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लकड़ी के सपाट दरवाजे के शटर  
(सेलुलर, खोखले एवं ट्यूबलर प्रकार के कोर) —  
विशिष्टि

भाग 2 पार्टिकल बोर्ड, उच्च घनत्व फाइबर बोर्ड,  
मध्यम घनत्व फाइबर बोर्ड एवं फाइबर हार्डबोर्ड सतहयुक्त पल्ले  
( चौथा पुनरीक्षण )

**Wooden Flush Door Shutters  
(Cellular, Hollow and Tubular Core  
Type) — Specification**

**Part 2 Particle Board, High Density Fibre Board, Medium  
Density Fibre Board and Fibre Hardboard Face Panels**

( Fourth Revision )

ICS 91.060.50

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## FOREWORD

This Indian Standard (Part 2) (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 1962 and subsequently revised in 1966, 1980 and 1983. During this period the standard has undergone modifications relating to grade of doors, species of timber, inclusion of tests, etc and the sizes were rationalized.

Considering the rapid changes in lifestyle as well as material availabilities and acceptance of ecofriendly options in door constructions during the last four decades, this fourth revision is a major makeover. Wooden flush door shutters using particle board, high density fibre board (HDF), medium density fibre board (MDF) and hardboard for face panels are generally manufactured in the same way as the doors with plywood face panels.

In this revision, the following major modifications have been incorporated:

- a) Medium Density fibre board (MDF) and High density fibre board (HDF) have been included as face panel materials ;Tubular type core has been added and accordingly the title and scope of the Indian standard have been modified.
- b) Wooden flush door shutters (cellular, hollow and tubular core type) have been categorized in two grades that is BWP (Boiling Water Proof) Grade and MR (Moisture Resistance) Grade.
- c) Thickness criteria for wooden flush door shutter for all designations have been revised.
- d) Raw materials requirements have been modified as per new grades of wooden flush door shutters (cellular, hollow and tubular core type).
- e) Amendments issued to the previous version of the standard have been absorbed, and the text of the standard has been suitably modified to make it more user friendly.

A scheme of labelling environment friendly products known as ECO-Mark has been instituted at the instance of the Ministry of Environment, Forests and Climate Change, Government of India. The ECO-Mark is administered by the Bureau of Indian Standards (BIS) under the *Bureau of Indian Standards Act, 2016* as per the Resolution No. 71 dated 21 February 1991 and Resolution No. 425 dated 20 October 1992 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 (ISI mark) of BIS besides meeting additional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the Eco logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for eco friendliness, will be optional. Manufacturing units will be free to opt for ISI Mark alone also.

The ECO-Mark criteria is based on the Gazette Notification No. 170 dated 16 May 1996 for wood substitutes as environment friendly products published in the Gazette of Government of India, as revised/amended from time to time.

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

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 : 2022 'Rules for rounding of numerical values (*second revision*)'. 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*

# WOODEN FLUSH DOOR SHUTTERS (CELLULAR, HOLLOW AND TUBULAR CORE TYPE) — SPECIFICATION

## PART 2 PARTICLE BOARD, HIGH DENSITY FIBRE BOARD, MEDIUM DENSITY FIBRE BOARD AND FIBRE HARDBOARD FACE PANELS

(*Fourth Revision*)

### 1 SCOPE

This standard (Part 2) specifies the requirements of wooden flush door shutters of cellular, hollow and tubular core type with face panels of particle board and high density fibre board (HDF), medium density fibre board (MDF) and fibre hardboard face panels.

### 2 REFERENCES

The standards listed 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 in Annex A.

### 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 which 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 GRADE, TYPE AND CONSTRUCTION

**4.1 Flush door shutters shall be of the following two grades:**

- a) *BWP (Boiling Water Proof) Grade* — Such flush door shutters may be used in both humid and dry locations.
- b) *MR (Moisture Resistance) Grade* — Such flush door shutters may be used in dry locations.

**4.2** Each of the grades specified in 4.1 shall be of the different types and construction of the core as given in Table 1.

