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TEST REPORT

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Your Ref: - Quotation SPD/ thc2008/ dw003R dd 17th April 2008
Our Ref: SP- 2 (10) /THC

Date: 19/09/2008

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Subject : Determination of Physical and Mechanical Properties of "BESTA" Magnesium Oxide (MgO) board, submitted by Best Rock Building Systems Pte Ltd on 11/07 /2008.

Tested For : M/s Best Rock Building Systems PTE LTD
14 Zion Road
Singapore 247732
Attn: Mr. Daniel Wong

Method of Test : **Physical and Mechanical Properties :**
1) Density : ISO TR 1896 : 1991 - clause 6.3
2) Bending Strength (Dry and Saturated) : ISO TR 1896 : 1991 - clause 6.4
3) Linear Thermal Shrinkage (drying shrinkage) : ISO TR 1896 : 1991 - clause 6.7
4) Moisture Movement Test : ASTM C 1185 - Clause 8
5) Moisture Content : ASTM C 1185 - clause 10
6) Water Absorption: ASTM C 1185 - clause 9
7) Water Tightness Test : ASTM C 1185 - clause 11

Specification adopted : ISO TR 1896 : 1991 Technical Report : Products in Fibre-reinforced Cement - Non-combustible Fibre-reinforced boards of Calcium Silicate or cement for Insulation and Fire Protection.

Description of Sample : "BESTA" Magnesium Oxide (MgO) boards of thickness 10mm, cut to the required size were received (See photos attached).

Test Results : Table 1: Test Summary
Table 2 to 8 - Individual Test Result.

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Results:

Table 1 : Summary of Test Results on Physical and Mechanical Properties to ISO TR 1896 : 1991 / ASTM C1185

(Test Results on Material Property are attached)

S/N	Type of Test	Clause, Methods	Sample Sizes	Besta MgO Board (10 mm thick)
1	Density	Cl.6.3, ISO TR 1896	60 x 40 x 10 mm	1060 Kg /m ³
2	Bending Strength (Dry and saturated)	Cl.6.4, ISO TR 1896	250 x 250 x 10 mm	5.1 N/mm ² (Dry); 6.2 N/mm ² (Saturated)
3	Linear Thermal Shrinkage	Cl.6.7, ISO TR 1896	35 x 35 x 10 mm	Samples softened & crumpled after subjected to 950°C for 4 hours
4	Moisture Movement	Cl.8, ASTM C 1185	305 x 76 x 10 mm	0.076%
5	Water Absorption	Cl.9, ASTM C 1185	100 x 100 x 10 mm	22.0%
6	Moisture Content	Cl.10, ASTM C 1185	152 x 76 x 10 mm	9.6%
7	Water Tightness	Cl.11, ASTM C 1185	610 x 508 x 10 mm	Dampness appeared after 5 hours

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Results:

Table 2: Density Test

Sample Reference	"BESTA" MgO board (10mm thick)				
	1	2	3	4	5
Date of test	18/07/2008				
Dimension of cut specimen (mm)	60 x 40 x 10mm				
Measured length (mm)	60.2	60.4	60.1	59.7	60.7
Measured width (mm)	37.9	38.7	39.9	38.8	38.2
Measured thickness (mm)	10.2	10.2	10.3	10.2	10.1
Net dry density (kg/m ³)	1050	1070	1050	1070	1070
Mean net dry density (kg/m ³)	1060				



Results:Table 3: Bending Strength (Dry and Saturated) Test

Sample Reference	"BESTA" MgO board (10mm thick)							
	Dry strength				Saturated strength			
	1	2	3	4	5	6	7	8
Date of Test	05/08/08							
Dimension of cut specimen (mm)	250 x 250 x 10 mm (thick)							
Distance between supports (mm)	215							
Measured length (mm)	256.7	249.3	248.4	248.6	250.2	250.4	249.6	246.7
Measured width (mm)	251.0	249.0	247.8	246.1	249.5	248.7	250.0	246.9
Thickness measured along the line of fracture - 1st break (mm)	10.1	10.2	10.3	10.2	10.3	10.2	10.3	10.2
Thickness measured along the line of fracture - 2nd break (mm)	10.2	10.2	10.1	10.0	10.3	10.2	10.2	10.1
Mass of specimen after oven dried (g)	496.1	473.9	450.0	475.7	701.2	458.3	704.6	442.2
Mass of specimen after immersed in water for 24 hrs prior to test - Oven Dry (g)	-	-	-	-	829.5	587.9	837.0	576.2
Date of Test	11/08/08				12/08/08			
Breaking load - 1st break (N)	377	432	354	438	682	481	436	459
Breaking load - 2nd break (N)	492	374	414	351	429	455	654	379
Bending strength - 1st break (N/mm ²)	4.8	5.4	4.4	5.5	8.4	6.0	5.4	5.8
Bending strength - 2nd break (N/mm ²)	6.0	4.7	5.2	4.6	5.2	5.7	8.0	4.8
Mean bending strength (N/mm ²)	5.1				6.2			

