



Testing Summary

Who Does the Testing?



SAIT TESTING LABS

With over 10 years of experience serving the innovation needs of the region, GBT provides early stage business development, design and engineering, fabrication and prototyping, laboratory and field site testing services that fundamentally change the way we build, educate and develop skilled labour.



QAI

<https://qai.org/>

QAI specializes in Testing, Certification and issuing Code Evaluation Reports for building products. They offer comprehensive testing services for a vast array of building products in the broad areas of construction materials, roofing products, doors, fire doors and windows.

TESTING STANDARDS FOR CANADA

Canadian Standards

The following organizations are accredited as standards development organizations in Canada:

- American Society for Testing and Materials International (ASTM)
- Bureau de normalisation du Québec (BNQ)
- Canadian General Standards Board (CGSB)
- Canadian Standards Association (CSA)
- Underwriters' Laboratories (UL)
- ULC Standards (ULC)

Non- Canadian Standards

The American Society of Heating, Refrigerating and Air- Conditioning Engineers (ASHRAE) and the National Fire Protection Association (NFPA) (these standards have been reviewed by the relevant standing committees and found to be acceptable.)

ICC-ES AC 386

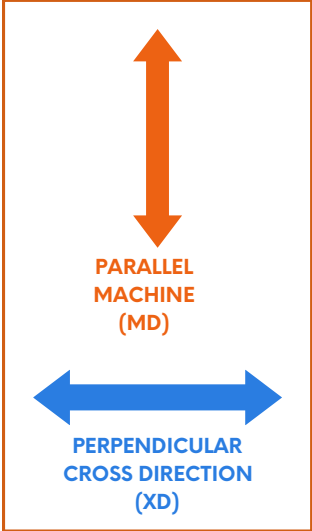
Acceptance Criteria for Fiber-Reinforced Magnesium-Oxide-Based Sheets.
Documents available on request.

QAI Laboratories

“ZS2 Magnesium Sulphate Sheets evaluated by QAI were found to comply with ICC-ES AC 386 for use as interior backer board.”

TESTING NAME	TESTING STANDARD	REQUIREMENTS	ZS ² TechBoard™ RESULTS
ZS² TechBoard™ PHYSICAL PROPERTIES TESTING 1/2 " (12mm)			
<p>Flame Spread characteristic: a ranking derived by laboratory standard test methodology of a material's propensity to burn rapidly and spread flames.</p>	<p>ICC – ES AC386 & ASTM E84-19b Comparable to : UL 723, ANSI/286\N0. 255, UBC No. 8-1</p>	<p>Flame- spread index of 10 or less and a smoke-developed index of 5 or less.</p>	<p>PASS – Class A 0 Flame Spread 5 Smoke Developed</p>
<p>Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth Aka “Room Corner Burn”: A-1 test method evaluates the performance of exterior walls of structures when exposed to direct flames. A gas burner positioned at the center of the wall assembly test module.</p>	<p>NFPA 286 & CSF Title 24 part 12-7A-1 & Wildland Urban Interface (WUI)</p>	<p>1. Absence of flame penetration through the wall assembly at any time. 2. Absence of sustained flaming or glowing combustion of any kind at the conclusion of the 60-minute observation period.</p>	<p>1. PASS 2. PASS</p>

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<p>Freeze-thaw 25 cycles ICC – ES AC386 flexural strength Comparable to : One set of five specimens was BS EN 12467 :2012+A1:2016 subjected to Wet Conditioning, followed by flexural strength testing. The second set was first immersed in water at a temperature of at least 50C (410F) for a minimum of 48 hours, then sealed separately in plastic bags. The specimens were then subjected to 25 cycles freeze/thaw.</p>		<p>1. Examine specimens for cracks, delamination or other defects</p> <p>2. Report ratio of Flexural strength compared to saturated samples</p>	<p>PASS</p> <p>1. No Visual signs of cracks, delamination or other defects</p> <p>2. Flexural Strength = 11.2 MPa</p> <p>Retention = 1.08 (aka. No loss in structural strength)</p>
<p>Flexural Strength: ICC – ES AC386 Ten specimens were tested in the dry condition and ten were tested in the wet condition. The dry specimens were conditioned for a minimum of 7 days in a controlled atmosphere of 23 ± 2°C (73 ± 4°F) and 50 ± 5% relative humidity. The wet specimens were conditioned by immersing in 23 ± 2°C (73 ± 4°F) water for 48 hours.</p>		<p>Minimum average flexural strength of 4000 kPa (580 psi) both wet and dry.</p>	<p>PASS</p> <p>1. WET & Parallel = 10.47 MPa (1518 psi)</p> <p>2. DRY & Parallel = 13.46 MPa (1952 psi)</p> <p>3. WET & Perpendicular = 10.43 MPa (1512 psi)</p> <p>4. DRY & Perpendicular = 11.86 MPa (1720 psi)</p>
<p>Falling Ball Impact: A 2" diameter steel ball was dropped from 12" vertical height onto the specimens supported in a frame. One drop was made on the specimen approximately in the center of the panel.</p>	<p>ICC – ES AC386 Comparable to : ISO 7892:1988</p>	<p>Samples shall show no damage to top or bottom surfaces at a 305 mm (12") drop height.</p>	<p>PASS</p> <p>Slight indentation at impact point, no cracking.</p>

