

P-3938017
30/06/2022

Inter Office Note
(Prov Dte)

No. U.II-98/2021-22-Prov(QRs Uploading)-14
Dated, the 28 June 2022

Sub : Reg. Uploading of QRs/Specification of Hard Board Cot (MDF) to CRPF website.

As per MHA U.O No. U.II-11/2011-12-Prov(Clo) dated 12/12/2011 has been authorized Hard Board Cot (MDF) with a life of 12 years replacing 80% of existing Cotton-Tape Niwar Steel Cot. Hence, QRs/Specification of Hard Board Cot (MDF) adopted by this organization is not uploaded in CRPF website.

Sl. No.	Name of Item	QRs/Specification No.
01	Hard Board Cot (MDF)	QRs/Specification of Folding Cot Steel Frame made out of steel tubular construction with ISI marked confirming to IS:1161/2014 (Fifth revision) (reaffirmed 2013) (as per DGS&D Drawing No. DGS&D/GE/FC/246) and QRs/Specification of MDF Board size of 2100x900x17 mm conforming to IS:12406/2003 (latest reaffirmation) (as per DGS&D Drawing No. DGS&D/GE/FC/246)

2. It is requested to upload the above QR/Specification on CRPF website at the earliest. Copy of above QRs/Specification is enclosed herewith for n/a please.


DIG (Prov) Dte

DIG (IT) Dte

इस्पात नलिकाएँ सरचनात्मक
उपयोगों के लिये — विशिष्टि
(पाँचवाँ पुनरीक्षण)

Steel Tubes For Structural
Purposes — Specification
(Fifth Revision)

ICS 77.140.75; 91.220



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Price Group 3

FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Steel Tubes, Pipes and Fittings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1958 and revised in 1963, 1968, 1979 and 1998, respectively. While reviewing this standard, the Committee has felt it necessary to revise this Indian Standard with the following modifications:

- a) A new Grade YSt 355 has been incorporated.
- b) All amendments have been incorporated.

In the formulation of this standard, due consideration has been given to the trade practices followed in the country in this field. Due consideration has also been given to international co-ordination among the standards prevailing in different countries. Assistance has been derived from the following publications:

ISO 4200 : 1991	Plain end steel tubes, welded or seamless — General tables of dimensions and masses per unit length, issued by International Organization for Standardization
ISO 10799-1 : 2011 (E)	Cold formed welded structural hollow sections of non-alloy and fine grain steel Part 1 (for YSt 355 grade)
ISO 12633-1 : 2011 (E)	Hot finished structural hollow sections of non-alloy and fine grain steel Part 1 (for YSt 355 grade)
BS EN 10219-1 : 2006	Cold formed welded Structural hollow sections of non-alloy and fine grain steel (for YSt 355 grade)

This standard contains clauses 6.1.3, 9.1, 10.1 and 11.5.2 which call for agreement between the purchaser and the manufacturer.

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

STEEL TUBES FOR STRUCTURAL PURPOSES — SPECIFICATION

(Fifth Revision)

1 SCOPE

This standard covers the requirements for hot finished seamless (HPS), and electric resistance welded (ERW) or high frequency induction welded (HFIW) steel tubes for structural purposes.

2 REFERENCES

The following standards contain provisions which through reference 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 agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
228 (in parts)	Method of chemical analysis of steel
1239 (Part 1) : 2004	Mild steel tubes, tubulars and other wrought steel fittings: Part 1 Mild steel tubes (sixth revision)
1387 : 1993	General requirements for the supply of metallurgical material (second revision)
1608 : 2005/	Metallic materials — Tensile testing at ambient temperature
ISO 6892 : 1998	(third revision)
2328 : 2005/	Metallic materials — Tube flattening test on metallic tubes (second revision)
ISO 8492 : 1998	
2329 : 2005/	Metallic materials — Tube (in full section) — Bend test (second revision)
ISO 8491 : 1998	
4711 : 2008	Methods for sampling of steel pipes, tubes and fittings (second revision)
4736 : 1986	Hot-dip zinc coatings on mild steel tubes (first revision)
4740 : 1979	Code of practice for packaging of steel tubes (first revision)
10748 : 2004	Hot-rolled steel strip for welded tubes and pipes (second revision)
2062 : 2011	Hot rolled Low, Medium and High tensile structural steel (seventh revision)

3 DESIGNATION

Steel tubes covered by this standard shall be designated by their nominal bore and wall thickness (see Table 1). They shall be further graded as YSt 210, YSt 240, YSt 310 and YSt 355 depending on the yield strength of the material (see Table 2). The designation of the steel tubes shall, therefore, include the nominal bore of the tube and grade of the material.

4 SUPPLY OF MATERIAL

General requirements relating to the supply of the steel tubes for structural purposes shall conform to IS 1387.

5 MATERIAL

Steel tubes shall be manufactured through one of the following processes as given in Table 3 and shall be supplied in conditions as shown therein:

- Hot finished seamless (HPS);
- Cold finished seamless (CDS); and
- Electric resistance welded or high frequency induction welded (ERW or HFIW).

NOTE — Tubes made by manual welding are not covered by this standard.

6 DIMENSIONS AND WEIGHTS

6.1 The standard sizes and mass of tubes for structural purposes shall be as given in Table 1.

6.1.1 Some geometrical properties of the steel tubes are also given in Table 1 for information.

6.1.2 Tubes of thickness lower than the specified minimum thickness of tube, as shown in Table 1 shall not be permissible.

6.1.3 Tubes of thickness higher than the specified minimum thickness of tube, as shown in Table 1 may be supplied, if so mutually agreed to between the purchaser and the manufacturer.

Table 1 Sizes and Properties of Steel Tubes for Structural Purposes
(Clauses 3.1, 6.1, 6.1.1, 6.1.2 and 6.1.3)

