

(DZONGKHA TITLE)

**BHUTAN STANDARD**

**Timber Panelled and Glazed Door Shutters- Specification**



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# **FDBTS 344: 2021**

## **FOREWORD**

This Bhutan Standard for Timber Panelled and Glazed Door Shutters - Specification was adopted by Bhutan Standards Bureau after the draft finalized by the Wood and Timber Product Standards Technical Committee TC 07 and approved by the Bhutan Standards Bureau Board (BSB Board) on xxxx 2021

This standard is subject to systematic review after five years to keep pace with the market trends, industrial and technological developments. Any suggestions and further information may be directed to the concerned Technical Committee.

# **(DZONGKHA)**

## **BHUTAN STANDARD**

### **Timber Panelled and Glazed Door Shutters- Specification**

#### **1 Scope**

1.1 This standard lays down the requirements regarding material, sizes, construction, workmanship, finish, inspection and testing of timber door shutters generally used in residential and institutional buildings.

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

1.3 Panel inserts used with timber shutter frames shall be timber, plywood, blockboard, veneered particle board, wood particle boards, prelaminated particle boards, wire gauge and glass panels.

#### **2 Normative References**

The following documents are indispensable for application of this document. For dated references, only the edition cited applies, for undated references, the latest edition of the latest document (including any amendments) applies.

BTS 119: 2018 IS 303: 1989 Plywood for General Purposes – Specification

BTS 129: 2017 IS 3087: 2005 Particle Boards of Wood and Other Lignocellulosic Materials (Medium Density) for General Purposes – Specification

BTS 130: 2017 IS 12823: 2015 Prelaminated Particle Boards from Wood and Other Lignocellulosic Materials – Specification (First Revision)

BTS 133: 2017 IS 848: 2006 Synthetic Resin Adhesive for Plywood (Phenolic and Aminoplastic) – Specification

FDBTS 346: 2021 D4442-20 Standard Test Methods for Direct Moisture Content Measurement of Wood and WoodBased Materials

FDBTS 347: 2021 IS 401: 2001 (reaffirmed 2002) Preservation of Timber – Code of Practice

FDBTS 348: 2021 IS 851: 1987 Specification for Synthetic Resin Adhesives for Construction Work (Non-Structural) in Wood Practice

FDBTS 349: 2021 IS 1659: 2004 Block Boards - Specification

FDBTS 350: 2021 IS 3097: 2006 Veneered Particle Boards - Specification

FDBTS 351: 2021 IS 2835: 1987 Specification for Flat Transparent Sheet Glass

FDBTS 352: 2021 IS 2553 (Part I): 2018 Safety Glass – Specification Part 1: Architectural, Building and General Uses (Fourth Revision)

FDBTS 153: 2021 IS 4020 (Part 1 to 16): 1998 Door Shutters – Method of Tests (Third Revision)



### **3 Terms and Definition**

- 3.1 Beading – strip of wood used to hold door panels with shutter frames
- 3.2 Block boards – pre-engineered wood product manufactured from wooden strips or blocks placed edge to edge between two layers of plywood which are then glued together under required pressure
- 3.3 Clearance – is the required gap between the bottom edge of the shutter and the top of the floor finish
- 3.4 Dead knots - a knot in which the layers of annual growth are not completely intergrown with those of the adjacent wood. It is surrounded by pith or bark. The encasement may be partial or complete
- 3.5 Door Shutter - are movable barrier consisting of a panelled assembly or otherwise which fits into the frame
- 3.6 Double leafed shutter – door frame carrying one shutter each
- 3.7 Double Shutter – door frame carrying two shutters
- 3.8 Live knots - a knot free from decay and other defects, in which the fibres are firmly intergrown with those of the surrounding wood.
- 3.9 Modular Width – the width provided in this standard for calculating dimensions and sizes
- 3.10 Muntin/Glazing bars - a strip of wood or metal separating and holding panes of glass in a door
- 3.11 Panel – components of door shutter constructed in the framework of rails and stiles
- 3.12 Panel Inserts – types of panel inserted based on the materials
- 3.13 Pin hole - hole not over 2 mm in diameter, usually darkly stained and not containing bore dust or frass
- 3.14 Pitch pockets - accumulation of resin between growth rings of coniferous wood as seen on the cross-section
- 3.15 Plywood - a pre-engineered wood product manufactured from thin layers of wood also called as wood veneer that are glued together with adhesive
- 3.16 Prelaminated Particle Board - a particle board laminated on both surfaces by synthetic resin impregnated base papers under the influence of heat and pressure or with finished foils under the influence of pressure or pressure and heat depending upon the type of binder used
- 3.17 Preservatives - a substance or a chemical that is added to wood to prevent decomposition by microbial growth or by undesirable chemical changes
- 3.18 Profile – the ornamentation provided at the shutter frame and the beading
- 3.19 Rail - are the horizontal shutter frame of the door. Depending upon the location; rails are termed as top or frieze rail, lock rail, bottom rail, and intermediate rails
- 3.20 Rebate - a recess along the edge of a piece of timber to receive another piece or a door, sash or frame
- 3.21 Sapwood - the outer layers of the log, which in the growing tree contain living cells and food material. The sapwood is usually lighter in colour and is readily attacked by insects and fungi
- 3.22 Spyhole – a viewing hole in a door for observing callers before opening
- 3.23 Stiles – are the vertical shutter frame of the door.
- 3.24 Veneered Particle Board - a particle board with one ply on each side

3.25 Worm hole – hole made by a burrowing worm

## 4 Materials

### 4.1 Timber

Commonly available timber species suitable for the manufacture of door shall be in accordance with timber classification as specified in **ANNEX-A** of this standard. 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.