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<p>Moisture Movement: The specimens were conditioned to practical equilibrium* at a relative humidity of 30 ± 2% and a temperature of 23 ± 2°C (73 ± 4°F). After conditioning, the length of each specimen was measured to the nearest 0.02 mm (0.001"). The specimens were then conditioned to practical equilibrium at a relative humidity of 90 ± 5% and a temperature of 23 ± 3°C (73 ± 6°F).</p> <p>After conditioning, the length of each specimen was again measured to the nearest 0.02 mm (0.001").</p> <p>*Practical equilibrium is defined as the state of time change in weight where, for practical purposes, the specimen is neither gaining nor losing moisture content more than 0.1 wt. % in a 24 hour period.</p>	<p>ICC – ES AC386</p> <p>Comparable to : BS EN 12467</p> <p>:2012+A1:2016</p>	<p>Report linear change based on relative humidity change from 30% to 90%</p>	<p>PASS</p> <p>Parallel = 0.16% Perpendicular = 0.21%</p> <div data-bbox="1170 825 1479 1352" style="border: 1px solid #f4a460; padding: 10px; text-align: center;">  <p>PARALLEL MACHINE (MD)</p> <p>PERPENDICULAR CROSS DIRECTION (XD)</p> </div>

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<p>Dimensional and Tolerances:</p> <p>Dimensional measurements were taken in accordance with ASTM C1185 with conditions of acceptance noted in ASTM C1186 on five full sheets of cement board siding and the results recorded below.</p>	<p>ICC – ES AC386</p> <p>Comparable to : EN 12467:2012+A1:20 16 section 7.2</p>	<p>Length & Width: The tolerance from the nominal shall be ± 0.5% with a maximum variation of ± 6 mm (1/4")</p> <p>Thickness: The maximum difference between extreme values of the thickness measurements within a sheet shall not exceed 15% of the maximum measured value. Thickness variation from sheet to sheet shall not exceed ± 1.3 (0.05").</p> <p>Squareness: The length of the diagonals shall not vary by more than 2.6 mm/m (1/32" per foot) of the length of the sheet. Opposite sides of the sheet shall not vary in length by more than 2.6 mm/m (1/32" per foot).</p> <p>Edge Straightness: The sheet edges shall be straight within 2.6mm/m (1/32" per foot) of length or width. N/A – see results</p> <p>N/A - see results</p>	<p>PASS</p> <p>Length = 3049mm +/-3mm</p> <p>Width = 1219 mm +/- 1mm</p> <p>Thickness = 12.7mm +/-0.8mm</p>
<p>Water Absorption:</p> <p>The test specimens were placed in an oven maintained at 90 ± 2°C (194 ± 4°F) and dried to constant weight. After cooling in a desiccator, the specimens were weighed the nearest 0.001 gram. The specimens were then submerged in 23 ± 4°C (73 ± 7°F) water for 48 ± 8 hours. After the 48 hour period, the specimens were removed from the water, wiped with a damp cloth and weighed to the nearest 0.001 gram.</p>	<p>ICC – ES AC386</p>		<p>37.8%</p>