NB	OD	Thk	Mass	Area of Cross- Section	Internal Volume	Surface		Moment of Inertia	Modulus of Section	Radius of Gyration	Square of Radius of Gyration
mm (1)	mm (2)	mm (3)	kg/m (4)	cm ² (5)	cm ³ /m (6)	External cm ² /m (7)	Internal cm ² /m (8)	cm ⁴ /m (9)	cm ³ (10)	cm (11)	cm ² (12)
15	21.3	2	0.952	1.21	235	669	543	0.57	0.54	0.69	0.47
	21.3	2.6	1.20	1.53	204	669	506	0.68	0.64	0.67	0.45
	21.3	3.2	1.43	1.82	174	669	468	0.77	0.72	0.65	0.42
20	26.9	2.3	1.40	1.78	391	845	701	1.36	1.01	0.87	0.76
	26.9	2.6	1.56	1.98	370	845	682	1.48	1.10	0.86	0.75
	26.9	3.2	1.87	2.38	330	845	644	1.70	1.27	0.85	0.71
25	33.7	2.6	1.99	2.54	638	1 059	895	3.09	1.84	1.10	1.22
	33.7	3.2	2.41	3.07	585	1 059	858	3.60	2.14	1.08	1.18
	33.7	4	2.93	3.73	519	1 059	807	4.19	2.49	1.06	1.12
32	42.4	2.6	2.55	3.25	1 087	1 332	1 169	6.46	3.05	1.41	1.99
	42.4	3.2	3.09	3.94	1 018	1 332	1 131	7.62	3.59	1.39	1.93
	42.4	4	3.79	4.83	929	1 332	1 081	8.99	4.24	1.36	1.86
40	48.3	2.9	3.25	4.14	1 419	1 517	1 335	10.70	4.43	1.61	2.59
	48.3	3.2	3.56	4.53	1 379	1 517	1 316	11.59	4.80	1.60	2.56
	48.3	4	4.37	5.57	1 276	1 517	1 266	13.77	5.70	1.57	2.47
50	60.3	2.9	4.11	5.23	2 333	1 894	1 712	21.59	7.16	2.03	4.13
	60.3	3.6	5.03	6.41	2 215	1 894	1 668	25.87	8.58	2.01	4.03
	60.3	4.5	6.19	7.89	2 067	1 894	1 612	30.90	10.25	1.98	3.92
65	76.1	2.9	5.24	6.67	3 882	2 391	2 209	44.74	11.76	2.59	6.71
	76.1	3.6	6.44	8.20	3 728	2 391	2 165	54.01	14.19	2.57	6.59
	76.1	4.5	7.95	10.12	3 536	2 391	2 108	65.12	17.11	2.54	6.43
80	88.9	3.2	6.76	8.62	5 346	2 793	2 592	79.21	17.82	3.03	9.19
	88.9	4	8.38	10.67	5 140	2 793	2 542	96.34	21.67	3.00	9.03
	88.9	4.8	9.96	12.68	4 939	2 793	2 491	112.49	25.31	2.98	8.87
90	101.6	3.6	8.70	11.08	6 999	3 192	2 966	133.24	26.23	3.47	12.02
	101.6	4	9.63	12.26	6 881	3 192	2 941	146.28	28.80	3.45	11.93
	101.6	4.8	11.46	14.60	6 648	3 192	2 890	171.39	33.74	3.43	11.74
100	114.3	3.6	9.83	12.52	9 009	3 591	3 365	191.98	33.59	3.92	15.33
	114.3	4.5	12.19	15.52	8 709	3 591	3 308	234.32	41.00	3.89	15.10
	114.3	5.4	14.50	18.47	8 413	3 591	3 252	274.54	48.04	3.85	14.86
110	127	4.5	12.59	17.32	10 936	3 990	3 707	325.29	51.23	4.33	18.78
	127	4.8	14.47	18.43	10 825	3 990	3 688	344.50	54.25	4.32	18.69
	127	5.4	16.19	20.63	10 605	3 990	3 651	382.04	60.16	4.30	18.52
125	139.7	4.5	15.00	19.11	13 417	4 389	4 106	437.20	62.59	4.78	22.87
	139.7	4.8	15.97	20.34	13 295	4 389	4 087	463.33	66.33	4.77	22.78
	139.7	5.4	17.89	22.78	13 160	4 389	4 050	514.50	73.66	4.75	22.58
135	152.4	4.5	16.41	20.91	16 151	4 788	4 505	572.24	75.10	5.23	27.32
	152.4	4.8	17.47	22.26	16 016	4 788	4 486	606.76	79.63	5.22	27.26
	152.4	5.4	19.58	24.94	15 748	4 788	4 448	674.51	88.52	5.20	27.05
150	165.1	4.5	17.82	22.70	19 138	5 187	4 904	732.57	88.74	5.68	32.27
	165.1	4.8	18.98	24.17	18 991	5 187	4 885	777.13	94.14	5.67	32.15
	165.1	5.4	21.27	27.09	18 699	5 187	4 847	864.70	104.75	5.65	31.92
	165.1	5.9	23.20	29.50	18 465	5 189	4 818	970.90	113.40	5.63	31.72
	165.1	6.3	24.67	31.43	18 265	5 187	4 791	992.28	120.20	5.62	31.57
	165.1	8	30.99	39.48	17 460	5 187	4 684	1 221.25	147.94	5.56	30.93
150	168.3	4.5	18.18	23.16	19 931	5 287	5 005	777.22	92.36	5.79	33.56
	168.3	4.8	19.35	24.66	19 781	5 287	4 986	824.57	97.99	5.78	33.44
	168.3	5.4	21.69	27.64	19 483	5 287	4 948	917.69	109.05	5.76	33.21
	168.3	6.3	25.17	32.06	19 040	5 287	4 891	1 053.42	125.15	5.73	32.65
	168.3	8	31.63	40.29	18 218	5 287	4 785	1 297.27	154.16	5.67	32.20
	168.3	10	39.04	49.73	17 273	5 287	4 659	1 563.98	185.86	5.61	31.45

Table 1 — (Concluded)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
175	193.7	4.8	22.36	28.49	26 619	6 085	5 784	1271.39	131.27	6.68	44.63
	193.7	5.4	25.08	31.94	26 273	6 085	5 746	1416.97	146.31	6.66	44.36
	193.7	5.9	27.33	34.81	25 987	6 085	5 715	1536.13	158.61	6.64	44.13
	193.7	6.3	29.12	37.09	25 759	6 085	5 689	1630.05	168.31	6.63	43.95
	193.7	8	36.64	46.67	24 801	6 085	5 583	2015.54	208.11	6.57	43.19
	193.7	10	45.30	57.71	23 697	6 085	5 457	2441.59	252.10	6.50	42.31
200	193.7	12	53.77	68.50	22 618	6 085	5 331	2839.20	293.15	6.44	41.45
	219.1	4.8	25.37	32.32	34 471	6 883	6 582	1856.03	169.42	7.58	57.43
	219.1	5.6	29.49	37.56	33 947	6 883	6531	2141.61	195.49	7.55	57.02
	219.1	5.9	31.02	39.52	33 751	6 883	6 513	2247.01	205.11	7.54	56.86
	219.1	6.3	33.06	42.12	33 491	6 883	6 487	2386.14	217.81	7.53	56.65
	219.1	8	41.65	53.06	32 397	6 883	6 381	2959.63	270.16	7.47	55.78
225	219.1	10	51.57	65.69	31 134	6 883	6 255	3598.44	328.47	7.40	54.78
	219.1	12	61.29	78.07	29 895	6 883	6 129	4199.38	383.38	7.33	53.79
	244.5	5.9	34.72	44.23	42 529	7 681	7 310	3149.12	257.60	8.44	71.21
	244.5	6.3	37.01	47.14	42 237	7 681	7 285	3346.03	273.70	8.42	70.97
	244.5	8	46.66	59.44	41 007	7 681	7 179	4160.45	340.32	8.37	70.00
	244.5	10	57.83	73.67	39 584	7 681	7 053	5073.15	414.98	8.30	68.86
250	273	5.9	38.86	49.51	53 584	8 577	8 206	4417.18	323.60	9.45	89.22
	273	6.3	41.44	52.79	53 256	8 577	8 181	4695.82	344.02	9.43	88.96
	273	8	52.28	66.60	51 875	8 577	8 074	5851.71	428.70	9.37	87.86
	273	10	64.86	82.62	50 273	8 577	7 948	7154.09	524.11	9.31	86.59
	273	12	77.24	98.39	48 695	8 577	7 823	8396.14	615.10	9.24	85.33
	323.9	6.3	49.34	62.86	76 111	10 176	9 780	7928.90	489.59	11.23	126.14
300	323.9	8	62.32	79.39	74 458	10 176	9 673	9910.08	611.92	11.17	124.82
	323.9	10	77.41	98.61	72 536	10 176	9 547	12158.34	750.75	11.10	123.29
	323.9	12	92.30	117.58	70 639	10 176	9 422	14319.56	884.20	11.04	121.78
	355.6	8	68.58	87.36	90 579	11 172	10 669	13201.37	742.48	12.29	151.11
	355.6	10	85.23	108.57	88 457	11 172	10 543	16223.50	912.46	12.22	149.42
	355.6	12	101.68	129.53	86 361	11 172	10 418	19139.47	1076.46	12.16	147.76

6.2 Tolerances

The following tolerances shall apply:

- a) *Outside diameter* :
 - 1) Up to and including 48.3 mm : + 0.4 mm
- 0.8 mm
 - 2) Over 48.3 mm : ± 1.0 percent
- b) *Thickness (for all sizes)* :
 - 1) Welded tubes : ± 10 percent
 - 2) Seamless tubes : + Not limited
- 12.5 percent
- c) *Weight* :
 - 1) Single tube : ± 10 percent
 - 2) 10 tonne lots : ± 7.5 percent

NOTE—For 10 tonne (*Min*) lots, the weighment may be done in convenient smaller lots and added up at the option of the manufacturer.