#### 4.1.1 Defects

Defects like decay, fungal growth, boxed heart, splits, pitch pocket or streaks on the exposed faces shall be prohibited. However, the timber shall be graded as First Grade or Second Grade on the basis of the permissible defects in timber as given in **Table 1**.

**Table 1: Permissible Defects in Various Grades of Timber**

SL.No	Defects	First Grade	Second Grade
1	Cross Grain	Not steeper than 1 in 15	Not steeper than 1 in 10
2	Sound Knots and live knots a) Size, Max b) Number per metre	1) Stiles and rails  Not more than 20 mm size and not more than 1 knot/m <sup>2</sup> No knot shall occur within 20 mm of the edges  2) Panels - 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) Stiles and Rails  Not more than 20 mm Size and not more than 3 knots per stile and 1 knot per rail  2) Panels - 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
3	Dead and loose knots (Plugged)	1) Stiles and Rails - Not more than 10 mm size centrally located and not more than 1 knot/m <sup>2</sup>  2) Panels - 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) Stiles and Rails - Not more than 10 mm Size, centrally located and not more than 3 knots per stile and 1 knot per rail  2) Panels - 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
4	Pitch pockets or streaks	None	Permissible except on exposed edges, provided that they are clean and filled up with suitable putty or with 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
5	Sapwood	Total not exceeding 5mm wide and 150mm long per metre	Total not exceeding 10mm wide and 200mm long per metre
6	Pin Holes	Permitted provided they are not in clusters	Permitted
7	Worm holes	None	Permitted provided they are not more than 10mm in diameter and not more than one per meter and provided such worm holes are plugged with similar timber in such a manner that the plugging merge with the surrounding area both as to colour and grains

#### **4.1.2 Seasoning and Treatment**

Any piece of wood will give off or take in moisture from the surrounding atmosphere until the moisture in wood has come to a balance with the existing atmospheric conditions. The moisture content at which timber neither gains nor loses moisture when subject to a given constant condition of temperature and humidity is known as equilibrium moisture content corresponding to that condition.

Seasoned timber (whether air or kiln dried) shall conform to the moisture content requirements as specified in **Table 2** if the averaged moisture content of all the samples from a given lot is within the permissible limit. Sapwood of durable species in hardwood and sapwood of non-durable species shall be treated with suitable preservatives (except the water soluble leachable type) as specified in **FDBTS 347: 2021/IS 401: 2001 (reaffirmed 2002)**.

**Table 2 - Permissible Moisture Content of Timber Door Shutters**

<b>Door components</b>	<b>Moisture Content, Percent, Max</b>	<b>Average Moisture Content of all samples from a lot shall be</b>	<b>Moisture Content of individual samples shall be</b>	<b>Test Method</b>
Thinner than 50 mm	14%	+2%	Within +3%	D4442 - 20

#### **4.2 Plywood**

Plywood used for panelling of door shutters shall conform to BTS 119: 2018 IS 303: 1989.

#### **4.3 Prelaminated Particle Board**

Prelaminated particle boards used for paneling of door shutters shall conform to Grade I, Type I (PLB-II) of BTS 130: 2017 IS 12823: 2015. Particle boards used for core of prelaminate particle board shall be

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FPT-1 conforming to BTS 129: 2017 IS 3087: 2005 and shall have been bonded with BWP type of synthetic resin adhesive conforming to BTS 133: 2017 IS 848: 2006.

### **4.4 Wood Particle Board (Medium Density)**

Medium density wood particle boards used for paneling of doors shutters shall conform to grade FPT-I of BTS 129: 2017 IS 3087: 2005 and shall be bonded with BWP type of synthetic resin adhesive conforming to BTS 133: 2017 IS 848: 2006.

### **4.5 Block boards**

Block boards used for door shutters shall confirm to Grade 1 (exterior grade) of FDBTS 349: 2021 IS 1659: 2004.

### **4.6 Veneered Particle Board**

Veneered particle boards used for panelling of door shutters shall conform to FDBTS 350: 2021 IS 3097: 2006. Particle boards used for core of veneered particle board shall be FPT-I conforming to BTS 129: 2017 IS 3087: 2005 and shall have been bonded with BWP type of synthetic resin adhesive conforming to BTS 133: 2017 IS 848: 2006.

### **4.7 Glass**

Glass for glazing shall conform to FDBTS 351: 2021 IS 2835:1987 or FDBTS 352: 2021 IS 2553 (Part I): 2018. 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 Constructions and Workmanship**

### **5.1 General**

**5.1.1** Timber panelled shutters shall be constructed in the form of timber framework of stiles and rails with panel inserts of timber, plywood, block board, medium density fibre board, veneered particle board, prelaminated particle board, wire gauze and glass. The panels shall be fixed by either providing grooves in the stiles and rails or beading or both (see 5.2). The stiles, top rails and lock rails shall be joined to each other by mortice and tenon joints (see Fig. 1) and the profile of stiles and rails shall be as agreed between the supplier and purchaser.

