be of one piece of thickness 12 mm or more and there shall be no restriction on the size of the panel.

#### 6.9 Veneered Particle Board Panelling

Panels shall be made of one piece of veneered particle board. The thickness of particle boards used shall not be less than 12 mm.

#### 6.10 Wire Gauze Panelling

Wire gauze panel shall be so designated that no single panel exceeds 0.5 m<sup>2</sup> in area.

### 6.11 Asbestos Cement Board Panelling

Asbestos cement sheets for panelling shall consist of two or more panels. Thickness of each panel shall not be less than 6 mm.

### 6.12 Medium Density Fibre Board Panelling

Panels shall be made up of one piece of medium density fibre board. The thickness of boards used shall not be less than 12 mm.

### 6.13 Prelaminated Particles Board Panelling

Panels shall be made of one piece of prelaminate particle board. The thickness of particle boards used shall not be less than 12 mm.

### 6.14 Medium Density Wood Particle Board Panelling

Panels shall be made of one piece of medium density

wood particle board. The thickness of particle boards used shall not be less than 12 mm.

### 6.15 Rebating

In case of double-leaved shutters the meeting of the stiles shall be rebated either splayed or square type as shown in Fig. 5.

### 6.16 Gluing of Joints

The contact surfaces of tenon and mortice shall be treated, before putting together, with bulk type synthetic resin adhesive conforming to IS 851 suitable for construction work in wood, or synthetic resin adhesive (phenolic and aminoplastic) conforming to IS 848 suitable for plywood or animal glue for general wood-working purposes conforming to IS 852 or polyvinyl acetate dispersion based adhesive for wood conforming to IS 4835. However, gluing of joints is optional and may be done with the agreement between the purchaser and the supplier.

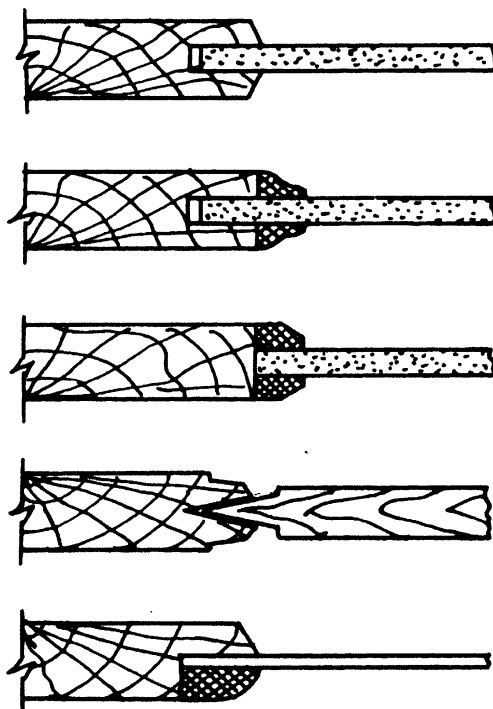


FIG. 4 COMMON METHODS OF JOINTING PANELS WITH STILES AND RAILS WITH/WITHOUT BEADING

## 7 DIMENSIONS, SIZES AND TOLERANCES

### 7.1 Dimensions of Components and Tolerances

The finished dimensions and tolerances of the different components of door shutters shall be as given in Table 2.

### 7.2 Sizes and Types

Sizes and types of the timber panelled and glazed shutters shall generally conform to the modular sizes specified in Table 3 (*see also* Fig. 6). Sizes other than modular sizes as agreed to between the manufacturer and the purchaser, may also be permitted.

### 7.3 Tolerances

Tolerances on the sizes of door shutters shall be  $\pm 3$  mm.

## 8 LOCATION OF FITTINGS AND ACCESSORIES

8.1 The lock rail of door shutters, where provided, shall be so placed that its centre line is at a height of  $850 \pm 5$  mm from the bottom of the shutter.

8.2 Each door shutter shall be fixed to the door frame with hinges of the type specified by the purchaser, as follows:

- a) Door shutter of width : Three hinges for 900 mm and below  
single leaf door

- b) Door shutter of width : Six hinges for double-leaved doors, three on each side and four hinges for single leaf door  
more than 900 mm

8.3 Timber panelled shutter may be provided with louvers or vision panels as specified by the purchaser. Where such a provision is made, the position, size and shape of louver or vision panel opening shall be as specified by the purchaser.

## 9 FINISH

9.1 All door shutters shall be sanded and finished smooth.

9.2 Panels of shutters shall be flat and well-sanded to a smooth and level surface.

9.3 Defective knots, when permitted on surfaces exposed to view shall be completely bored or cut out and tightly plugged with the same timber species and properly glued in. The grains of the plug shall run in direction of the grains of the piece.