7 WORKMANSHIP

The tubes shall be cleanly finished and reasonably free from scale. They shall be free from cracks, surface flaws, laminations and other defects. The ends shall

be cut cleanly and square with the axis of tube, unless otherwise specified.

Surface imperfections such as handling marks, light die or roll marks, or shallow pits shall not be considered as defects provided the imperfections are removable within minimum wall thickness permitted. Removal of such surface imperfections is not required. Welded tubing shall be free of protruding metal on the outside surface of the weld seam.

8 GALVANIZING

If the tubes are required in galvanized condition the zinc coating on the tubes shall be conforming to the requirements and tested as per methods, specified in IS 4736.

9 STRAIGHTNESS

Unless otherwise agreed to between the purchaser and the manufacturer, tubes shall not deviate from straightness by more than 1 mm in any 600 mm length.

10 LENGTHS

The tubes shall normally be supplied in random lengths

at 4 to 7 m. If ordered in exact lengths, the tolerances shall be subject to prior agreement between the manufacturer and the purchaser.

11 MECHANICAL TESTS

11.1 The following mechanical tests shall be carried out on the selected tube. For mechanical tests, tubes shall be sampled in accordance with IS 4711.

11.2 Tensile Test

The tensile strength, the yield stress and the percentage elongation shall be determined in accordance with the methods specified in IS 1608 and shall be not less than the values specified for the relevant grades of tubes given in Table 2.

11.2.1 The tensile test shall be made on,

- length cut from the end of the selected tube (the ends of the length being plugged for grips, where necessary); or
- a longitudinal strip cut from the tube, not including the weld, if any, and tested in the curved condition, the choice resting with the manufacturer.

Table 2 Tensile Properties of Steel Tubes for Structural Purposes
(Clauses 3.1 and 11.2)

Sl No.	Grade	Tensile Strength Min	Yield Strength Min	Elongation on Gauge Length $5.65\sqrt{S_0}$ Min
(1)	(2)	(3) MPa	(4) MPa	(5) Percent
i)	YSi 210	330	210	20
ii)	YSi 240	410	240	17
iii)	YSi 310	450	310	14
iv)	YSi 355	490	355	10

NOTES

1 1 MPa = 1 N/mm² = 0.102 kgf/mm².

2 Elongation percent for tubes up to and including 25 mm nominal bore for all grades shall be 12 minimum.

11.3 Ductility Test

11.3.1 Cold Bend Test (Up to and Including 50 mm NB)

Table 3 Steel and Supply Conditions
(Clause 5.1)

Sl No.	Manufacturing Process	Steel	Supply Conditions
(1)	(2)	(3)	(4)
i)	HFW	IS 10748	Only YSi 210 or YSi 240
ii)	HFS/CDS	Bars/ingots with suitable Chemical composition as per IS 10748 to achieve mechanical for respective grades	YSi 210, YSi 240, YSi 310 or YSi 355
iii)	ERW/HFIW	IS 10748	YSi 210, YSi 240, YSi 310 or YSi 355 as welded, heat treated or cold drawn and normalized

NOTE — If required the copper bearing steel may be used to impart weather resistant properties in the steel. Copper content shall be between 0.26 to 0.35 percent subject to mutual agreement between the supplier and the purchaser.

When tested in accordance with IS 2329 an unfilled length of tube shall be capable of being bent cold by tube bending machine around a grooved former (with radius at bottom of the groove equal to $6 \times O.D.$ of the tube) through 180° (with weld at 90° to the plane of bending) without showing any crack at the weld or the metal.

11.3.2 Flattening Test (Tubes Above 50 mm NB)

Rings, not less than 40 mm in length cut from the ends of selected tubes with edges rounded shall be flattened between parallel plates with the weld, if any, at 90° (point of maximum bending) in accordance with IS 2328. No opening shall occur by fracture in the weld until the distance between the plates is less than the value specified for each grade in col 4 of Table 4 and no cracks or breaks in the metal elsewhere than in the weld shall occur until the distance between the plates is less than the value specified for each grade in col 5 of Table 4.

Table 4 Flattening Requirement in Metal
(Clause 11.3.2)

Sl No.	Manufacturing Process Metal	Steel Grade	Weld (Distance Between the Plates)	Parent (Distance Between the Plates)
(1)	(2)	(3)	(4)	(5)
i)	HFS/CDS/ERW/HFIW	YSi 210	75 percent of OD ^a	60 percent of OD
ii)	HFS/CDS/ERW/HFIW	YSi 240	85 percent of OD	75 percent of OD
iii)	HFS/CDS/ERW/HFIW	YSi 310	85 percent of OD	75 percent of OD
iv)	HFS/CDS/ERW/HFIW	YSi 355	85 percent of OD	75 percent of OD

^a OD = Outside diameter.

11.4 Re-Test

Should any one of the test pieces first selected fail to pass any of the tests specified, two further samples shall be selected for testing in respect of each failure from the same lot. Should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirement of that particular test. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be deemed as not complying with the standard or the manufacturer may select to test individually the remaining lengths in the lot for the test failed to comply in the preceding tests.

11.5 Sampling

11.5.1 Sampling of Tubes

For the purpose of drawing samples all mild steel tubes bearing same designation and manufactured under a single process shall be grouped together to constitute a lot. Each lot shall be sampled separately and assessed for conformity to this specification.

11.5.2 Sampling and Criterion for Conformity

Unless otherwise agreed to between the manufacturer and the purchaser the procedure for sampling of tubes

for various tests and criteria for conformity shall be as given in IS 4711.

12 MARKING

12.1 Each tube shall be suitably marked with the manufacturer's name or trade-mark, grade of the steel.

12.1.1 BIS Certification Marking

The tubes may also be marked with the Standard Mark.

12.1.2 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. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13 OILING AND PAINTING

All tubes shall, unless otherwise specified, be varnished, painted or oiled externally.

