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*EVALUATION
REPORT*

DIVISION 07256

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Re-Evaluation
in process

Ceraclad Fibre-Cement Rain Screen System

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1. Purpose of Evaluation

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that “Ceraclad Fibre-Cement Rain Screen System” can serve as a cladding system conforming to the intent of the National Building Code of Canada (NBC) 1995.

2. Opinion

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that “Ceraclad Fibre-Cement Rain Screen System” complies with CCMC’s Technical Guide for Cladding Systems using Exterior Cement-bonded Fibrous Wood Particle Board, Masterformat number

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07256, dated 02-01-04, and provides a level of performance equivalent to that required in:

- National Building Code of Canada 1995, Part 9, Article 9.27.2.1.

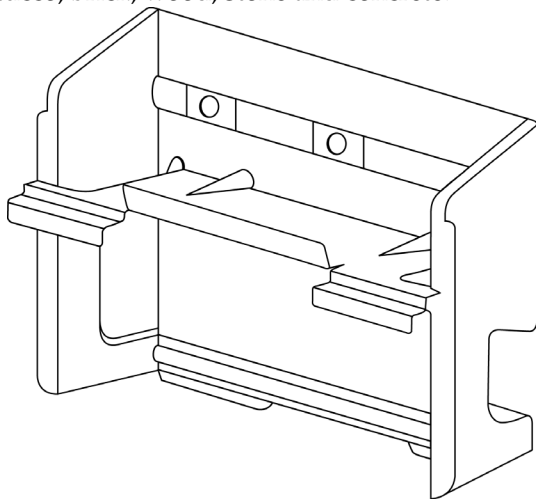
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3. Description

“Ceraclad Fibre-Cement Rain Screen System” is a fibre-cement board cladding system consisting mainly of hydraulic cement reinforced integrally with cellulose fibres. Using stainless steel clips, it is attached to an OSB or Plywood substrate having a minimum thickness of 9.5 mm or otherwise approved by a licensed professional engineer.

The panels are 3030 mm long, 455 mm wide and their thickness ranges from 16 to 25 mm depending on the profile and/or texture of each panel. The panels’ longitudinal profile incorporates concealed channels that run the full length, along the top and bottom of each panel. The vertical joints are square cut. Corner profile sections and accessories for use in conjunction with details are available from the manufacturer.

The panels are available in different factory-produced profiles and textures that simulate stucco, brick, wood, stone and concrete.



Clip Anchors

The stainless steel clip anchors are profiled to provide a rain screen airspace between the panels and the sheathing of either 10 mm or 18 mm. For the field of the wall, the clip anchors are 81.5 mm long, 67 mm high and 0.8 mm thick. A G90/Z275 galvanized steel starter strip in variable lengths, 67 mm high and 0.8 mm thick is used for the starter course. The starter strip is perforated to provide air circulation while at the same time providing bug/rodent protection.

For the starter strip, the clip anchors are 3030 mm long, 33 mm high and 1.2 mm thick.

Screws

The stainless steel clip anchors shall be fastened to the substrate at stud intervals using #9, 26 mm long stainless steel screws. The screws shall penetrate at least 12.5 mm into the studs, otherwise, the fastening method shall be approved by a licensed professional engineer. Note: #9 stainless steel screws have a head, shank and thread diameters of 8.08 mm, 3.11 mm and 4.35 mm.

“Ceraclad Fibre-Cement Rain Screen System” clip anchor unit and starter strip are illustrated in Figure 1.

“Ceraclad Fibre-Cement Rain Screen System” installation details are illustrated in Figure 2.

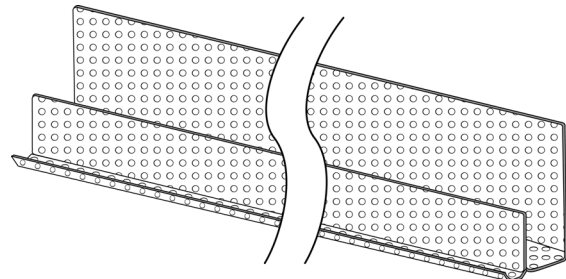


Figure 1. “Ceraclad Fibre-Cement Rain Screen System” Clip Anchor Unit and Starter Strip