### 5 SIZES AND TOLERANCES

Sizes and thickness of the door shutters shall 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 Table 2.

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.

### 6 MATERIAL

#### 6.1 Timber

Any Species of timber for may be used as stiles and rails in the flush door shutters. The species of timber suitable for use in the stiles, rails and lipping core of flush door shutters for guidance purpose as specified in IS 2191 (Part 1). Moisture content and permissible defects therein and preservative treatment required for use in the core and lipping shall conform to the relevant requirements laid down in IS 2191 (Part 1).

#### 6.2 Alternative Materials

Laminated veneer lumber (LVL) conforming to IS 14616, veneer laminated lumber (VLL) conforming to IS 16171, medium density fibre board (MDF) conforming to Grade 1 of IS 12406, high density fibre board (HDF), plywood conforming to IS 710 and IS 303 for BWP grade flush door shutter and MR grade flush door shutter respectively, may also be used for stiles and rails.

**Table 1 Designation of Wooden Flush Door Shutters, Solid Core Type with Particle Board; HDF, MDF and Fibre Hardboard Face Panels**

[Clauses 4.2 and 13.1 (c)]

Sl No. (1)	Core (2)	Type (3)	Abbreviation (4)
i)	Cellular	Decorative with skins of decorative veneered/prelaminated particle board/HDF/MDF	C D P V
		Non-decorative with skins of particle boards/MDF/HDF unveneered	C N P
		Non-decorative with skins of particle board/HDF/MDF veneered with commercial veneers	C N P V
ii)	Hollow	Decorative with skins of decorative veneered/prelaminated particle board/HDF/MDF	H D P V
		Non-decorative (paintable) with skins of particle boards/MDF/HDF unveneered	H N P
		Non-decorative (paintable) with skins of particle board/HDF/MDF veneered with commercial veneers	H N P V
iii)	Tubular	Decorative with skins of decorative veneered/prelaminated particle board/HDF/MDF	T D P V
		Non-decorative (paintable) with skins of particle board/MDF/HDF unveneered	T N P
		Non-decorative (paintable) with skins of particle board/HDF/MDF veneered with commercial veneers	T N P V

**Table 2 Dimensions of Flush Door Shutters**

[Clauses 5 and 13.1 (e)]

Sl No. (1)	Designation of Door Shutters (2)	Width mm (3)	Height mm (4)	Thickness mm (5)
i)	8 DS 20	700	1 905 (1 945)	} 25 or 30
ii)	8 DS 21	700	2 005 (2 045)	
iii)	9 DS 20	800	1 905 (1 945)	} 30
iv)	9 DS 21	800	2 005 (2 045)	
v)	10 DS 20	900	1 905 (1 945)	} 35
vi)	10 DS 21	900	2 005 (2 045)	
vii)	12 DT 20	1 100*	1 905 (1 945)	} 35
viii)	12 DT 21	1 100*	2 005 (2 045)	