14 BUNDLING AND PACKING

Where tubes are to be bundled for transport, they shall unless otherwise specified, be packed in accordance with IS 4740.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

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

This Indian Standard has been developed from Doc No.: MTD 19 (5205).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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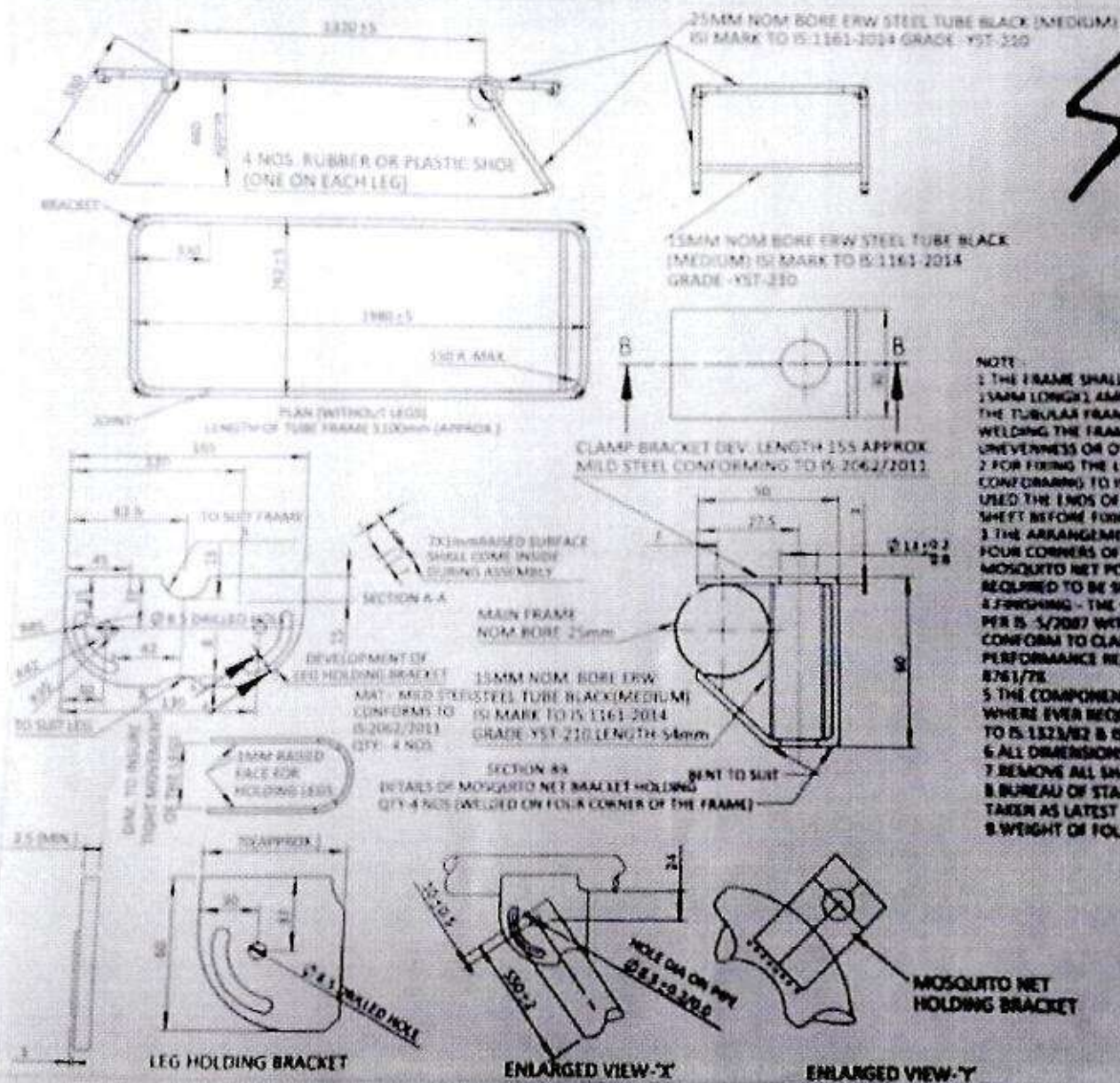
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Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

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Published by BIS, New Delhi



- NOTE
- 1 THE FRAME SHALL NOT HAVE MORE THAN ONE JOINT AT THE JOINT A PIECE OF 15MM LENGTH 1MM THICK (MIN) TUBE OF OUTSIDE DIA EQUAL TO INSIDE DIA OF THE TUBULAR FRAME BE WELDED THE JOINT SHALL BE THEN SECURED BY WELDING THE FRAME TUBE SHALL BE BENT WITHOUT CAUSING ANY CRACKS, UNEVENNESS OR OTHER DEFECTS.
 - 2 FOR FORMING THE LEGS IN THE LEGS HOLDING BRACKET SNAP HEAD BOLT CONFORMING TO IS 2998/82 OR 1 SIZE BOLT OF SAME LENGTH (APPROX.) SHALL BE USED THE ENDS OF THE LEGS SHALL BE SUITABLY CLOSED BY WELDING WITH M.S. SHEET BEFORE FORMING RUBBER/PLASTIC SHOE ON IT.
 - 3 THE ARRANGEMENT FOR MOSQUITO NET HOLDING POLES TO BE WELDED ON FOUR CORNERS OF THE FRAME OF COT IN A MANNER THAT IT HOLDS THE MOSQUITO NET POLES IN VERTICAL POSITION MOSQUITO NET POLES ARE NOT REQUIRED TO BE SUPPLIED.
 - 4 FINISHING - THE COTS SHALL BE PAINTED IN OLIVE GREEN COLOUR (IS-220 AS PER IS-5/2007) WITH TWO COATS OF ENAMEL PAINT THE FINISH SHOULD CONFORM TO CLAUSE 6 OF IS-8761/78 SPEC. FOR STEEL FOLDING COTS THE PERFORMANCE REQUIREMENT OF FINISH SHOULD CONFORM TO CLAUSE 7 OF IS-8761/78.
 - 5 THE COMPONENTS SHALL BE ASSEMBLED BY MEANS OF WELDING OR RIVETTING WHERE EVER REQUIRED THE METHOD OF GAS & ARC WELDING SHALL CONFORM TO IS 1323/82 & IS-816-88.
 - 6 ALL DIMENSIONS ARE IN mm.
 - 7 REMOVE ALL SHARP CORNERS.
 - 8 BUREAU OF STANDARD SPECIFICATION PRESCRIBED IN THIS DRAWING SHALL BE TAKEN AS LATEST VERSION EXISTING AT THE TIME OF FINALIZATION OF CONTRACT.
 - 9 WEIGHT OF FOLDING COT FRAME 19.8KG (APPRX.)

TITLE STEEL FOLDING COT

SUB TITLE STEEL FRAME

VERSION 01

YEAR 2014

DRAWING NO. DGS&D/GE/FC/246

★ इंटरनेट

मानक ★

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Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

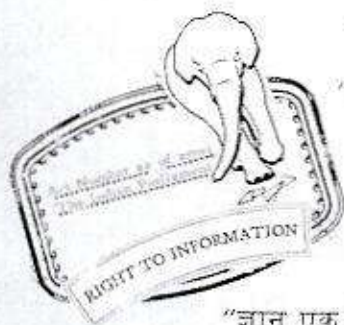
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“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12406 (2003): Medium Density Fibre Boards for General Purpose -Specification [CED 20: Wood and other Lignocellulosic products]



“ज्ञान में एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“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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सामान्य प्रयोजनो के लिए मध्यम घनत्व के
रेशा बोर्ड — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
MEDIUM DENSITY FIBRE BOARDS FOR GENERAL
PURPOSE — SPECIFICATION
(*First Revision*)

ICS 79.060.20

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

February 2003

Price Group 5

**AMENDMENT NO. 1 SEPTEMBER 2006
TO
IS 12406 : 2003 MEDIUM DENSITY FIBREBOARDS
FOR GENERAL PURPOSES — SPECIFICATION**

(First Revision)

*(Page 4, clause 12, Title) — Substitute 'ADDITIONAL' for
'OPTIONAL'.*

(CED 20)

Reprography Unit, BIS, New Delhi, India

**AMENDMENT NO. 2 JANUARY 2007
TO
IS 12406 : 2003 MEDIUM DENSITY FIBRE BOARDS
FOR GENERAL PURPOSE — SPECIFICATION**

(First Revision)

(Page 2, clause 8.1) — Substitute 'MDF board' for 'plywood' wherever appearing in the clause.