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Results:

Table 4: Linear Thermal Shrinkage Test

Samples Reference	"BESTA" MgO board (10mm thick)				
	1	2	3	4	5
Dimension of cut specimens (mm)	35 x 35 x 10mm				
Date of Test	07/08/08				
Temperature of furnace for 4 hours at test	950 °C				
Remarks	All specimens softened and crumpled when pressed lightly with fingers after the test				

Results:

Table 5: Moisture Movement (Linear Change) Test

Sample Reference	"BESTA" MgO board (10mm thick)			
	1	2	3	4
Date of Test	06/08/08			
Dimension of cut specimens (mm)	305 x 76 x 10 mm			
Length (mm)	304.7	304.7	304.9	304.9
Width (mm)	76.8	75.9	75.6	76.7
Thickness (mm)	10.2	10.6	10.3	10.4
Measurement of specimen after condition at R.H 30%	14.568	14.353	14.750	14.366
Measurement of specimen after condition at R.H 90%	14.579	14.365	14.760	14.377
Linear change %	0.076	0.084	0.068	0.077
Average Linear Change %	0.076			

Results:Table 6: Moisture Content Test

Sample Reference	"BESTA" MgO board (10mm thick)				
	1	2	3	4	5
Date of Test	5/8/2008				
Dimension of cut specimens	152 x 76 x 10				
Length (mm)	151.6	151.6	150.2	150.4	151.7
Width (mm)	75.9	75.0	75.8	75.3	76.6
Thickness (mm)	10.06	10.33	10.38	10.09	10.23
Moisture content (%)	10.5	9.5	9.0	10.0	9.0
Average moisture content (%)	9.6				

Results:Table 7: Water Absorption Test

Sample Reference	"BESTA" MgO board (10mm thick)									
	1	2	3	4	5	6	7	8	9	10
Date of test	25/07/2008									
Dimension of cut specimens (mm)	100 x 100 x 10									
Length (mm)	100.6	100.8	97.9	100.5	99.6	101.0	99.5	99.6	100.7	100.3
Width (mm)	99.2	99.9	98.7	99.7	99.1	99.9	99.4	99.3	97.8	96.1
Water absorption by mass (%)	23.0	23.0	21.0	23.0	21.5	23.5	20.0	21.0	21.5	23.0
Average water absorption by mass (%)	22.0									

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Table 8: Water Tightness Test

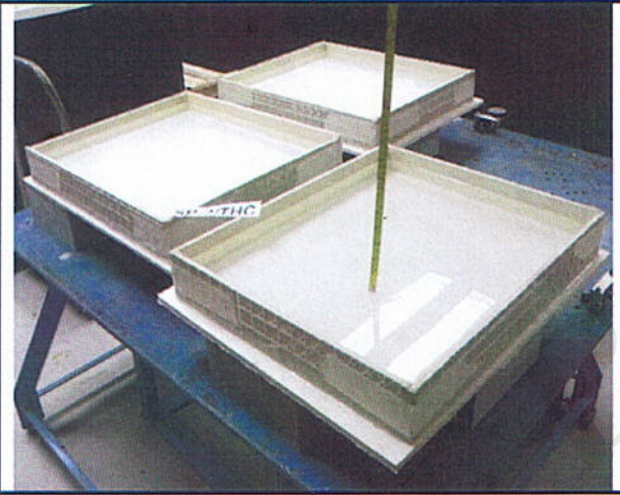


Sample Reference	"BESTA" MgO board		
	1	2	3
Date of test	11/08/08		
Dimension of cut specimens (mm)	610 x 508 x 10		
Height of clean water above prepared test specimens (mm)	50		
Observation	Dampness on the bottom surface observed (Refer to photographs 2 & 3)		