## NOTES

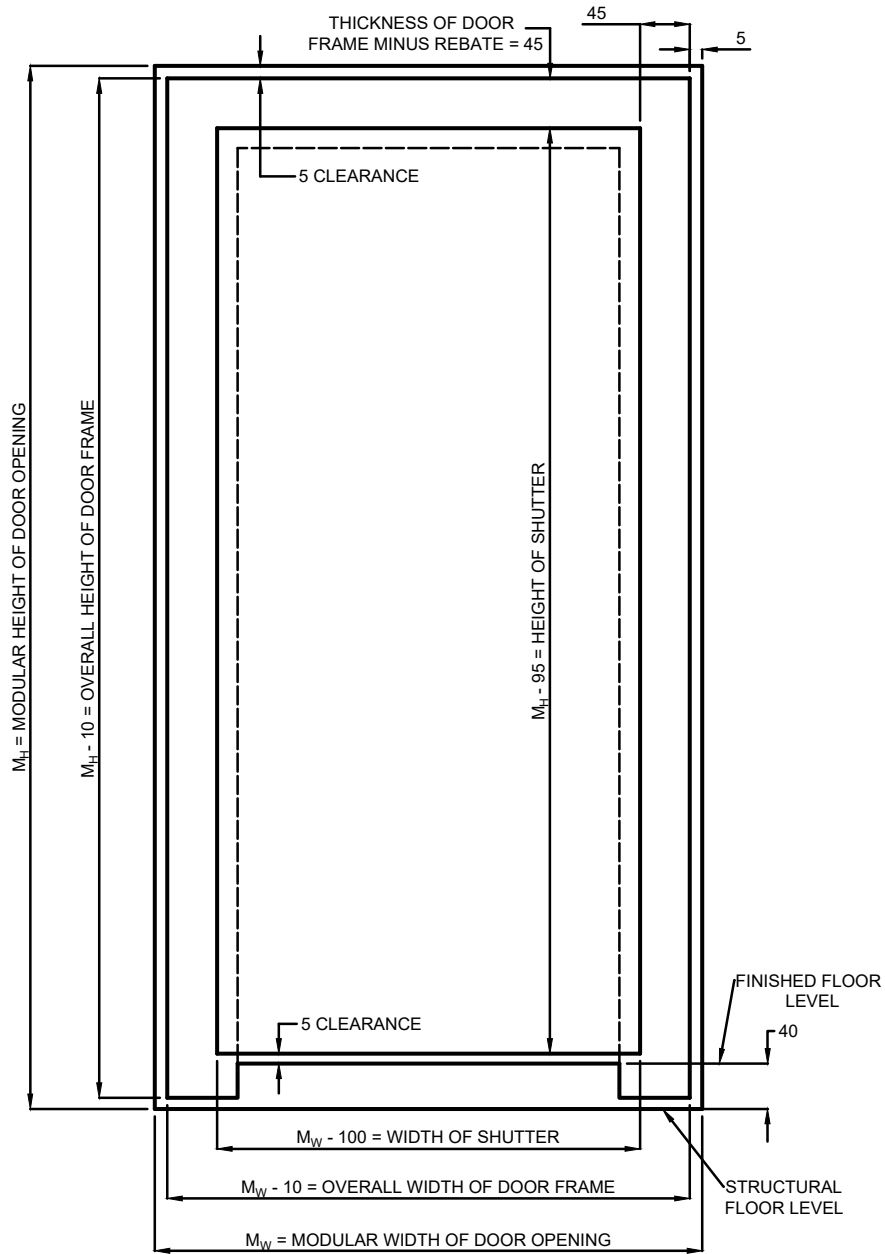
1 D = Door, S = Single Shutter, and T = Double Leaf Shutter.

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 and 4351.

4 In arriving at the standard widths and heights of flush door shutters, allowance have been made as given in Fig. 1. In case, the modular height of door opening is taken from finished floor level, the height of the flush door shall be the one given in the bracket. In case of double shutters, the rebate shall be as given in 7.8 of IS 2191 (Part 1).

\*Combined width of two shutters in closed position



All dimensions in mm

FIG. 1 TYPICAL SKETCH ILLUSTRATING DIMENSIONS OF SHUTTER

### 6.3 Face Panels: Particle Board/HDF/MDF/Fibre Hardboard

**6.3.1** Particle board used for face panel of flush door shutters of C N P, H N P and T N P types shall conform to FPT-1 designation of IS 3087.

**6.3.2** MDF board and HDF board used for face panel of flush door shutters of C N P, H N P and T N P types shall conform to requirements of Grade 1 of IS 12406 and except the density of HDF shall be more than 900 kg/m<sup>3</sup>.

**6.3.3** For C D P V, H D P V and T D P V types of flush door shutters, face panel of veneered particle board of SO D-I type conforming to IS 3097, prelaminated particle board of Grade I conforming to IS 12823, prelaminated MDF board of Grade I conforming to IS 14587 and HDF conforming to requirements of Grade 1 of IS 12406 and except the density of HDF shall be more than 900 kg/m<sup>3</sup>.