9.4 All the surfaces of door shutters which are required to be painted or polished or varnished ultimately shall be covered initially before delivery by protective coat of primer polish or varnish as specified in IS 2338 (Part 1) and IS 2338 (Part 2).

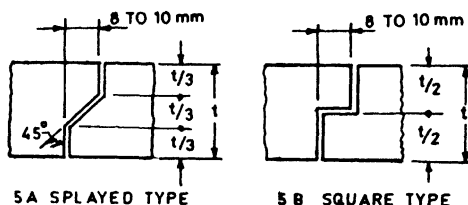


FIG. 5 MEETING OF STILES FOR DOUBLE-LEAVED DOOR SHUTTERS

Table 2 Dimensions and Tolerances of Components of Door Shutters  
(Clause 7.1)

Sl No.	Description	Width mm	Thickness mm
(1)	(2)	(3)	(4)
i)	Vertical stile top and freeze rail	$100 \pm 3$	$35 \pm 1$ or $40 \pm 1$
ii)	Lock rail	$150 \pm 3$	$35 \pm 1$ or $40 \pm 1$
iii)	Bottom rail	$200 \pm 3$	$35 \pm 1$ or $40 \pm 1$
iv)	Munting	$100 \pm 3$	$35 \pm 1$ or $40 \pm 1$
v)	Glazing bar	$40 \pm 1$	$35 \pm 1$ or $40 \pm 1$

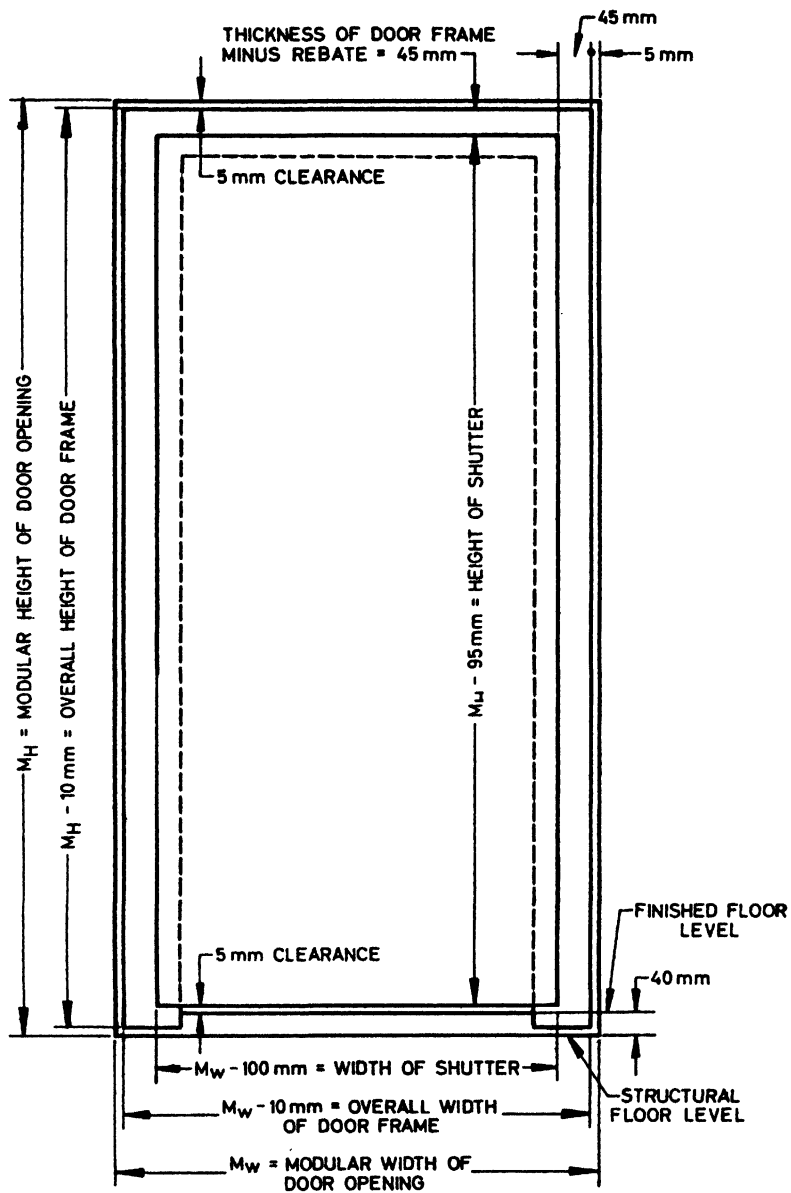


FIG. 6 SKETCH ILLUSTRATING DIMENSIONS OF SHUTTER

**Table 3 Dimension of Door Shutters**  
(Clause 7.2)

Sl No.	Designation of Doors	Width mm	Height mm
(1)	(2)	(3)	(4)
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 <sup>1)</sup>	1 905 ( 1 945)
viii)	12 DT 21	1 100 <sup>1)</sup>	2 005 ( 2 045)

#### NOTES

1 The designation refers to modular sizes of door openings. First number stands for width and the last for height in module ( $M = 100$  mm). Alphabet 'D' refer to doors. 'S' to single shutter and 'T' to double leaf shutter.