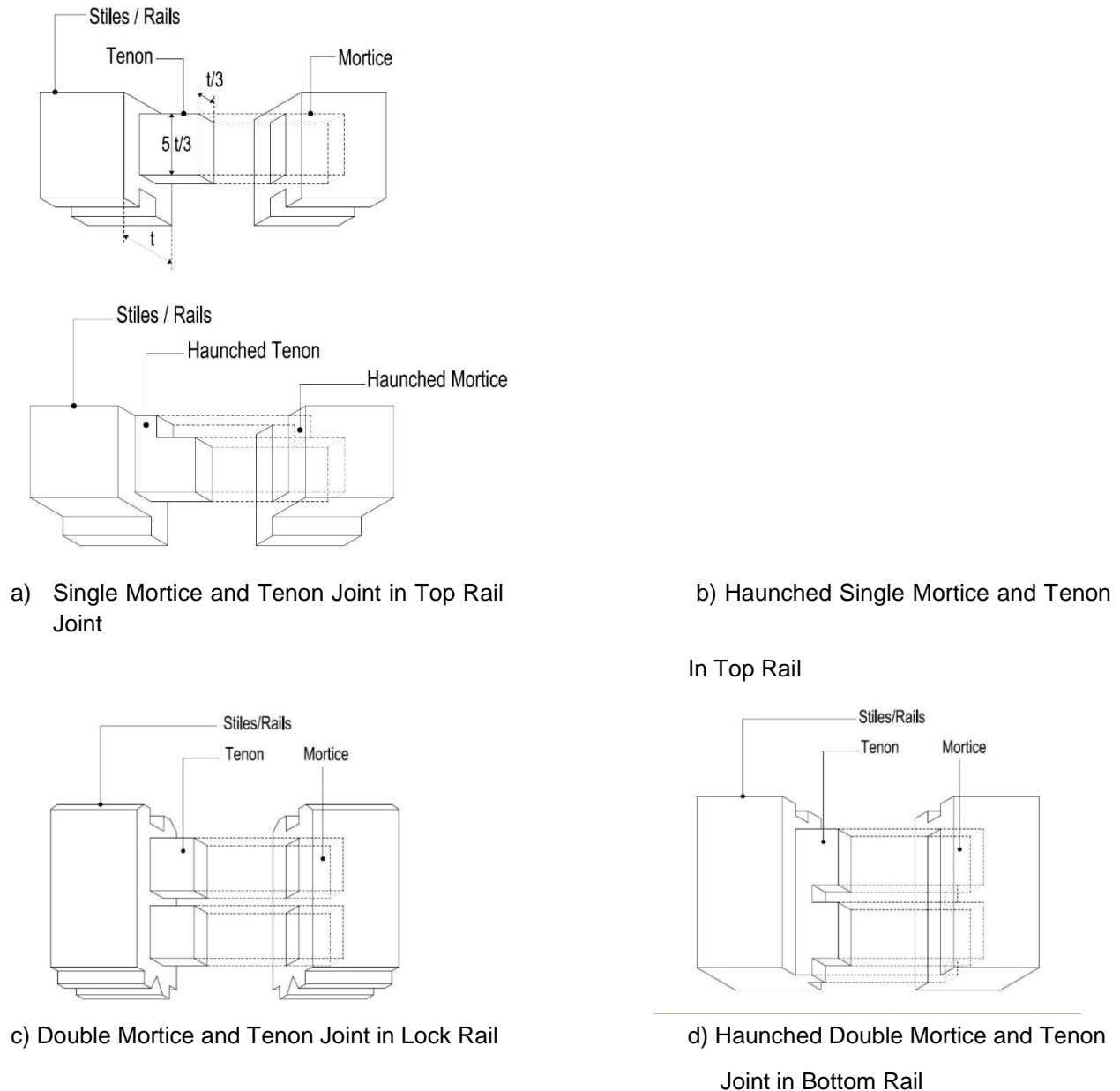


Fig.1 Typical illustration of tenon and haunched tenon in joinery

**5.1.2** 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.

**5.1.3** For fitting of shutter between rebates of the frame, a clearance of 1.5 mm shall be retained for the thickness of paint which is applied subsequently and also to meet the exigencies due to any swelling, etc.

**5.1.4** 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.

**5.1.5** Muntin and glazing bars shall be stub tenoned to the maximum depth which the size of the member would permit or to a depth of 25 mm, whichever is less.

**5.1.6** Some of the common methods for jointing of panels with stiles/rails are shown in **Fig. 2**. 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 5.6 to 6.12 for respective panel materials.

## 5.2 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 and wire gauge 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. 2**). The beading shall have a size not less than 15 mm x 10 mm and its profile shall be as agreed between the supplier and the purchaser. It can be fixed by suitably nailing or screwing.