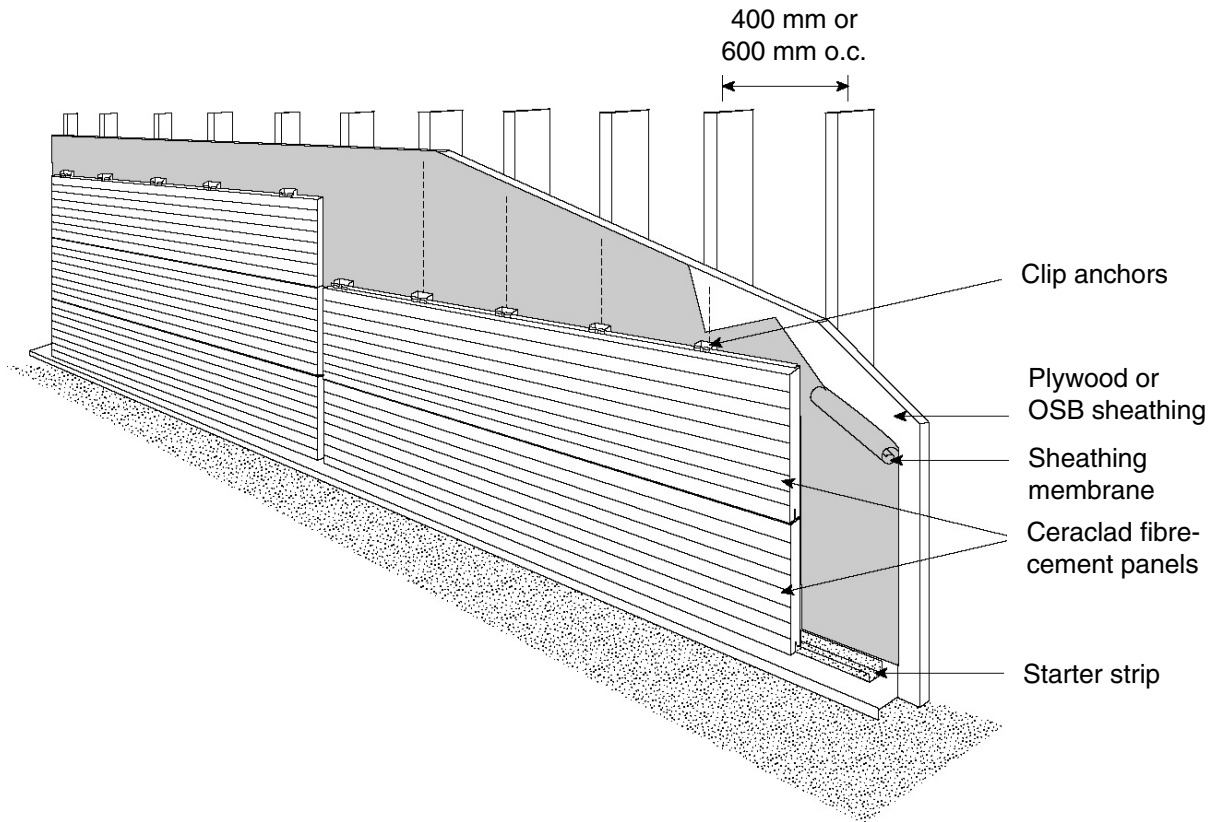


Figure 2. “Ceraclad Fibre-Cement Rain Screen System” Installation Details

4. Usage and Limitations

The “Ceraclad Fibre-Cement Rain Screen System” is intended to be used in new and retrofit constructions that are permitted to be combustible and that fall under the scope of Part 9 of the NBC 1995, over concrete, masonry, wood or steel framing designed in conformance with Part 4 of the NBC, 1995 for the anticipated loads, including cladding.

“Ceraclad Fibre-Cement Rain Screen System” shall be limited to installations where the 1-in-10-year wind design value for the geographical area, as factored for local exposure conditions and building height, is less than $Q_{10} < 0.40$ kPa, at 600 mm stud spacing.

The wind design value has been validated for “Ceraclad Fibre-Cement Rain Screen System” installed over plywood structural sheathing having a minimum thickness of 12.5 mm (½”) and conforming to the applicable standards as stated in Article 9.23.16.2. of the NBC 1995. The fastening of

the wall sheathing shall be in accordance with Article 9.23.3.5. of the NBC 1995.