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<p>Compression Indentation: Load Point 1 was located 25 mm (1") o/c from adjacent sides of a corner of the board specimen and Load Point 2 was located at the center of each specimen. A 25.4 mm (1") diameter disk was used to load each location to 4.368 kN (982 lbf), which corresponds to 8820 kPa (1250 psi). Each location was loaded to 8820 kPa (1250 psi), and immediately the load was reduced to 0. The indentation at peak load, as well as the residual indentation was measured and recorded 1 hour after the test was completed on each specimen.</p>	<p>ICC – ES AC386 Comparable to : EN 12467:2012+A1:2 0 16 section 7.2,</p>	<p>Report linear change based on relative humidity change from 30% to 90%.</p>	<p>PASS Parallel = 0.16% Perpendicular = 0.21%</p>
<p>Nail Head Pull Through: Dimensional measurements were taken in accordance with ASTM C1185 with conditions of acceptance noted in ASTM C1186 on five full sheets of MgO board siding and the results recorded</p>	<p>ICC – ES AC386</p>	<p>Minimum saturated nail- head pull-through resistance of 560 N (125 lbf).</p>	<p>PASS 994 N (223 lbf) Saturated Conditions FOS 3 Applied For allowable capacity of: 331N (74 lbf)</p>
<p>Humidified Deflection: Testing was performed in an environmental chamber maintained at 32 ± 1.7°C (90 ± 3°F) and 90 ± 3% relative humidity for a period of 48 hours. The deflection of each specimen was measured before and after conditioning at the center of each specimen to within 0.01 of an inch.</p>	<p>ICC – ES AC386</p>	<p>The maximum allowable deflection is 7.9 mm (0.3125") when used as wallboard. The maximum allowable deflection is 7.9 mm (0.3125") when used as ceiling finish. The maximum allowable deflection is 1.6 mm (0.0639") when used as a base for tile.</p>	<p>PASS Maximum measured deflection of 0.46mm (0.01")</p>

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Shear Bond Strength - Dry Set Portland Cement Mortar: N/A	ICC – ES AC386 & ANSI A 118.1	The substrate sheets adhered to substrate sheets shall demonstrate a minimum shear bond strength at seven day curing of 50 psi (345 kPa) for a minimum of 5 specimens.	PASS 61.1 psi
Shear Bond Strength - Latex Portland Cement Mortar: N/A	ICC – ES AC386 & ANSI A 118.1	The substrate sheets adhered to substrate sheets shall demonstrate a minimum shear bond strength at seven day curing of 50 psi (345 kPa) for a minimum of 5 specimens.	PASS 124 psi
Compressive Strength:	ASTM C1325 & ASTM D3295	N/A	2452 psi
Fungus, Mold and Mildew Testing:	ASTM G21 ASTM D3272 ASTM D3273	N/A	No evidence of fungal growth ASTM rating of 0
Weight:	ASTM 1037	N/A	2.69 lbs. per sq.ft.
Organic Mortar: N/A	ANSI 136.1	N/A	Not suitable
Thermal Conductivity: N/A	EN 12667:2001	N/A	0.186 WM - 1 K-1
Water Vapor Permeance:	ASTM E96	N/A	Average water vapor permeance rating 125.02 ng/Pa*s*m2 Permeance rating 2.2 US PERMS

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Lateral Nail Resistance:	ICC-ES AC378 ASTM D1037-99	Minimum 267 N (60 lbf) MD = MACHINE DIRECTION XD = CROSS DIRECTION	PASS 6mm (1/4") Dry Equilibrium = 481 N (108 lbf) MD 445 N (100 lbf) XD 6mm (1/4" Accelerated Aging = 271 N (60 lbf) MD 10mm Equilibrium = 847 N (190 lbf) MD 821 N (184 lbf) XD 10mm Saturated = 486 N (109 lbf) MD 486 N (109 lbf) XD 10mm Accelerated Aging = 483 N (108 lbf) MD 478 N (107 lbf) XD 13mm Equilibrium = 1131 N (254 lbf) MD 1091 N (245 lbf) XD 13mm Saturated = 637 N (143 lbf) MD 567 N (127 lbf) XD 13mm Accelerated Aging = 634 N (142 lbf) MD 655 N (147 lbf) XD 19mm Equilibrium = 1432 N (322 lbf) MD 1502 N (338 lbf) XD 19mm Saturated = 767 N (172 lbf) MD 825 N (185 lbf) XD 19mm Accelerated Aging = 879 N (198 lbf) MD 844 N (189 lbf) XD



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CONTACT US FOR A QUOTE

Through prefabricated construction technologies, combined with advances in material science, it's time to improve safety, close the productivity gap, increase building performance, and build for the future.