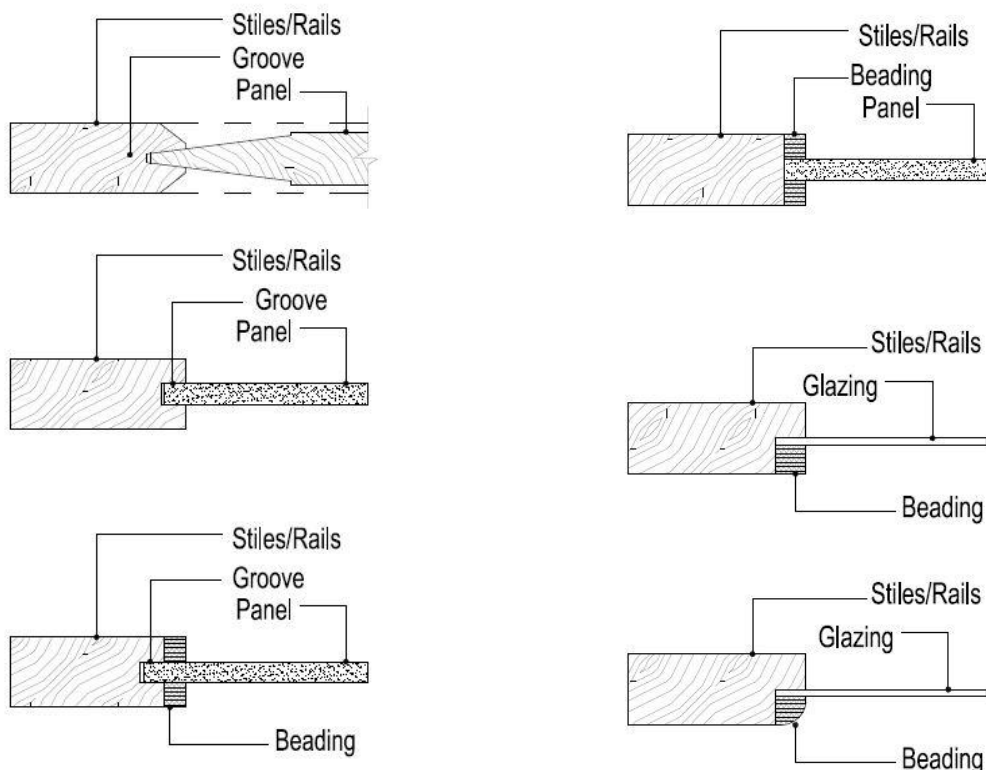


Fig. 2 Common method of jointing panels with stiles and rails

### **5.3 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  $0.5 \text{ m}^2$  in area. Beading may be done as 5.2.

### **5.4 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.

### **5.5 Prelaminated Particles Board Panelling**

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

### **5.6 Medium Density Wood Particle Board Panelling**

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.

### **5.7 Blockboard Panelling**

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

5.10.2 Block boards of 35 mm and 40 mm thick shall be used as flush doors without requiring stiles and rails.

### **5.8 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.

### **5.9 Wire Gauze Panelling**

Wire gauze panel shall be so designated that no single panel exceeds  $0.5 \text{ m}^2$  in area.

### **5.10 Glazing**

**5.10.1** 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.

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

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

**5.10.4** Wash leather, ribbon velvet, rubber flannel 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.

### 5.11 Rebating

In case of double-leaved shutters the meeting of the stiles shall be rebated either splayed or square type as shown in **Fig. 3**.

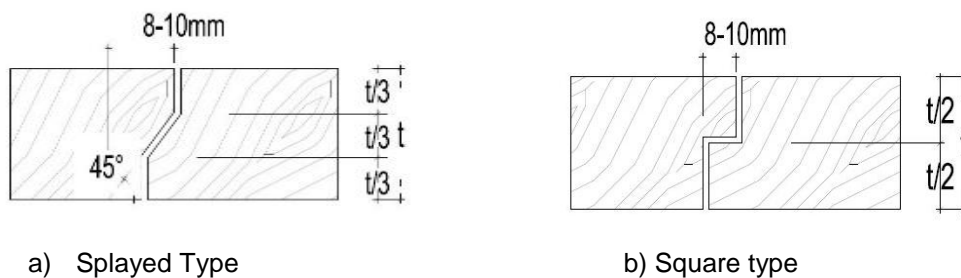


Fig.3 Meeting of stiles for double leafed shutter

### 5.12 Gluing of Joints

The contact faces of tenon and mortise shall be cleaned and treated with bulk type synthetic adhesives conforming to **FDBTS 348: 2021/IS 851: 1978** before putting together. The members shall be placed in proper position and further secured with suitable nails and screws. However, gluing of joints is optional and may be done with the agreement between the purchaser and the supplier.

## 6 Dimensions, Sizes and Tolerances

### 6.1 Dimensions of Components and Tolerances

The finished dimensions and tolerances of the different components of door shutters shall be as given in **Table 3**.

**Table 3: Sizes and Tolerances of Components of Door Shutters**

Sl.No	Descriptions	Width (mm)	Thickness (mm)
1	Vertical stile top and freeze rail	$120 \pm 3$	$35 \pm 1$ or $40 \pm 1$
2	Lock rail	$150 \pm 3$	$35 \pm 1$ or $40 \pm 1$



3	Bottom rail	$200 \pm 3$	$35 \pm 1$ or $40 \pm 1$
4	Intermediate Rail	$120 \pm 3$	$35 \pm 1$ or $40 \pm 1$
5	Muntin	$120 \pm 3$	$35 \pm 1$ or $40 \pm 1$
6	Glazing bar	$40 \pm 1$	$35 \pm 1$ or $40 \pm 1$

## 6.2 Sizes and Types

Sizes and types of the timber panelled and glazed shutters shall generally conform to the modular sizes specified in **Table 4** (see also **Fig. 4**). Sizes other than modular sizes as agreed to between the manufacturer and the purchaser may also be permitted.