(CED 20)

Reprography Unit, BIS, New Delhi, India

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

Medium density fibre board is a panel product manufactured from lignocellulosic fibres combined with synthetic resin or other suitable binder. The panels are manufactured to a specific gravity of 0.6 to 0.9 by the application of heat and pressure by a process in which the interfibre bond is substantially created by the added binder. Other materials may have been added during manufacturing to improve certain properties.

This standard was first published in 1988. This revision is being brought out to incorporate modifications found necessary in the present day context. Further, detailed requirements for physical and mechanical properties have been given for various thickness of boards. Medium density fibre boards are recommended for use in interior dry locations. Grade I boards may be used in Hazard Class 1¹⁾ and Hazard Class 2²⁾, whereas Grade II boards may be used in Hazard Class 1¹⁾ only.

In formulation of this standard, due weightage has been given to standards and practices prevailing in different countries and also to the climatic conditions and customs in the country. In this revision properties have been incorporated to facilitate the proper application of product, properties like modulus of elasticity and the values indicating minimum and average have been included.

A scheme of labelling environment friendly products to be known as ECO-Mark has been 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 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 of the 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 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.

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

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.

¹⁾ Hazard Class 1 — Environment with relative humidity less than or equal to 70 percent so that equilibrium moisture content of MDF will not be more than 15 percent.

²⁾ Hazard Class 2 — Environment with relative humidity more than 70 percent so that equilibrium moisture content of MDF will not be more than 20 percent.

Indian Standard

MEDIUM DENSITY FIBRE BOARDS FOR GENERAL PURPOSE — SPECIFICATION (First Revision)

1 SCOPE

1.1 This standard covers the requirements of medium density fibre boards for general purposes having density in the range of 600-900 kg/m³.

1.2 This standard does not cover veneered or laminated or prelaminated or other specially treated boards, moulded boards, etc.

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

3.1 For the purpose of this standard, the following definitions shall apply and for definitions other than those given below, reference may be made to IS 707.

3.2 **Additive** — Any material introduced prior to the final consolidation of a board to increase bulking or improve some property of the final board. Fillers and preservatives are included under this term.

3.3 **Defibration** — Under the influence of steam and heat, lignin is softened and the fibres can be separated from each other by a low energy output. Normally in medium density fibre board plant, the fibre separation takes place in defibrators where steamed chips are pushed through screws and ground between big grinding disc, one stationary and the other rotating.

3.4 **Fibre** — Wood fibre produced by fiberising steamed wood under pressure in a refiner and defibrator.

3.5 **Formation (Forming)** — The laying of the blended mass of glued fibres to form a mat for medium density fibre board.

3.6 **MDF** — MDF is the short term for medium density fibre board.

3.7 **Particles** — Distinct particles or fractions of wood or other lignocellulose material produced mechanically

as a first step towards defibration. The chips may be in the form of flakes, granules, shavings, splinter and sliver as stated below:

- a) **Flakes** — Specially made thin flat particles, with the grain of the wood essentially parallel to the surface of the flake, prepared with the cutting action of the knife in a plane parallel to the grain but at an angle to the axis of the fibre.
- b) **Granule** — A particle in which the length, width and thickness are approximately equal, such as particle of saw-dust.
- c) **Shaving** — A thin slice or strip of wood pared off with a knife, planer or other cutting instrument, the knife action being approximately along the axis of the fibre, such as the shavings produced in planing the surface of wood.
- d) **Splinter and Silver** — Particle of nearly square or rectangular cross-section with a length parallel to the grain of the wood of at least four times the thickness.

3.8 **Sizing Material** — Alum, wax, resin or other additive introduced to the agglomerate for MDF prior to forming, primarily to increase water resistance.

4 TYPES

Medium density fibre boards for general purpose shall be of one type only, that is, flat pressed single layer. It may, however, be of two Grades, Grade I and Grade II and may be designated as follows:

Grade	Designation
Solid board Grade I	SBG I
Solid board Grade II	SBG II

5 MATERIAL

5.1 Wood

Any species of wood or any other lignocellulosic material may be used for the manufacture of medium density fibre boards. However, the purchaser may at his own discretion, specify a particular species of wood or any particular lignocellulosic material for the manufacture of medium density fibre boards.

For ECO-Mark, only species of wood other than natural forests, such as wood from rubber, coconut, cashew, industrial and social forestry plantations, etc and shade trees from tea and coffee estates, wood residues or agricultural wastes shall be used for the manufacture of MDF board.

5.2 Adhesive

Any suitable type of synthetic resin adhesive may be used for the purpose of bonding to comply with physical and mechanical requirements given in Table 1.

5.3 Sizing Material

Paraffin wax dissolved in mineral spirit or alternatively emulsified with water, or melted shall be used as sizing material.

5.4 Preservative Treatment

A suitable preservative may be added to the fibre mix at the mixing stage of adhesive. The following preservatives are regarded as suitable and their percentage is given on the basis of oven dry weight of fibres:

- Sodium pentachlorophenate to the extent of 2 percent, and
- Trichlorophenol to the extent of 5 percent.

6 MANUFACTURE

Wood or any other lignocellulosic material shall be cut into small chips/particles on a suitable chipping machine. These chips shall be steamed and defibrated in suitable defibrating machine. These fibre thus produced shall be dried in flash dryers and blended with resin and wax. The blended fibres shall then be formed into mats by air felting and pressed into panels by passing into press under controlled heat, pressure and time conditions.

7 FINISH

Medium density fibre board shall be of uniform thickness and density throughout the length and width of the boards. All medium density fibre boards shall be flat. Both surfaces of the boards shall be sanded to a smooth finish. The boards shall be rectangular and shall have square edges. Edge straightness and squareness shall be measured according to the method given in Annex B.

8 DIMENSIONS AND TOLERANCES

8.1 The dimensions of plywood shall be as follows:

Length : The length of plywood shall be 5.49, 4.89, 3.66, 3.05, 2.44, 1.83 and 1.22 m.

Width : The width of plywood shall be 1.22 m.

Thickness : The thickness of plywood shall be 6, 9, 12, 15, 18, 22, 25, 30, 35 and 40 mm.

NOTE — Any other dimension as agreed to between the purchaser and the manufacturer may be used.

8.2 Tolerances

Tolerances on the nominal dimensions of finished boards shall be as follows:

<i>Dimension</i>	<i>Tolerance</i>
Length	± 3 mm/m
Width	± 3 mm/m
Thickness	± 0.3 mm
Squareness	2 mm/m
Edge straightness	2 mm/m

9 PHYSICAL AND MECHANICAL REQUIREMENTS

Density, moisture content, water absorption, linear expansion, modulus of elasticity, modulus of rupture, internal bonding and screw withdrawal strength of MDF boards when tested in accordance with 10 and 11, shall meet the requirements specified in Table 1.

10 SAMPLING AND INSPECTION

10.1 Scale of Sampling

10.1.1 Lot

In any consignment, all the MDF boards of same grade, type and *N* dimensions and manufactured under similar conditions of production shall be grouped together to constitute a lot.