**6.3.4** For flush door shutters of C N P V, H N P V and T N P V, the face panel of veneered particle board of SO GP-I type conforming to IS 3097, particle board of FPT-I or XPS conforming to IS 3087, MDF board and HDF board conforming to requirements Grade 1 of IS 12406 except density of HDF board shall be more than 900 kg/m<sup>3</sup>, with commercial veneers conforming to IS 14315 shall be used.

**6.3.5** For shutters with fibre hardboard face, tempered hardboard conforming to IS 1658 shall be used.

### 6.4 Adhesive

Adhesives used for bonding face panels to core shall be adhesive conforming to BWP grade and MR grade as specified in IS 848 for BWP grade flush door shutter and MR grade flush door shutter respectively.

**6.5** The swelling in thickness of the particle board, MDF and HDF board for core when tested in accordance with IS 2380 (Part 17) shall not exceed 5 percent.

## 7 CONSTRUCTION

**7.1** The construction of flush doors shall be in accordance with the relevant requirements laid down in IS 2191 (Part 1) with modifications as in **7.2** and **7.3**.

### 7.2 Face Panel

The particle board or MDF board, HDF board with or without surface facing for the face panel shall be not less than 3 mm thick in the case of cellular or tubular core flush doors and not less than 6 mm thick in the case of hollow core flush doors. Hardboard, if used, for the face panel shall be not less than 3 mm in thickness in the case of tubular core flush doors and not less than 6 mm in thickness in the case of hollow core flush doors. The panel shall be glued under pressure on both

faces of the core by the hot or high frequency press or cold press process.

**7.3** Flush door shutters with particle board or MDF board or HDF board or fibre hardboard face panels shall have their edges lipped by timber external lipping of any of the species mentioned in Annex B of IS 2191 (Part 1) for guidance or by any other edge banding (as agreed to between the manufacturer and the purchaser) and shall be glued using a moisture resistance glue.

## 8 FITTINGS

### 8.1 Locks

Shutters shall be shop-prepared for taking mortice locks or latches as may be ordered. Shop preparing the door with morticed holes for lock fixing shall be done only when desired by the purchaser. Where the purchaser so desires, suitable blocks of wood or LVL or VLL may be provided for fixing the hardware. In the absence of specific requirements, block preferably correspond to the maximum size of lock covered in IS 16015.

**8.2** Other fittings such as pull bolt, tower bolt, doors handle etc, may be provided as agreed to between the purchaser and the manufacturer.

## 9 WORKMANSHIP AND FINISH

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

**9.2** When face panels are unfinished, both faces of the door shutter shall be smooth even texture. If required by the purchaser, all 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 purchaser, *see also* IS 2338 (Part 1).

**9.3** Workmanship and finish of face panels shall conform to the requirements of respective grades/types as mentioned in **6.3** and also, if desired, as agreed to between the manufacturer and the purchaser.

## 10 TESTS

**10.1** The various test and requirements for flush door shutters shall be as laid down in **10** and **11** of IS 2191 (Part 1) except knife test and with the modification in the two tests as given in **10.2** and **10.3**.

### 10.2 End Immersion Test

When tested in accordance with IS 4020 (Part 13), there shall be no delamination at the end of the test. Glue lines in between the face panels and the stile and rail shall be examined for delamination. The immersion cycles for MR grade door shutter shall however be three.

### 10.3 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 occurred between the face panels and the stile and rail. Delamination at a knot, knot hole, a pitch pocket and wormhole 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. However, in the test for MR grade door shutter, the water with submerged specimens shall be brought to  $(60 \pm 2)$  °C in the place of boiling water.

## 11 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling and criteria for conformity for flush door shutters shall be as laid down in 12 of IS 2191 (Part 1).

## 12 ADDITIONAL REQUIREMENTS FOR ECO MARK

Particle board, MDF board, HDF board and fibre hardboard face panels shall be manufactured from agricultural or industrial wastes or wood residues or wood from sources other than natural forests such as timber from industrial and social forestry plantations, shade trees from tea and coffee estates, etc in addition to those specified in this standard and face panels shall conform to the requirements of quality and performance as specified in this standard as well as the specific requirements 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 manufacturers shall produce 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.