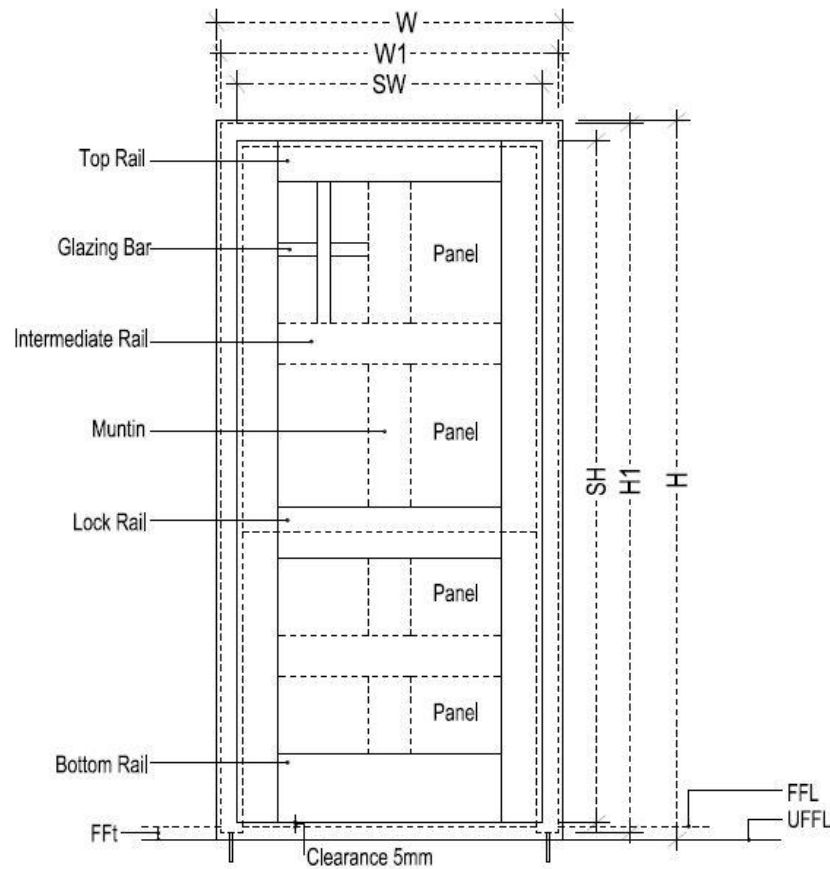


Fig.4 Sketch illustrating dimensions of shutter

**Table 4: Dimensions of Door Shutters**

Sl.No	Designation	Width (mm) SW = $W_1 - 2(a - 15)$		Height (mm) SH = $H_1 - a - FFt - 25$ , $H_1 - (a - 15) - 5 - FFt - 5$	
		Conifer (a = 90 mm)	Broadleaved (a = 65 mm)	Conifer (a = 90 mm)	Broadleaved (a = 65 mm)
1	12DS21	1040	1090	1975-FFt	2000-FFt
2	12DT21	1040	1090	1975-FFt	2000-FFt
3	11DS21	940	990	1975-FFt	2000-FFt
4	11DT21	940	990	1975-FFt	2000-FFt
5	10DS21	840	890	1975-FFt	2000-FFt
6	10DT21	840	890	1975-FFt	2000-FFt
7	9DS21	740	790	1975-FFt	2000-FFt
8	9DT21	740	790	1975-FFt	2000-FFt
9	8DS20	640	690	1875-FFt	1900-FFt
10	8DT20	640	690	1875-FFt	1900-FFt
11	7DS20	540	590	1875-FFt	1900-FFt
12	7DT20	540	590	1875-FFt	1900-FFt

Note:

1. SW is the shutter width and SH is the shutter height
2. For value of  $W_1$  and  $H_1$ , refer Table 4 of FDBTS 293: 2021
3. FFt is the floor finish thickness of the floor on which the particular door shall be installed. This value shall be as provided by the purchaser.

### 6.3 Tolerances

Tolerances on the sizes of door shutters shall be  $\pm 3\text{mm}$

## 7 Location of Fittings and Accessories

7.1 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 see **Fig.5**

7.2 Each door shutter shall be fixed to the door frame with hinges of the type specified by the purchaser (see **Fig.5**), as follows:

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

7.3 Spyhole if required shall be centrally located and placed at a height of 1200 mm to 1500 mm from finished floor level (see **Fig.5**)