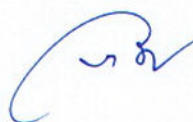



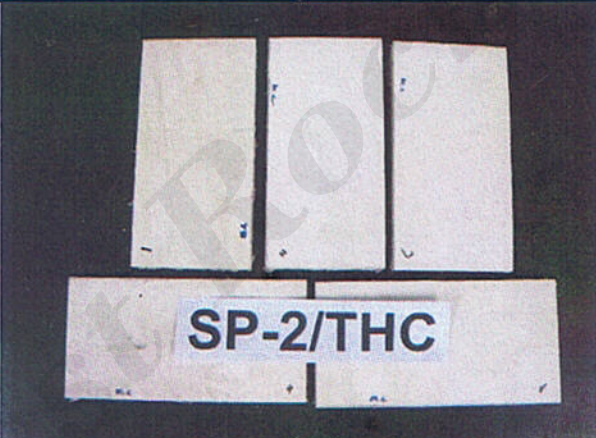
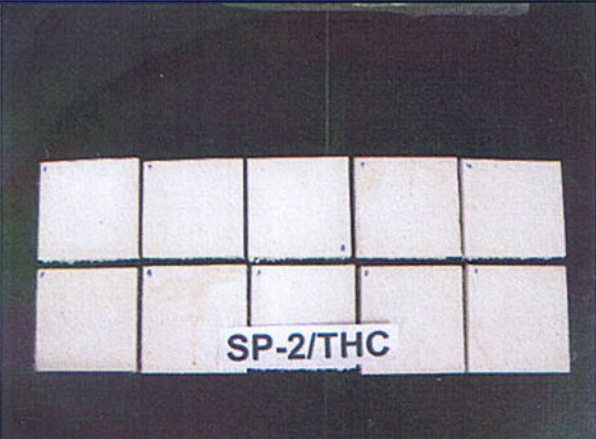
Yip Poh Chuan
Testing Officer
Special Project Department



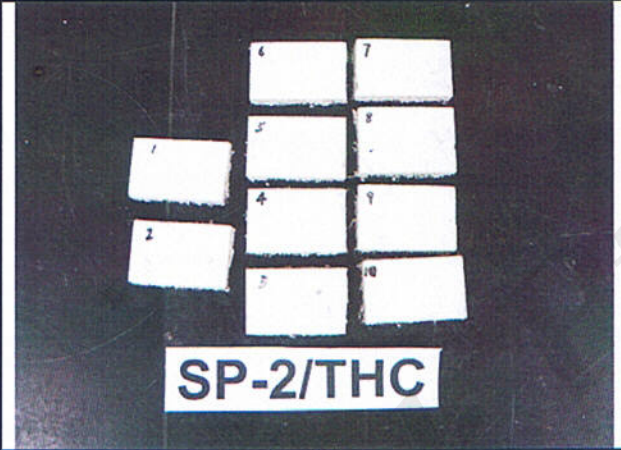


Tan Hong Choon
Asst. Manager
Special Project Department

<p>Photo 1.</p> 	<p>Physical and Mechanical Properties - Water-tightness test.</p> <p>Test in progress : MgO boards of 10mm thick cut into test specimens of dimension 22 inch x 18 inch (559mm x 457mm) with Water height of 2 in (50mm) been maintained above the top surfaces at $23 \pm 2^{\circ}\text{C}$ and $50 \pm 5\%$ relative humidity for the 24 hours test.</p>
<p>Photo 2.</p> 	<p>Physical and Mechanical Properties - Water-tightness test.</p> <p>Test in progress: After about 5 hours, sign of water dampness started to appear on the underside of test specimens.</p>
<p>Photo 3.</p> 	<p>Physical and Mechanical Properties in the lab for water tightness test.</p> <p>Photo shows the appearance of dampness on the underside of all the three (03) test specimens at the conclusion of water-tightness test after 24 hours.</p>




<p>Photo 4.</p> 	<p>Physical and Mechanical Properties – Moisture Movement test.</p> <p>Cut test specimens of 305 x 76mm x 10mm MgO board.</p>
<p>Photo 5.</p> 	<p>Physical and Mechanical Properties – Moisture Content test.</p> <p>Cut test specimens of 152 x 76mm x 10mm MgO board.</p>
<p>Photo 6.</p> 	<p>Physical and Mechanical Properties – Water Absorption test.</p> <p>Cut test specimens of 100 x 100 x 10mm MgO board.</p>



<p>Photo 7.</p> 	<p>Physical and Mechanical Properties – Density.</p> <p>Cut test specimens of 60 x 40mm x 10mm MgO.</p>
<p>Photo 8.</p> 	<p>Physical and Mechanical Properties – Bending Strength test.</p> <p>Photo shows the cut test specimens after conditioning and subjected to bending load supported at a span of 215mm.</p>
<p>Photo 9.</p> 	<p>Physical and Mechanical Properties – Bending Strength test.</p> <p>After 1st break, the fractured test specimens were assembled for a second bending test along an axis perpendicular to that used in the 1st test.</p>