10.1.2 The conformity of a lot, to the requirements of this specification, shall be ascertained on the basis of tests on MDF boards selected from it.

10.1.3 The number of MDF boards to be selected from a lot shall be in accordance with the following:

<i>Lot Size</i>	<i>Number of Medium Density Fibre Boards to be Selected</i>
<i>N</i>	<i>n</i>
Up to 50	2
51-100	3
101-200	4
201-300	5
301-500	7
501 and above	10

10.1.4 These MDF boards shall be selected at random (see IS 4905). In order to ensure randomness of selection, all the MDF boards in the lot may be arranged in a serial order and every *n*th MDF board may be selected till the required number is obtained.

r being the integral part of N/n , where N is the lot size and n is the sample size.

10.2 Test Specimens and Number of Tests

The length, width, thickness and the diagonals of the MDF boards selected as in 10.1.3 shall be measured before cutting the MDF boards for taking test specimens. The straightness of edge shall also be measured.

10.2.1 From each of the MDF boards selected, following test specimens shall be cut out for portions 150 mm away from the edges for tests as specified under 11. The method of preparation and conditioning of specimens for tests listed in (c), (d), (e), (f) and (g) below shall be as specified in IS 2380 (Part 1).

- a) *For determination of density* — Three test specimens from each sample, each of size 150 mm × 75 mm × full thickness of board. Other sizes of sample specimens may be used when deemed necessary.
- b) *For determination of moisture content* — Three test specimens from each sample, each of size 150 mm × 75 mm × full thickness of board. Smaller specimens may be used when deemed necessary.
- c) *For water absorption test* — Three test specimens from each sample, each of size 300 mm × 300 mm × full thickness of board.
- d) *For determination of linear expansion:*
 - 1) *Due to general absorption* — Three test specimens from each sample, each of size 200 mm × 100 mm × full thickness of board.
 - 2) *Due to surface absorption* — Three test specimens from each sample, each of size 200 mm × 100 mm × full thickness of board.
- e) *For determination of modulus of elasticity and modulus of rupture* — Three test specimens each for modulus of elasticity and modulus of rupture, from each sample to conform to dimensions as specified in 2 of IS 2380 (Part 4).
- f) *Internal bond* — Six specimens from each sample conforming to the dimensions specified in 3 of IS 2380 (Part 5). Out of these, three specimens shall be subjected to the test for internal bond as given in 11.9. The remaining three specimens shall be subjected to either cyclic or accelerated water resistance test as given in 11.9.1.
- g) *For screw withdrawal test* — Three test specimens from each sample conforming to the dimensions specified in 2 of IS 2380 (Part 14)

10.3 Criteria for Conformity

A lot shall be considered as conforming to the requirements of this specification, if all the samples and test specimens pass the conditions as prescribed in 11.

10.4 If any sample fails to conform to the requirements, further samples shall be taken from the lot, double in number, and the lot shall be considered to have passed, if these samples conform to the requirements prescribed.

11 TESTING OF SAMPLES

11.1 The samples drawn and the test specimens made therefrom in accordance with 10 shall be subjected to the tests as given in 11.3 to 11.10. The specimens shall meet the requirements specified in Table 1 (see also 9 and 10.3).

11.2 Preparation and Conditioning of Test Specimens

All the test specimens shall be prepared and conditioned before testing in accordance with the procedure given in IS 2380 (Part 1).

11.3 Accuracy of Dimensions of Boards

All the samples selected in accordance with 10.2.1 shall be measured for straightness of edges, squareness of boards, lengths, widths and thickness as given in IS 2380 (Part 2). The dimensions shall comply with the requirements specified in 8.

11.4 Test for Density

The average value of density as prescribed in 10.2.1(a), when tested in accordance with IS 2380 (Part 3) shall meet the requirements specified in Table 1 (see 9).

11.5 Test for Moisture Content

The average value of moisture content as prescribed in 10.2.1(b), when tested in accordance with IS 2380 (Part 3), shall meet the requirements specified in Table 1 (see 9).

11.6 Test for Water Absorption

The average value of water absorption as prescribed in 10.2.1(c), when tested in accordance with IS 2380 (Part 16) shall not exceed the limits specified in Table 1 (see 9).

11.7 Test for Linear Expansion (Swelling in Water)

11.7.1 Due to General Absorption

The average value of linear expansion as prescribed in 10.2.1(d), when tested in accordance with IS 2380

(Part 17) shall not exceed the limit specified in Table 1 (see 9).

11.7.2 Due to Surface Absorption

The average value of surface absorption as prescribed in 10.2.1(d), when tested in accordance with IS 2380 (Part 17) shall not exceed the limit specified in Table 1 (see 9).

11.8 Test for Modulus of Elasticity and Modulus of Rupture

The average and minimum individual value of modulus of elasticity and modulus of rupture as prescribed in 10.2.1(e), when tested in accordance with IS 2380 (Part 4) shall not be less than the value specified in Table 1 (see 9).

11.9 Test for Internal Bond

The average and minimum individual value of internal bond as prescribed in 10.2.1(f), when tested in accordance with IS 2380 (Part 5) shall not be less than the value specified in Table 1 (see 9).

11.9.1 The average and minimum individual value of internal bond as prescribed in 10.2.1(f), when subjected to (a) cyclic test or (b) accelerated water resistance test as given in Table 1 shall be not less than the values specified in Table 1 (see 9).

11.10 Test for Screw Withdrawal Strength

The average value of screw withdrawal strength as prescribed in 10.2.1(g), when tested in accordance with IS 2380 (Part 14) shall not be less than the value specified in Table 1 (see 9).

12 OPTIONAL REQUIREMENT FOR ECO-MARK

12.1 General Requirement

12.1.1 MDF shall conform to the requirement of quality and performance as specified in this standard.

12.1.2 The manufacturer shall produce to BIS

environmental consent clearance from 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* and *Water (Prevention and Control of Pollution) Act, 1981* and *Water (Prevention and Control of Pollution) Cess Act, 1977* alongwith the authorization, if required under the *Environment (Protection) Act, 1986*, while applying for ECO-Mark appropriate with enforced rules and regulations of Forest Department.

12.2 Specific Requirement

MDF shall conform to the specific requirements given for ECO-Mark under relevant clauses of the standard.

NOTE — The manufacturer shall provide documentary evidence by way of certificate or declaration to Bureau of Indian Standards, while applying for ECO-Mark.

13 MARKING

13.1 Each fibre board shall be legibly marked near any of its corners with the following:

- a) Name of the manufacturer;
- b) Grade of fibreboard (see 4 and Table 1);
- c) Nominal dimensions (length, width and thickness);
- d) Date of manufacture, and
- e) The criteria for which the MDF has been labelled as ECO-Mark.