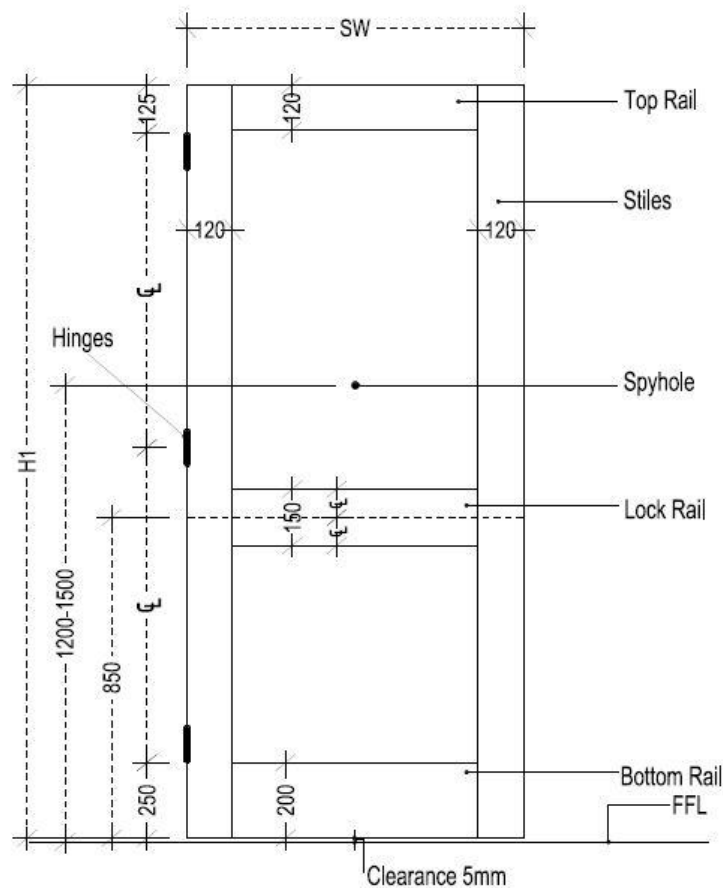


Fig.5 Location of fittings and accessories

## 8 Finishing

8.1 All shutter components exposed to view shall be sanded and finished smooth with minimum 200 grit abrasive.

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8.2 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.

8.3 In the case of timber shutter frames or timber panel inserts to be polished or varnished, a suitable wood primer shall be applied before delivery.

### **9 Tests**

Door shutters shall be subjected to the following tests.

#### **9.1 Dimensions and Squareness Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 2): 1998, 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.

#### **9.2 General Flatness Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 3): 1998, the twist, cupping and warping shall not exceed 6 mm.

#### **9.3 Local Planeness Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 4): 1998, the depth of deviation measured at any point shall not be more than 0.5 mm.

#### **9.4 Impact Indentation Test**

Door shutters, when tested in accordance with FDBTS 253: 2021 IS 4020 (Part 5): 1998, shall have no defects such as cracking, tearing or delamination and the depth of indentation shall not be more than 0.2 mm.

#### **9.5 Flexure Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 6): 1998, there shall not be any residual deflection of 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.

#### **9.6 Edge Loading Test**

Door shutters. when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 7): 1998, 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.

#### **9.7 Shock Resistance Test**

9.7.1 Door shutters, when tested in accordance with 2.1 of FDBTS 153: 2021 IS 4020 (Part 8): 1998, there shall be no visible damage in any part of the door after twenty five blows on each end.

9.7.2 Door shutters, when tested in accordance with 3.1 of FDBTS 153: 2021 IS 4020 (Part 8): 1998, 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.

### **9.8 Buckling Test**

Door shutters when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 9): 1998 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.

### **9.9 Slamming Test**

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

9.10.2 Door shutters, when tested in accordance with 2.1 of FDBTS 153: 2021 IS 4020 (Part 10): 1998 shall not have any visible damage in any part of the door at the end of 50 successive impacts.

9.10.3 Door shutters, when tested in accordance with 3.1 of FDBTS 153: 2021 IS 4020 (Part 10): 1998, shall not have any visible damage in any part of the door at the end of 100 successive impacts.

### **9.10 Misuse Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part II): 1998, there shall not be any permanent deformation of the fixing or any other part of the door set in hindering its normal working after the test.

### **9.11 Screw Withdrawal Resistance Test**

Door shutters, when tested in accordance with FDBTS 153: 2021 IS 4020 (Part 16): 1998, 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.

## **10 Marking**

All shutters shall be provided with the following information:

- a) Name of Manufacturer and trade-mark
- b) Timber Species
- c) Designation
- d) Batch number; and
- e) Month and year of manufacture.

## **11 Sampling**

In any consignment all the shutters of the same type, size and manufactured from the same species of wood under similar conditions of production shall be grouped together to constitute a lot. Samples shall be selected and tested from each lot separately to determine its conformity or otherwise to the requirements of this standard.

The number of samples to be selected at random from a lot for inspection shall depend upon the size of the lot (the number of frames in the lot) and shall be in accordance to the information given in the **Table 5**. All the frames selected in the sample shall be inspected for material, dimensions, tolerances, workmanship, joinery and finish.

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A frame, which is not meeting any one of the requirement, shall be considered as defective. A lot shall be considered as conforming to the requirements of this standard in case the number of defective frames found in the sample does not exceed the permissible number of defectives. However, the defective ones shall not be counted for supply.

**Table 5- Sample size and permissible number of defectives**

<b>Lot Size</b>	<b>Sample Size</b>	<b>Permissible number of Defectives</b>
26 to 50	8	0
51 to 100	13	1
101 to 150	20	1
151 to 300	32	1
301 to 500	50	2
501 and above	80	2

## 12 Information to be supplied by the Purchaser

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

- a) The purchaser shall provide drawings and details of requirements,
- b) Whether any other provisions has to be made;
- c) Whether the shutters are to be polished or painted.