2 Standard sizes of door frames are covered in IS 4021 and IS 4351.

3 The standard widths and heights for panel doors are arrived at as shown in Fig. 6. In case the modular height is taken from the finished floor level, the height of the door shall be the one given in bracket. In the case of double leave shutters, the rebate in the shutters shall be as given in 6.15.

<sup>1)</sup> Combined width of double leaf shutters.

## 10 GLAZING

**10.1** The glass used for panels shall be of good and durable quality, weighing not less than  $10 \text{ kg/m}^2$  and the thickness shall not be less than 4 mm. The particular type, quality and shade shall be as agreed to between the purchaser and the supplier.

**10.2** In specifying sizes of openings or panels of glass, the first dimension shall be the width.

**10.3** The glass shall be embedded in putty and secured to the rebate by wooden beads of suitable size and shape.

**10.4** Wash leather, ribbon velvet, rubber flannel, felt, asbestos or other similar material may be used in place of putty for internal glazing. The material shall be fitted either as a beading on one side or in such a manner that it covers all parts of the glass which will be covered by the beading.

## 11 TESTS

Door shutters shall be subjected to the following tests.

### 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  $\pm 5$  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  $\pm 1$  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 twenty five 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 withstand 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 deterioration and any residual deformation more than 5 mm after 15 min of unloading and the initial deflection also shall not be more than 50 mm.

### 11.9 Slamming Test

11.9.1 Any one 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 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 3 of Table 4.

12.2.2 For slamming test, the number of shutters shall be as per col 5 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.

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 4 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 while 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 All door shutters shall be hammer-marked or indelibly marked on the exposed edge of a rail with the following information :

- a) Name of the manufacturer or trade-mark, if any;

**Table 4 Sample Size and Criteria for Conformity**  
(Clauses 12.2.1, 12.2.2 and 12.3)

Sl No.	Lot Size	Sample Size	Permissible No. of Defectives	Sub-sample Size
(1)	(2)	(3)	(4)	(5)
i)	26 to 50	8	0	1
ii)	51 to 100	13	1	2
iii)	101 to 150	20	1	2
iv)	151 to 300	32	1	3
v)	301 to 500	50	2	4
vi)	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.

- b) Whether the size of the shutter is 'Modular' or 'Non-modular' ;
- c) Designation (showing width and height in modules) for modular sizes as specified in Table 3, of the actual size (width and height in case of non-modular sizes) along with appropriate symbols for shutters as given in Note 1 of Table 3;
- d) Group and Grade of timber used for rails and stiles (*see 5.1.1 and 5.1.5*);
- e) Species of timber, in case of ECO-Mark; and
- f) The criteria for which the product has been labelled as ECO-Mark.

**14.1.1** The shutters may also be marked with the Standard Mark.

**14.1.1.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. Details of conditions under which a licence for use of

the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## **15 INFORMATION TO BE SUPPLIED BY THE PURCHASER**

**15.1** The purchaser shall supply the following information at the time of placing the order :

- a) The size and the type of door shutters, species of timber, the group and grade of timber to be used, particulars regarding panels, the handing of door (right or left) and the way the door is required to open (inward or outward);
- b) Whether single or double-leaved and the type of rebate in double-leaved shutter;
- c) Whether provision has to be made for letter plates, postal knockers, etc; and
- d) Whether the door shutters are to be polished or painted.