13.2 BIS Certification Marking

13.2.1 Each fibre board may also be marked with Standard Mark.

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

Table 1 Physical and Mechanical Requirements of Medium Density Fibre Boards
(Clauses 5.2, 9, 11.1, 11.4, 11.5, 11.6, 11.7.1, 11.7.2, 11.8, 11.9, 11.9.1 and 11.10)

Sl No.	Properties	Grade II (SBG II)	Grade I (SBG I)
(1)	(2)	(3)	(4)
i)	Density (Kg/m ³)	600-900	600-900
ii)	Variation from mean density, percent	± 10	± 10
iii)	Moisture content, percent	5-10	5-10
iv)	Variation from mean moisture content percent (absolute)	± 3	± 3
v)	Water absorption percent, Max		
	a) After 2 h soaking	9	6
	b) After 24 h soaking:		
	Up to and including 6 mm thick	45	30
	7 to 12 mm thick	30	20
	13 to 19 mm thick	20	13
	20 mm thick and above	18	12
vi)	Linear expansion (swelling in water) percent, Max		
	a) Due to general absorption after 24 h soaking:		
	Thickness	7	4
	Length	0.4	0.3
	Width	0.4	0.3
	b) Due to surface absorption (in thickness) after 2 h soaking	5	4
vii)	Modulus of rupture, N/mm ²		
	a) Up to 20 mm thickness		
	Average	28	28
	Minimum individual	25	25
	b) Above 20 mm thickness		
	Average	25	25
	Minimum individual	22	22
viii)	Modulus of elasticity, N/mm ²		
	a) Up to 20 mm thickness		
	Average	2 800	2 800
	Minimum individual	2 500	2 500
	b) Above 20 mm thickness		
	Average	2 500	2 500
	Minimum individual	2 300	2 300
ix)	Internal bond, N/mm ²		
	a) Up to 20 mm thickness		
	Average	0.8	0.9
	Minimum individual	0.7	0.8
	b) Above 20 mm thickness		
	Average	0.7	0.8
	Minimum individual	0.6	0.7
x)	Internal bond, N/mm ²		
	a) After cyclic test ¹⁾		
	Average	—	0.45
	Minimum individual	—	0.4
	b) After accelerated water resistance test ²⁾		
	Average	—	0.30
	Minimum individual	—	0.25
xi)	Screw withdrawal strength (Min), N		
	a) Face	1 500	1 500
	b) Edge (for thickness > 12 mm)	1 250	1 250

¹⁾ Cyclic test — Specimens are immersed in water at 27 ± 2°C for a period of 72 h, followed by drying in air at 27 ± 2°C for 24 h and then heating in dry air at 70°C for 72 h. Three such cycles are to be followed and then the specimens are tested for internal bond strength.

²⁾ Accelerated water resistance test — Specimens are immersed in water at 27 ± 2°C and water is brought to boiling and kept at boiling temperature for 2 hours. Specimens are then cooled in water to 27 ± 2°C and then tested for internal bond strength.

ANNEX A*(Clause 2)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
707 : 1976	Glossary of terms applicable of timber technology and utilization (<i>second revision</i>)	(Part 4) : 1977	Determination of static bending strength (<i>first revision</i>)
4905 : 1968	Methods for random sampling	(Part 5) : 1977	Determination of tensile strength perpendicular to surface (<i>first revision</i>)
2380	Methods of test for wood particle boards and boards from other lignocellulosic materials:	(Part 14) : 1977	Screw and nail withdrawal test (<i>first revision</i>)
(Part 1) : 1977	Preparation and conditioning of test specimens (<i>first revision</i>)	(Part 16) : 1977	Determination of water absorption (<i>first revision</i>)
(Part 2) : 1977	Accuracy of dimensions of boards (<i>first revision</i>)	(Part 17) : 1977	Determination of swelling in water (<i>first revision</i>)
(Part 3) : 1977	Determination of moisture content and density (<i>first revision</i>)		

ANNEX B*(Clause 7)***METHOD OF TEST FOR EDGE STRAIGHTNESS AND SQUARENESS****B-1 PROCEDURE FOR EDGE STRAIGHTNESS**

The straightness of the edges and ends of MDF board shall be verified against a straightedge not less than the full length of the board. If the edge on the end of the board is convex, it shall be held against the straightedge in such a way as to give approximately equal gap at each end. The largest gap between the

straightedge and the edge shall be measured to the nearest millimetre and recorded.

B-2 PROCEDURE FOR SQUARENESS

The squareness of MDF board shall be checked with a 1 200 × 1 200 mm², by applying one arm of the square to the board. The maximum width of the gap shall be recorded.

ANNEX C

(Foreword)

COMMITTEE COMPOSITION

Wood Products Sectional Committee, CED 20

<i>Organization</i>	<i>Representative(s)</i>
Indian Plywood Training and Research Institute, Bangalore	SHRI ARUN K. BANSAL (<i>Chairman</i>)
All India Agro-Board Association, Pune	SHRI V. S. RAJU
Andaman Chamber of Commerce and Industries, Kolkata	SHRI S. KUMAR SHRI HARISH KHATTAN (<i>Alternate</i>)
Assam Plywood Manufacturers Association, Tinsukia	SHRI S. L. YADAV
Builders Association of India, Chennai	REPRESENTATIVE
Building Materials & Technology Promotion Council, New Delhi	REPRESENTATIVE
Central Building Research Institute, Roorkee	DR Y. SINGH DR L. K. AGARWAL (<i>Alternate</i>)
Central Public Works Department, New Delhi	SHRI SUKINDER KUMAR SHRI S. K. VERMA (<i>Alternate</i>)
Civil Aviation Department (Technical Centre), New Delhi	SHRI B. V. JOSHI SHRI N. M. WALECHA (<i>Alternate</i>)
Council of Architecture, New Delhi	REPRESENTATIVE
Directorate General of Supplies & Disposals, Hyderabad	SHRI M. GANGARAJU
Directorate of Standardization, New Delhi	SHRI K. L. ARORA
Engineer-in-Chief's Branch, New Delhi	SHRIMATI MEENAKSHI SHRIMATI AMITA RAJ (<i>Alternate</i>)
Federation of Indian Plywood & Panel Industry, New Delhi	SHRI JAYADEEP CHITLANGIA SHRI S. P. GOENKA (<i>Alternate</i>)
Forest Research Institute, Dehra Dun	DIRECTOR
Indian Academy of Wood Science, Dehra Dun	SHRI S. N. SANYAL SHRI K. S. SHUKLA (<i>Alternate</i>)
Indian Institute of Packaging, Mumbai	SHRI P. G. DESHMUKH
Indian Plywood Research & Training Institute, Bangalore	SHRI S. S. ZOOLAGUD SHRI K. SHYAMASUNDER (<i>Alternate</i>)
Institute of Wood Science & Technical, Bangalore	DR K. S. RAO
Kutty Flush Door & Furniture Co Pvt Limited, Chennai	SHRI D. R. ANANTHAERISHNAN
Mangalam Timber Products Limited, Bangalore	SHRI K. SRIDHAR SHRI ANIL TALWAR (<i>Alternate</i>)
Ministry of Defence (R&D), New Delhi	SHRI RAVINDER KUMAR
Ministry of Defence (DGQA), Kanpur	SHRI RAM CHANDRA SHRI J. K. SENNA (<i>Alternate</i>)
Ministry of Railways (RDSO), Lucknow	DIRECTOR STANDARDS (CARRIAGE) ASSISTANT DIRECTOR (<i>Alternate</i>)
National Test House (ER), Kolkata	SHRI D. K. KANUNGO SHRI R. KAPUR (<i>Alternate</i>)
Novopan India Limited, Hyderabad	SHRI S. A. NAQVI SHRI A. V. V. RAGHAVACHARYA (<i>Alternate</i>)
Northern India Plywood Manufacturers Association, Jalandhar	SHRI N. K. TIWARI SHRI ANIL GOEL (<i>Alternate</i>)
Nuchem Limited, New Delhi	SHRI SUDIV BARAK SHRI PRAVEEN KUMAR (<i>Alternate</i>)
Permelli Wallace Limited, Bhopal	SHRI K. K. KEDASIA DR P. N. CHATURVEDI (<i>Alternate</i>)
The Indian Plywood Manufacturers Co Limited, Mumbai	SHRI P. T. S. MEKON