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### ANNEX A

List of Commonly available/used timber species

**Note:** the timber classification is based on the Royalty Schedule approved by the Ministry of Agriculture and Forest. However the list is subjected to change as per the government directives

#### a) Special Class

Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
1	Acacia catechu	Broadleaved	Toeja	Toeja	Khair	Cutch tree	yes	yes	yes	yes
2	Aquilaria agalocha	Broadleaved	Agoor	Agoor	Aghoree	Agarwood	no	no	no	no
3	Cupressus	Conifer	Tshendey	Tshenden-shing	Dhupi	Cypress	yes	yes	yes	Yes
4	Dalbergia sissoo	Broadleaved	Jaseng	-	Sissoo	North Indian Rosewood	Yes	Yes	Yes	Yes
5	Juglans regia	Broadleaved	Ta-shing	Kheshing	Okhar	Walnut	Yes	Yes	Yes	Yes
6	Junipers spp.	Conifer	Shoop	Shookpu-shing	Dhupi	Juniper	yes	yes	yes	Yes
7	Morus laevigata	Broadleaved	Tshende	Phroom-tekpa shing	Kimbu	Himalayan Mulberry	Yes	Yes	Yes	Yes
8	Shorea robusta	Broadleaved	-	-	Sal	Sal tree	Yes	Yes	Yes	Yes
9	Taxus baccata	Conifer	Ha-shing	Keerang-shing	Dhengre salla	Yew	yes	yes	yes	yes
10	Tectona grandis	Broadleaved	-	-	Sagoon	Teak	Yes	Yes	Yes	Yes

**b) A Class**

Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
1	Acer spp.	Broadleaved	Chalam	Sermaling-shing	Kapasey	Maple	yes	yes	yes	yes
2	Albizia lebbeck	Broadleaved	Khrithang-shing	-	Kalo siris	Lebbek tree	yes	yes	yes	yes
3	Betula alnoides	Broadleaved	Taap	Char-shing	Saur	Birch	yes	yes	yes	yes
4	Betula bhutanica	Broadleaved	Taap	Chaar-shing	Bhoj Patra	Birch	yes	yes	yes	yes
5	Dipterocarpus macrocarpus	Broadleaved	-	Hollong	-	-	yes	yes	yes	yes
6	Duabanga grandiflora	Broadleaved	Patang shing	Bikaling shing	Lampatey	-	yes	yes	yes	yes
7	Gmelina arborea	Broadleaved	Gamar shing	Kholom shing	Gamari/Kha mari	Beechwood	yes	yes	yes	yes
8	Michelia champaca	Broadleaved	Kha-shing	Kar-shing	Champ	Champak tree	yes	yes	yes	yes
9	Phoebe goalparensis	Broadleaved	-	Sechanglu-shing	Bonsum	Assam Teak	yes	yes	yes	yes
10	Michelia excelsa	Broadleaved	-	Champay-shing	Rani champ	The Temple Magnolia Doltsopa	Yes	Yes	Yes	Yes



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Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
11	Pinus Bhutanica	Conifer	Tongphu	Chang-shing	Salla	Bhutan pine	Yes	Yes	Yes	Yes
12	Pinus wallichiana	Conifer	Tongphu	Chang-shing	Salla	Bluepine	Yes	Yes	Yes	Yes
13	Terminalia mycriocarpa	Broadleaved	-	-	Hollok/Panisaj	East Indian almond	Yes	Yes	Yes	Yes
14	Terminalia tomentosa	Broadleaved	-	-	Pakhasaj	Indian Laurel	Yes	Yes	Yes	Yes

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## c) B Class

Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
1	<i>Abies densa</i>	<i>Conifer</i>	Dung-shing	Waangshing	Gobresalla	Silver fir	Yes	Yes	Yes	Yes
2	<i>Acrocarpus framinifolious</i>	<i>Broadleaved</i>	-	-	Mandaney	Indian Ash	Yes	Yes	Yes	Yes
3	<i>Adina cordifolia</i>	<i>Broadleaved</i>	-	-	Haldu	Kadam	yes	yes	yes	yes
4	<i>Ailanthus grandis</i>	<i>Broadleaved</i>	-	-	Gokul	Tree of Heaven	No	No	No	No
5	<i>Alangium excelsa</i>	<i>Broadleaved</i>	-	-	Jhikri	Alangium	No	No	No	No
6	<i>Ammora willichii</i>	<i>Broadleaved</i>	-	-	Lali	Amoora wallichii King	Yes	Yes	Yes	Yes
7	<i>Artocarpus chaplasi</i>	<i>Broadleaved</i>	-	-	Latar	Jack tree	no	no	no	no
8	<i>Bohemeria regulosa</i>	<i>Broadleaved</i>	-	Dongtsong-Shing	Dhar	False nettles	No	No	No	No
9	<i>Bucklandia populea</i>	<i>Broadleaved</i>	-	-	Pipla	Pipli tree	Yes	Yes	Yes	Yes
10	<i>Bombax ceiba</i>	<i>Broadleaved</i>	Pema geyser	Pema geyser	Semal	Cotton tree	No	No	No	No