## 13 MARKING

13.1 Each shutter shall be legibly and indelibly marked on any of its faces/edges with the following information on a sticker:

- a) Name of the manufacturer or trade-mark, if any;
- b) Grade of door shutter;
- c) Abbreviation indicating the nature of construction of the shutter (*see* Table 1);
- d) Whether the size of the shutter is 'Modular' or 'Non-modular';
- e) 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 symbols for door shutters as given in Table 2;
- f) Thickness of door shutters;
- g) Species of timber, in case of ECO Mark; and
- h) The criteria for which the shutter has been labelled as ECO-Mark (in case the door shutter has been marked with ECO-Mark).

### 13.2 BIS Certification Marking

The shutters conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the shutters may be marked with the Standard Mark.

## ANNEX A

(Clause 2)

## LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
303 : 1989	Plywood for general purposes — Specification ( <i>third revision</i> )	3097 : 2006	Veneered particle boards — Specification ( <i>second revision</i> )
707 : 2011	Timber technology and utilization of Wood, Bamboo and Cane — Glossary of Terms ( <i>third revision</i> )	4020 (Part 1 to 16) : (1998)	Door Shutters — Methods of Tests ( <i>third revision</i> )
710 : 2010	Marine plywood — Specification ( <i>second revision</i> )	4021 : 1995	Timber door, window and ventilator frames — Specification ( <i>third revision</i> )
848 : 2006	Synthetic resin adhesives for plywood (phenolic and aminoplastic) — Specification ( <i>second revision</i> )	4351 : 2003	Steel door frames — Specification ( <i>second revision</i> )
1658 : 2006	Fibre hardboards — Specification ( <i>third revision</i> )	10428 : 1983/ ISO 1804 : 1972	Glossary of terms relating to doors
2191 (Part 1) : 2022	Wooden flush door shutters (cellular, hollow and tubular core type) — Specification : Part 1 Plywood face panels ( <i>fifth revision</i> )	12406 : 2021	Medium density fibre boards for general purpose — Specification ( <i>second revision</i> )
2338 (Part 1) : 1967	Code of practice for finishing of wood and wood based materials: Part 1 Operations and workmanship	12823 : 2015	Prelaminated Particle boards from wood and other lignocellulosic material — Specification ( <i>first revision</i> )
2380 (Part 17) : 1977	Methods of test for wood particle boards and boards from other lignocellulosic materials: Part 17 Determination of swelling in water ( <i>first revision</i> )	14587 : 1998	Prelaminated medium density fibre board — Specification
3087 : 2005	Particle boards of wood and other lignocellulosic materials (medium density) for general purposes — Specification ( <i>second revision</i> )	14616 : 1999	Laminated veneer lumber — Specification
		16015 : 2013	Mortice locks with lever mechanism (vertical type, sliding door locks and dead locks) — Specification
		16171 : 2014	Veneer laminated lumber — Specification



## ANNEX B

(Foreword)

