

Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



PSB Singapore

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SUBJECT:

Testing of fibre cement boards submitted by Everest Industries Ltd

TESTED FOR:

Everest Industries Limited
The Genesis, A-32
Mohan Cooperative Industrial Estate
Mathura Road
New Delhi 110048
India

Attn: Mr Subrata Dutta

TEST METHODS:

1. Adopted ASTM C1185 : 2008 (2012) Standard Test Methods For Sampling And Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing And Siding Shingles, And Clapboards

Section 5 - Flexural Strength (Modulus of Rupture) Equilibrium Conditioning

Section 5 - Flexural Strength (Modulus of Rupture) Wet Conditioning

Section 6 - Density

Section 8 - Moisture Movement

Section 9 - Water Absorption

Section 10 - Moisture Content

Section 11 - Water Tightness



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2. Adopted ASTM D1037 : 2006a Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

Section 10 - Tension Parallel To Surface
Section 12 - Compression Parallel To Surface
Section 20 - Glue Line Shear (Block Type)
Section 21 - Falling Ball Impact

DESCRIPTION OF SAMPLE:

Fibre Cement board 'Everest Board'

REMARKS:

1. The flexural strength (equilibrium and wet conditioning), tensile strength and density tests were conducted in the presence of Mr Sharad Malli from Everest Industries on 25 Jul 2013.
2. The density test samples were cut to 50 mm x 50 mm from 305 mm x 152 mm prior to test.
3. The average values of two directions for flexural strength, moisture movement, moisture content and tensile strength tests are reported as requested by the client.
4. The compressive strength test samples were prepared by the client : 4-ply, each 50 mm x 50 mm bonded with epoxy adhesive.
5. The glue line shear block test samples were prepared by TUV SUD PSB Pte Ltd as follows :
 - a. 2-ply, each 45 mm x 50 mm were bonded with epoxy adhesive as one set.
 - b. Two sets were bonded to form a shear force test piece with 6 mm overhang.

Eddie Suwand
Senior Associate Engineer

Eng Aik How
Engineer
Building
Mechanical Centre

Test Report No. 7191058019-MEC13/01A-ED
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TEST RESULTS:

'Everest Board', size 305 mm x 152 mm

Section 5 - Flexural Strength (Modulus of Rupture) Equilibrium Conditioning

Direction : Grain

Crosshead speed : 50 mm/min

Sample Reference	1	2	3	4	5
Maximum Load (N)	337.46	322.36	313.67	319.24	334.02
Length of Span (mm)	254				
Width of Specimen (mm)	152	152	152	152	152
Thickness (mm)	8.89	8.78	8.75	9.14	8.84
Flexural Strength (MPa)	10.70	10.48	10.27	9.58	10.71
Average Flexural Strength (MPa)	10.35				

Direction : Across Grain

Crosshead speed : 50 mm/min

Sample Reference	1	2	3	4	5
Maximum Load (N)	658.98	700.82	664.80	678.30	750.61
Length of Span (mm)	254				
Width of Specimen (mm)	152	152	152	152	152
Thickness (mm)	9.02	9.04	8.92	9.02	9.03
Flexural Strength (MPa)	20.30	21.50	20.94	20.90	23.07
Average Flexural Strength (MPa)	21.34				

Average Flexural Strength, two directions (MPa)	15.85
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Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



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TEST RESULTS:

'Everest Board', size : 305 mm x 152 mm

Section 5 - Flexural Strength (Modulus of Rupture) Wet Conditioning

Direction : Grain

Crosshead speed : 50 mm/min

Sample Reference	1	2	3	4	5
Maximum Load (N)	221.71	223.91	245.92	214.46	218.76
Length of Span (mm)	254				
Width of Specimen (mm)	152	152	152	152	152
Thickness (mm)	8.81	8.89	8.92	8.85	8.87
Flexural Strength (MPa)	7.16	7.10	7.75	6.86	6.97
Average Flexural Strength (MPa)	7.17				

Direction : Across Grain

Crosshead speed : 50 mm/min

Sample Reference	1	2	3	4	5
Maximum Load (N)	463.17	488.90	462.32	457.27	452.37
Length of Span (mm)	254				
Width of Specimen (mm)	152	152	152	152	152
Thickness (mm)	8.91	8.91	8.93	9.05	8.95
Flexural Strength (MPa)	14.62	15.44	14.53	13.99	14.16
Average Flexural Strength (MPa)	14.55				

Average Flexural Strength, two directions (MPa)	10.86
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Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



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TEST RESULTS:

'Everest Board', size 50 mm x 50 mm

Section 6 - Density

Sample Reference	1	2	3	4	5	6
Dry Mass (kg)	0.03026	0.02963	0.03064	0.02919	0.02988	0.02968
Saturated weight (kg)	0.04057	0.03956	0.04097	0.03941	0.04017	0.04002
Suspended weight (kg)	0.01555	0.01580	0.01641	0.01538	0.01579	0.01555
Volume (m ³)	0.02502	0.02376	0.02456	0.02403	0.02438	0.02447
Density (kg/m ³)	1209.43	1247.05	1247.56	1214.73	1225.59	1212.91
Average Density (kg/m ³)	1226.21					

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Test Report No. 7191058019-MEC13/01A-ED
 dated 25 Jul 2013



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TEST RESULTS:

'Everest Board', size 305 mm x 76 mm

Section 7 - Moisture Movement

Test Temperature : 23°C

Direction : Grain

Sample Reference	1	2	3
Length at 30% RH (mm)	304.44	304.40	304.33
Length at 90% RH (mm)	304.46	304.42	304.34
Length Change (%)	0.0066	0.0066	0.0033
Average Length Change (%)	0.006		

Direction : Across Grain

Sample Reference	1	2	3
Length at 30% RH (mm)	304.48	304.61	304.34
Length at 90% RH (mm)	304.49	304.42	304.34
Length Change (%)	0.0033	0.0033	0.0131
Average Length Change (%)	0.007		

Average Moisture Movement, two directions (%)	0.007
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Test Report No. 7191058019-MEC13/01A-ED
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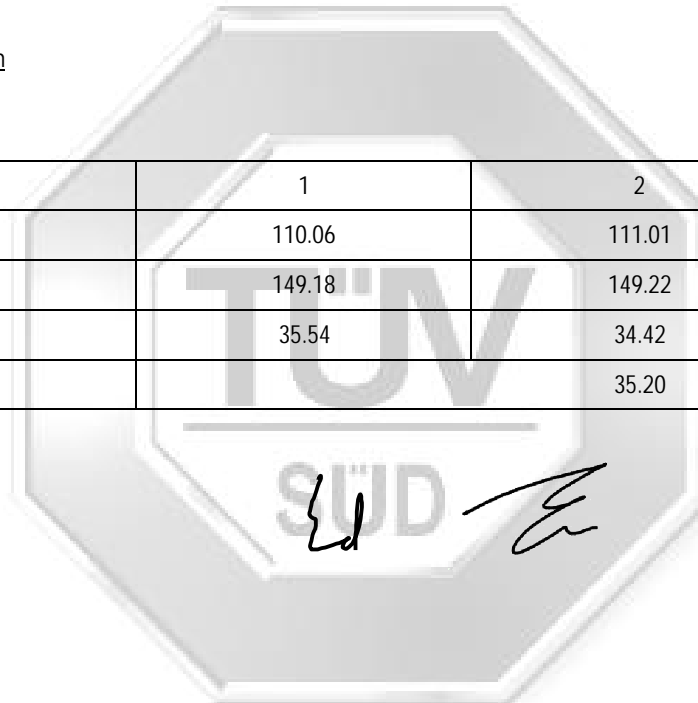
TEST RESULTS:

'Everest Board', size 100 mm x 100 mm

Section 9 - Water Absorption

Test condition : 23°C for 48 hrs

Sample Reference	1	2	3
Weight before immersion (g)	110.06	111.01	108.81
Weight after immersion (g)	149.18	149.22	147.61
Water Absorption (%)	35.54	34.42	35.65
Average Water Absorption (%)	35.20		



Test Report No. 7191058019-MEC13/01A-ED
 dated 25 Jul 2013



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TEST RESULTS:

'Everest Board', size 305 mm x 152 mm

Section 10 - Moisture Content
 Test condition : 90°C till constant mass
 Direction : Grain

Sample Reference	1	2	3
Initial Mass (g)	708.72	683.66	686.83
Final Mass (g)	676.09	653.26	658.34
Moisture Content (%)	4.82	4.65	4.32
Average Moisture Content (%)	4.60		

Direction : Across Grain

Sample Reference	1	2	3
Initial Mass (g)	555.60	550.40	559.41
Final Mass (g)	535.84	525.38	539.10
Moisture Content (%)	3.69	4.76	3.77
Average Moisture Content (%)	4.07		