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Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
11	Cassia fistula	Broadleaved	-	Dhongkala say Shing	Sonalu	Indian laburnum	No	No	No	No
12	Cedrela toona	Broadleaved	Chhuen-shing	Rawa shing	Tooni	Chinese Mahagony	Yes	Yes	Yes	Yes
13	Chukrasia tabularis	Broadleaved	-	-	Chekrasi	White Cedar	Yes	Yes	Yes	Yes
14	Elaeocarpus spp.	Broadleaved	-	Gasha-thung shing	Bhadrase	Wooden begar (Olive fruited)	Yes	Yes	Yes	Yes
15	Larix griffithii	Conifer	Zaashi	-	Bhangre salla	Larch	Yes	Yes	Yes	Yes
16	Phoebe bainesiana	Broadleaved	-	-	Aangare	Bonsum	Yes	Yes	Yes	Yes
17	Picea spinulosa	Conifer	Bashi	-	-	Spruce	Yes	Yes	Yes	Yes
18	Pinus roxburghii	Conifer	Theytong	Roinangshing	-	Chirpine	Yes	Yes	Yes	Yes
19	Schima wallichii	Broadleaved	Puyam	Zalashing	Chiluane	Chinese Guggar tree	Yes	Yes	Yes	Yes
20	Tsuga dumosa	Conifer	Sah shing	-	Dengre salla	Hemlock	Yes	Yes	Yes	Yes
21	Alnus spp.	Broadleaved	Gama shing	Gamo shing	Utis	Nepal Black Sedar	No	No	No	No

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Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
22	Anthocephalus kadamba	Broadleaved	-	-	Kadam	burflower-tree	Yes	Yes	Yes	Yes
23	Artocarpus hirsuta	Broadleaved	-	-	Aini/Koko	Wildjack or Jungle Jack	no	no	no	no
24	Castonopsis spp.	Broadleaved	Sokay	Tshai shing	Katus	chinquapin or chinkapin	Yes	Yes	Yes	Yes
25	Cinnimomum obtusifolium	Broadleaved	-	-	Gansarai	Cinnamom tree	yes	yes	yes	yes
26	Garuga pinnata	Broadleaved	-	-	Dabdabe	Garuga	No	No	No	No
27	Lagerstroemia spp.	Broadleaved	-	-	Sidha	Pride of India or Queen Crape Myrtle	Yes	Yes	Yes	Yes
28	Machilus spp	Broadleaved	-	-	Kawla	-	Yes	Yes	Yes	Yes
29	Nyssa javanica	Broadleaved	-	-	Lekh chailauna	-	Yes	Yes	Yes	Yes
30	Prunus nepalensis	Broadleaved	-	-	Arupata	Prunus	Yes	Yes	Yes	Yes
31	Pterospermum acerifolium	Broadleaved	-	-	Hathipaile	Dinner plate tree, Maple leafed Bayur tree, Bayur tree	Yes	Yes	Yes	Yes
32	Sterculia villosa	Boardleaved	-	Frang shing	Odal	Elephant Rope tree	No	No	No	No

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Sl. No	Scientific Name	Timber Type	Local Name				Use			
			Dzongkha	Sharchhop	Lhotsham	English	Door & Window (Shutter)	Door & Window (Frame)	Flooring	Panelling
33	Syzygium spp.	Broadleaved	-	Mentsu say shing	Jamun/Ambake	Jamun tree	Yes	Yes	Yes	Yes
34	Tetrameles nidiflora	Broadleaved	-	-	Maina	Tetrameles	No	No	No	No
35	Quercus spp.	Broadleaved	Bjishing	-	-	Oak	Yes	Yes	Yes	Yes

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### WOOD AND TIMBER PRODUCTS TECHNICAL COMMITTEE (TC 07)

#### **Organization**

#### **Representative(s)**

Forest Resource Division,  
Natural Resources Development Corporation Limited

(Chairperson)  
Mr. Ashit Chhetri

Bhutan Board Products Limited

(Members)  
Mr. Gayleg Dorji

Wood Craft Centre Limited

Mr. Sonam Tshering

Department of Forests and Park Services  
Ministry of Agriculture and Forest

Mr. Tashi Norbu Waiba

Association of Wood based Industries

Mr. Sangay Gyeltshen

Department of Engineering Services,  
Ministry of Works & Human Settlement

Mr. Karma Tenzin

Department of Engineering Services,  
Ministry of Works & Human Settlement

Mr. Tshering Norbu

Thimphu Thromde

Mr. Sonam Tshering

Bhutan Standards Bureau

Mr. Sherab Tenzin,  
Director General  
(Ex-officio member)

#### **Member Secretary**

Chenzom  
Standardization Division  
Bhutan Standards Bureau

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### **TIMBER DOORS AND WINDOWS SUB-COMMITTEE (TC-07/SC-02)**

#### ***Organization***

Department of Engineering Services,  
Ministry of Works & Human Settlement

Thimphu Thromde

Department of Engineering Services,  
Ministry of Works & Human Settlement

Ongdi Timber Industries

#### ***Representative(s)***

##### **(Chairperson)**

Mr. Tshering Norbu

##### **(Members)**

Mr. Sonam Tshering

Mr. Karma Tenzin

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#### **Member Secretary**

Chenzom  
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