## ANNEX A

## (Clause 2)

## LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
287 : 1993	Permissible moisture content for timber used for different purposes—Recommendations ( <i>third revision</i> )	2835 : 1987	Specification for flat transparent sheet glass ( <i>third revision</i> )
303 : 1989	Specification for plywood for general purposes ( <i>third revision</i> )	3087 : 1985	Specification for wood particle boards (medium density) for general purposes ( <i>third revision</i> )
401 : 2001	Code of practice for preservation of timber ( <i>fourth revision</i> )	3097 : 1980	Specification for veneered particle boards ( <i>first revision</i> )
707 : 1976	Glossary or terms applicable to timber technology and utilization ( <i>second revision</i> )	4020 (Parts 1 to 16) : 1998	Doors shutters — Methods of tests ( <i>third revision</i> )
848 : 1974	Specification for synthetic resin adhesives for plywood (phenolic and aminoplastic) ( <i>first revision</i> )	4021 : 1995	Timber, door, window and ventilator frames — Specification ( <i>third revision</i> )
851 : 1978	Specification for synthetic resin adhesive for construction work (non-structural) in wood ( <i>first revision</i> )	4043 : 1969	Recommendations for symbolic designation of direction of closing and faces of doors, windows and shutters
852 : 1994	Specification for animal glue for general wood-working purposes ( <i>second revision</i> )	4351 : 1976	Specification for steel door frames ( <i>first revision</i> )
1141 : 1993	Code of practice for seasoning of timber ( <i>second revision</i> )	4835 : 1979	Specification for polyvinyl acetate dispersion based adhesives for wood ( <i>first revision</i> )
1659 : 1990	Specification for block boards ( <i>third revision</i> )	10428 : 1983	Glossary of terms relating to doors
2096 : 1992	Specification for asbestos cement flat sheets ( <i>first revision</i> )	12406 : 1988	Specification for medium density fibreboards for general purposes
2338	Code of practice for finishing of wood and wood-based materials:	12823 : 1990	Specification for prelaminated particle boards from wood and other lignocellulosic materials
(Part1) : 1967	Operations and workmanship	12896 : 1990	Classification of Indian timbers for door and window shutters and frames
(Part2) : 1967	Schedules		
2553	Safety glass — Specification: Part 1		
(Part1) : 1967	General purpose ( <i>third revision</i> )		

**ANNEX B***(Clause 5.1.3)***METHOD FOR THE DETERMINATION OF PENETRATION AND IDENTIFICATION OF PRESERVATIVE BY SPOT TEST****B-1 GENERAL**

Methods for the determination of penetration of copper-chrome-arsenic composition and acid-cupric-chromate and ammoniacal-copper-arsenite composition are given below. Definite colour reactions are not given by other common preservatives. The entire cross-sectional area has to be tested for preservative treatment by using spot tests after cutting across stile/rail and other timber components at any given place. Thorough penetration of preservative chemical is required.

**B-2 COPPER-CHROME-ARSENIC COMPOSITION ACID-CUPRIC-CHROMATE COMPOSITION BORATED-COPPER-CHROME COMPOSITION AND AMMONIACAL-COPPER-ARSENITE COMPOSITION**

**B-2.1 Detection for Copper**

**B-2.1.1** Dissolve 0.5 g chrome Azurol-S and 5.0 g of sodium acetate in 80 ml water and dilute to 100 ml.

**B-2.1.2** Spray or brush the solution over split or cross-section or boring/bore dust with a fine spray on the cut surface of treated wood. A deep blue colour shows the presence of copper.

**B-2.2 Detection for Chromium**

**B-2.2.1** Dissolve 0.5 g diphenyl carbazide in 50 ml *iso*-propyl alcohol and 50 ml of distilled water.

**B-2.2.2** Spray or brush the solution on the boring/bore dust or cross-section of treated wood. Portions containing chromium will develop a purple colour while unpenetrated/untreated portion will remain as such.

**B-2.3 Detection for Arsenic****B-2.3.1 Solution 1**

3.5 g ammonium molybdate dissolved in 90 ml distilled water followed by 9 ml concentrated nitric acid.

**B-2.3.2 Solution 2**

0.7 g benzidine dihydrochloride dissolved in 10 ml

concentrated acetic acid and diluted to 100 ml by adding 90 ml distilled water.

**B-2.3.3 Solution 3**

30 g stannous chloride dissolved in 100 ml 1:1 hydrochloric acid in distilled water.

**B-2.3.4** Solution 1 may be prepared on fresh for each day testing. Solution 2 and solution 3 may be stored in clean glass stoppered brown glass bottles for one week.

**B-2.3.5** Apply Solution 1 to the boring or cross-section ensuring that entire wood surface is saturated. After 2 min, excess solution is shaken off and allowed to dry for about 1 min. Solution 2 is next applied in the same way as Solution 1. After 2 min, the excess solution is shaken off and surface is allowed to dry for 1 min. Solution 3 is last applied by pouring over cross-section or boring beginning at untreated part. The entire wood surface will immediately turn bluish on treated surface of wood containing arsenic.

**B-3 METHOD FOR THE DETECTION OF BORON IN COPPER-CHROME-BORON AND BORATED-COPPER-CHROME-ARSENIC COMPOSITION**

**B-3.1 Solution 1**

Extract 10 g turmeric powder with 90 g ethyl alcohol. Decant or filter to obtain clear solution.

**B-3.2 Solution 2**

20 ml of concentrated hydrochloric acid diluted to 100 ml with ethyl alcohol and then saturated with salicylic acid (about 13 g per 100 ml).

**B-3.3** Solution 1 is applied on the dry cut surface of wood or cross-section by spraying or with a dropper and the surface is allowed to dry for a few minute. Solution 2 is then applied in a similar manner to the areas that have been coloured yellow by the application of Solution 1. The colour changes shall be observed carefully. Areas having presence of boron turn red.

## Bureau of Indian Standards

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