Average Moisture Content, two directions (%)	4.34
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Test Report No. 7191058019-MEC13/01A-ED
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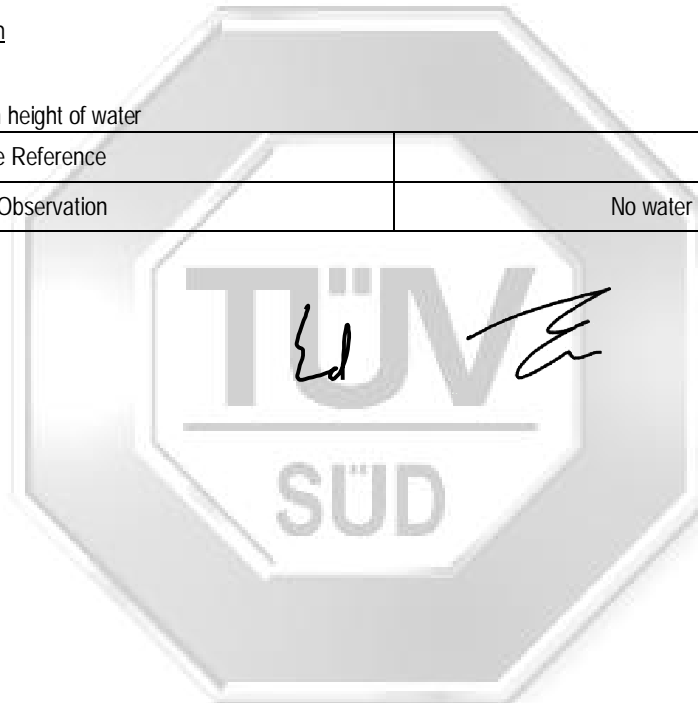
TEST RESULT:

'Everest Board', size 500 mm x 500 mm

Section 11 - Water Tightness

Test condition : 23°C for 24 hrs, 50 mm height of water

Sample Reference	1
Visual Observation	No water droplets at the underside



Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



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TEST RESULTS:

'Everest Board', Tensile test piece

Section 10 - Tension Parallel To Surface

Direction : Grain

Crosshead speed : 4 mm/min

Grip length : 115 mm

Sample Reference	1	2	3
Maximum Load (N)	2977.20	3008.51	3075.75
Width of Specimen (mm)	38	38	38
Thickness (mm)	8.86	8.93	8.86
Tensile Strength (MPa)	8.84	8.86	9.14
Average Tensile Strength (MPa)	8.94		

Direction : Across Grain

Crosshead speed : 4 mm/min

Grip length : 115 mm

Sample Reference	1	2	3
Maximum Load (N)	1316.17	1220.15	1279.89
Width of Specimen (mm)	38	38	38
Thickness (mm)	8.81	8.82	8.85
Tensile Strength (MPa)	3.93	3.64	3.81
Average Tensile Strength (MPa)	3.79		

Average Tensile Strength, two directions (MPa)	6.37
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Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



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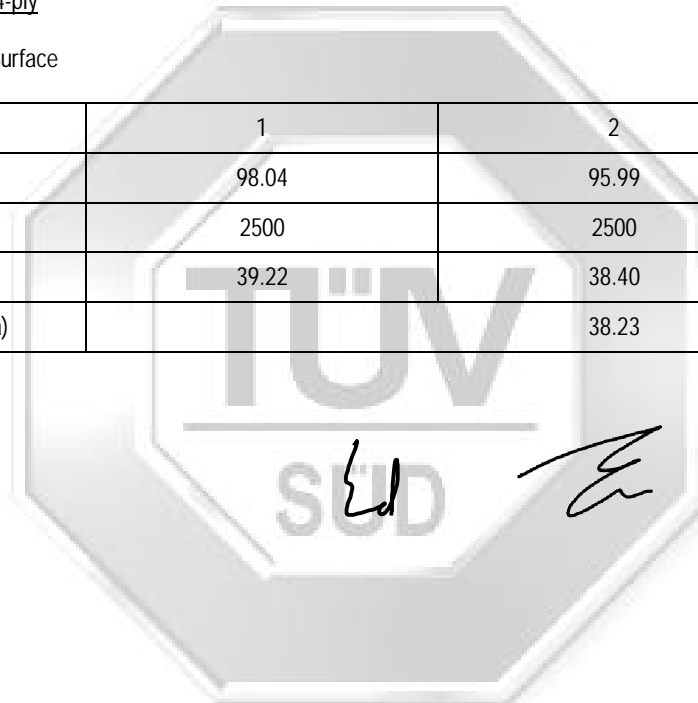
TEST RESULTS:

'Everest Board', size 50 mm x 50 mm, 4-ply

Section 12 - Compression Parallel To Surface

Test speed : 0.5 N/mm².s

Sample Reference	1	2	3
Maximum Load (N)	98.04	95.99	92.65
Test area (mm ²)	2500	2500	2500
Compressive Strength (MPa)	39.22	38.40	37.06
Average Compressive Strength (MPa)	38.23		



Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



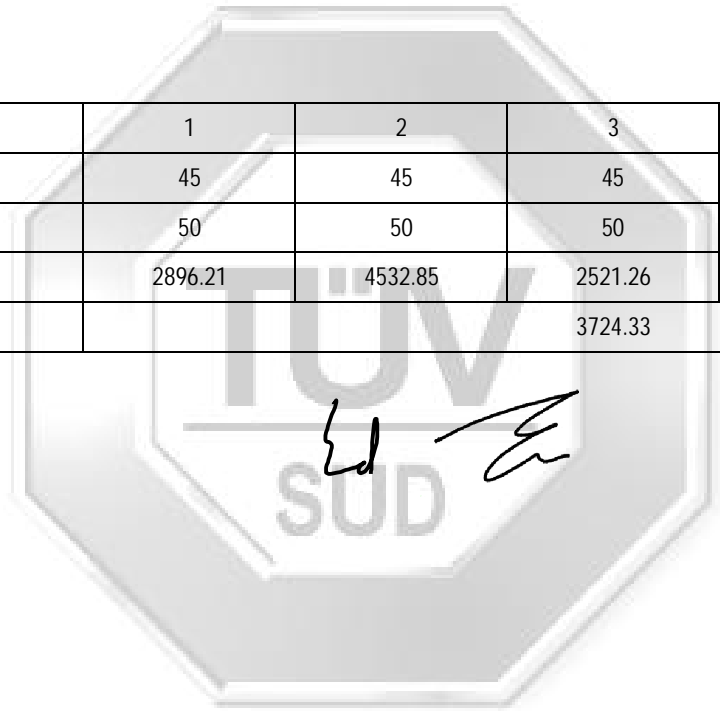
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TEST RESULTS:

'Everest Board', Shear force test piece

Section 20 - Glue Line Shear Block
Test speed : 0.6 mm/min

Sample Reference	1	2	3	4	5
Length of Specimen (mm)	45	45	45	45	45
Width of Specimen (mm)	50	50	50	50	50
Shear Force (N)	2896.21	4532.85	2521.26	5227.80	3443.51
Average Shear Force (N)	3724.33				



Test Report No. 7191058019-MEC13/01A-ED
dated 25 Jul 2013



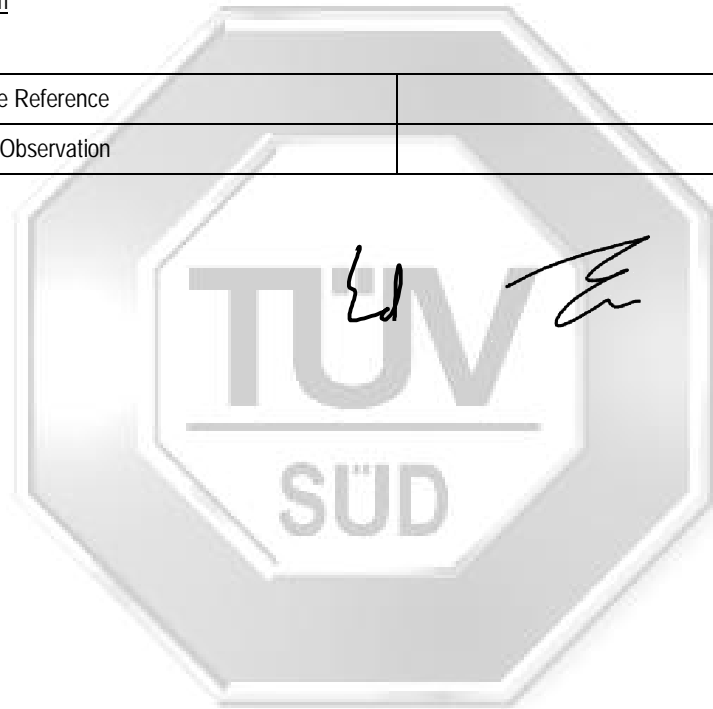
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TEST RESULT:

'Everest Board', size 254 mm x 228 mm

Section 21 - Falling Ball Impact

Sample Reference	1
Visual Observation	2.3 m





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July 2011