(Continued on page 8)

(Continued from page 7)

Organization	Representative(s)
The South Indian Plywood Manufacturers Association, Chennai	SHRI K. SANKARAKRISHNAN
The Western India Plywood Limited, Cannanore	SHRI P. K. MOHAMED
In personal capacity (E-59, Inderpuri, New Delhi 110012)	SHRI A. N. NAYER
BIS Directorate General	SHRI S. K. JAIN, Director and Head (Civ Engg) [Representing Director General (Ex-officio)]

Member Secretary
SHRI J. C. ARORA
Director (Civ Engg), BIS

Wood and Other Lignocellulosic Based Building Boards Subcommittee, CED 20 : 6

In personal capacity [No. 179(710), 24 th B-Cross, 3 rd Block, Jayanagar, Bangalore 560011(Karnataka)]	DR H. N. JAGADEESH (Convener)
Bamboo Board Factory, Kerala	REPRESENTATIVE
M/s ECO Board Industries Ltd, Pune	SHRI B. V. RAO SHRI S. KRISHNA RAJ (Alternate)
Central Building Research Institute (CSIR), Roorkee	DR L. K. ACKIARWAL SHRI B. SINGH (Alternate)
Central Public Works Department, New Delhi	SUPERINTENDING ENGINEER (S&S) EXECUTIVE ENGINEER (S&S) (Alternate)
Coir Industries Products Co-operative Society Ltd, Bangalore	SHRI MANOJ KUMAR SHRI VIJAY GHORPADE (Alternate)
Coir Board, Bangalore	SHRI M. SUDHAKARAN
Council of Architecture, New Delhi	REPRESENTATIVE
DGS&D, New Delhi	SHRI N. K. UPADHYAY
Engineer-in-Chief's Branch, New Delhi	SHRIMATI MEENAKSHI COL N. A. KUMAR (Alternate)
Forest Research Institute (Forest Products Division), Dehra Dun	SHRI K. S. SHUKLA DR S. P. SINGH (Alternate)
Godrej & Boyce Manufacturing Company Limited, Mumbai	SHRI GIRISH V. NALAYADE SHRI MANURHAJ M. SHAH (Alternate)
Indian Plywood Industries Research & Training Institute, Bangalore	SHRI K. SHYAMASUNDER SHRI M. VENUGOPALA NAIDU (Alternate)
Jolly Board Limited, Mumbai	SHRI ARVIND JOLLY SHRI N. K. PADHYE (Alternate)
Kutty Flush Doors and Furniture Company Pvt Limited, Chennai	SHRI K. SANKARAKRISHNAN SHRI Y. G. KRISHNAN (Alternate)
Mangalam Timber Products Limited, Kolkata	SHRI G. S. GUPTA SHRI G. R. PATNAIK (Alternate)
Ministry of Defence (DGQA), Kanpur	SHRI J. K. SINHA MAJ R. N. SAIGAL (Alternate)
Ministry of Defence (R&D), Kanpur	SHRI P. S. SRIVASTAVA SHRI RAVINDRA KUMAR (Alternate)
Ministry of Railways, Lucknow	DEPUTY DIRECTOR STANDARDS (CARRIAGE) ASSISTANT DIRECTOR (Alternate)
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Natura Fibretech Pvt Ltd, Bangalore	SHRI TOMMY MATHEW
Novopan India Limited, Hyderabad	SHRI S. A. NAQVI SHRI A. V. V. RACHAVACHARYA (Alternate)
Nuchem Limited, Faridabad	SHRI SUDIEV BARAR SHRI A. C. SOOD (Alternate)

(Continued on page 9)

(Continued from page 8)

<i>Organization</i>	<i>Representative(s)</i>
The Gurdit Institute Pvt Limited, Dharwad	SHRI YASHKARAN SINGH LAULY SHRI S. N. SHARMA (<i>Alternate</i>)
The Indian Plywood Manufacturing Company Limited, Mumbai	SHRI P. T. S. MENON SHRI P. N. HOSAMANI (<i>Alternate</i>)
The Mysore Chipboards Ltd, Mysore	SHRI A. ANANTHACHAR
The South Indian Plywood Manufacturers' Association, Kottayam	SHRI K. SANKARAKRISHNAN
The Western India Plywood Limited, Cannanore	SHRI K. P. KAMALUDDIN SHRI K. R. BIRJE (<i>Alternate</i>)
In personal capacity (5/6, 1 st Floor 13 th Main, HAL 2 nd Stage, Indira Nagar, Bangalore 560008)	SHRI P. K. BAOCHI
Institute of Wood Science and Technology, Bangalore	DR R. V. RAO DR S. R. SHUKLA (<i>Alternate</i>)
Integral Coach Factory, Chennai	REPRESENTATIVE
Padmavathy Penal Boards, Bangalore	REPRESENTATIVE

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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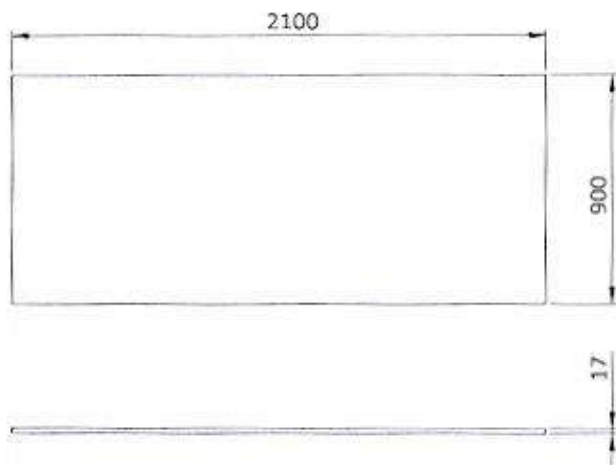
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AL C-CHANNEL

NOTE:-
THE MDF BOARD TOP SHALL BE OF SIZE 2100 X 900 X 17 mm ISI MARKED TO IS:12406/2003(REAFFIRMED 2013) WITH AMEND No. 1 & 2 GRADE-I (S8G-I).THE MDF BOARD TOP SHALL BE FITTED TO FRAME WITH NUTS AND BOLTS OF SIZE M6x65mm WITH SUITABLE WASHERS.THE STEEL FRAME & LEGS OF THE COTS SHALL BE AS PER DGS&D DRAWING No.DGS&D/GE/FC/246. THE WEIGHT OF THE EXTRANEIOUS MATERIAL IN THE FRAME OR LEGS.THE MDF BOARD TOP SHALL BE PROVIDED WITH ALUMINUM C-CHANNEL BEADING OF SIZE 21 x 11 x 2 mm FIXED BY SUITABLE SCREW SPACED AT 300 mm PITCH (MAX.) THE CORNER OF THE BEADING SHALL BE NEATLY DONE REMOVING ALL BURRS/ SHARP EDGES AND JOINTS (NOT EXCEEDING TWO) SHALL BE ONLY AT CORNER.

TITLE	STEEL FOLDING COT
SUB TITLE	MDF BOARD TOP
VERSION	01
YEAR	2014
DRAWING NO.	DGS&D/GE/FC/246