## COMMITTEE COMPOSITION

Doors, Windows and Shutters Sectional Committee, CED 11

<i>Organization</i>	<i>Representative(s)</i>
In Personal Capacity (B-094, Trinity Towers DLF Phase – V, Sector 53, Gurugram 122002, Haryana)	SHRI R. K. KAKAR ( <b>Chairman</b> )
A B Composites Private Limited, Kolkata	REPRESENTATIVE
A P Road and Buildings, Hyderabad	CHIEF ENGINEER (R & B)
APL Apollo Tubes Limited, Noida	SHRI TAPESH GUPTA
Aluminum Association of India, Bengaluru	DR PRADYUMNA KUMAR PRADHAN
B G Shirke Construction Technology Ltd, Pune	COL (RETD) SANJAY M. ADSAR SHRI Y. B. PATHAN ( <i>Alternate</i> )
Bhoruka Extrusions Private Limited, Mumbai	SHRI SEIJI KUMAMOTO SHRI OM PRAKASH VERMA ( <i>Alternate</i> )
Builders Association of India, Chennai	SHRI SUDIP KUMAR DUTTA SHRI M. SATHYANARAYANAMURTHY ( <i>Alternate</i> )
Building Material and Technology Promotion Council, New Delhi	SHRI C. N. JHA SHRI D. P. SINGH ( <i>Alternate</i> )
Central Institute of Plastics Engg. and Technology, Chennai	DR S. N. YADAV DR R. K. SINGH ( <i>Alternate</i> )
Central Public Works Department, New Delhi	SHRI A. K. SHARMA MS NANDINI MUKHOPADHYAY ( <i>Alternate</i> )
CSIR-Central Building Research Institute, Roorkee	DR B. SINGH DR SUKHDEO RAO KARADE ( <i>Alternate</i> )
Delhi Development Authority, New Delhi	REPRESENTATIVE
Engineers India Limited, New Delhi	SHRI SAMIR DAS MS JYOTSNA SHRIDHAR ( <i>Alternate I</i> ) SHRI AKHILESH MAURYA ( <i>Alternate II</i> )
Forest Research Institute, Dehradun	SHRI VIMAL KOTHIYAL SHRI D. P. KHALI ( <i>Alternate</i> )
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Gujarat State Forest Development Corporation Limited, Vadodara	SHRI R. K. SUGOOR SHRI A. K. GANDHI ( <i>Alternate</i> )
Hindalco Industries Limited, Mumbai	SHRI A. JAYAGOPAL SHRI CHANDAN AGRAWAL ( <i>Alternate</i> )
Indian Buildings Congress, New Delhi	SHRI A. K. SRIVASTAVA
Indian Plywood Industries Research and Training Institute, Bengaluru	SHRI ANAND NANDANWAR
Jindal Aluminium Limited, Bengaluru	REPRESENTATIVE
Military Engineer Services, Engineer-in-Chief's Branch, Integrated HQ of MoD (Army), New Delhi	SHRIMATI UPINDER KAUR SHRIMATI SHOBHANA V. ( <i>Alternate</i> )
Ministry of Micro, Small & Medium Enterprises, New Delhi	SHRI G. RAJAMONICKAM SHRI K. K. FUNDA ( <i>Alternate</i> )

**IS 2191 (Part 2) : 2022**

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Modern Fabrications, Kolkata	REPRESENTATIVE
NBCC (India) Ltd, New Delhi	SHRI M. C. SHARMA SHRIMATI RESHMA DUDHANI ( <i>Alternate</i> )
National Bamboo Mission, New Delhi	MISSION COORDINATOR
National Test House, Kolkata	SHRI D. V. S. PRASAD SHRI ALOKE DE ( <i>Alternate</i> )
Northern Indian Plywood Manufacturer Association, Yamuna Nagar	SHRI N. K. TIWARI
Public Works Department, Govt of NCT of Delhi, New Delhi	REPRESENTATIVE
Polywindows, Pune	SHRI PARMESH ARORA
Rajasthan Housing Board, Jaipur	SHRI B. N. MOOLCHANDANI SHRI D. C. BABEL ( <i>Alternate</i> )
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Research Designs and Standards Organization, Lucknow	REPRESENTATIVE
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Sleek Boards India LLP, Pune	SHRI NITIN VAZE SHRI AMIT VAZE ( <i>Alternate</i> )
Spacewood Furnishers Pvt Ltd, Nagpur	SHRI SHIRISH BHATT SHRI VIVEK DESHPANDE ( <i>Alternate</i> )
The Indian Institute of Architects, New Delhi	REPRESENTATIVE
U.P. Awas Evam Vikas Parishad (U P Housing & Development Board), Lucknow	REPRESENTATIVE
UPVC Windows and Door Manufactures Association, New Delhi	SHRI MARIO SCHMIDT SHRI ULLAS GULIANI ( <i>Alternate</i> )
Uttaranchal Plywood Manufacturers Association, Ramnagar	REPRESENTATIVE
BIS Directorate General	SHRI SANJAY PANT, SCIENTIST 'F' AND HEAD (CIVIL ENGINEERING) [REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> )]

*Member Secretary*

SHRI PRADEEP SINGH SHEKHAWAT  
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### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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