For applications over concrete, masonry or steel framing, the wind design value corresponding to the type and size of fasteners recommended by the manufacturer shall be determined by a professional engineer skilled in structural design and licensed to practice under the appropriate provincial or territorial legislation.

At least one layer of sheathing membrane conforming to Article 9.23.17.1. of the NBC 1995 must be applied beneath the “Ceraclad Fibre-Cement Rain Screen System”.

“Ceraclad Fibre-Cement Rain Screen System” shall be installed with suitable flashing to drain water from the drainage layer to the exterior and to protect the exposed top edge of the cladding. The flashing shall be in accordance with the requirements of Subsection 9.27.3. of the NBC 1995.

The 10-mm or 18-mm air space that is created by the anchors shall remain unobstructed so as to form a clear drainage layer behind the “Ceraclad Fibre-Cement Rain Screen System.” The requirements of Subsections 3.1.11. and 9.10.15. of the NBC 1995 regarding fire stops in concealed spaces shall be respected.

“Ceraclad Fibre-Cement Rain Screen System” shall be installed according to the manufacturer’s current requirements. Listed below are some instructions:

- The system is used in conjunction with a Z275/G90-coated galvanized steel starter strip. The starter strip shall be applied at a minimum of 200 mm above the finished ground level.
- Exposed field cuts shall be end-sealed with the manufacturer’s recommended sealer.

- Spacing between panels at vertical joints shall be 10 mm and shall be gasketed, capped or caulked according to the manufacturer’s recommendations.
- When panels are to be butted next to trims, a 10-mm gap is required to allow for panel and/or trim movement. “Ceraclad” accessories are available for all trimming needs including windows, doors, and inside and outside corners.

5. Performance

Testing was conducted at an independent laboratory recognized by CCMC. The results of testing “Ceraclad Fibre-Cement Rain Screen System” are summarized in Tables 1 through 3.

Table 1. Physical & Mechanical Properties of “Ceraclad Fibre-Cement Rain Screen System”

Test	Requirement	Results
Composition (%)		
- Max. Fibrous Wood Particles by Weight	≤ 30	7.3
- Min. Cementious Content by Weight	≥ 50	92.7
Dimensional Tolerances		
- Length (mm)	± 3	± 0.0
- Width (mm)	± 3	± 0.0
- Thickness (mm)	± 1.6	± 0.8
- Squareness (mm)	± 4.0	± 2.0
Water Absorption (% by mass)	≤ 40	41.8*
Density (kg/m ³)	≥ 950	MD 1016 XD 1030

Table 1. Physical & Mechanical Properties of “Ceraclad Fibre-Cement Rain Screen System” (cont’d)

Test	Requirement	Results
Dimensional Stability (%)	< 2 mm/m @ 30% to 90% RH and after 48 hours immersion	MD 0.008 XD 0.009
Flexural Strength (MPa)	≥ 3.0	MD 5.4 XD 3.0
Fastener Pull Resistance (N)	≥ 28 Z = 412 (Z is the board thickness in mm)	778
Water Vapour Transmission (ng/m ² ·s·Pa)	Report Value	296
Watertightness	No formation of water drops underside	Passed
Warm Water Resistance - Physical changes - Loss in flexural strength (%)	No cracking ≤ 45%	Passed MD 11 (gain in strength) XD 6 (gain in strength)
Freeze-Thaw Resistance - Loss in mass (%) - Loss in flexural strength (%) - Physical changes	≤ 3 ≤ 15% No delamination, crazing, spalling or cracking	Passed MD 6 XD 9 Passed

* The longitudinal channels along the length of the panels affected the drying requirements of the tested sample. Consequently, the obtained result is deemed to meet the intent of the water absorption requirements despite exceeding the established minimum by 1.8%.

Table 2. Test Results for Wind Load Resistance of “Ceraclad Fibre-Cement Rain Screen System” (1,2)

Negative/Positive Pressure (Pa)	Deflection Point ⁽⁴⁾												
	1	2	3	4	5	6	7	8	9	10	11	12	
Sustained Loads													
30 min. @ 400 Residual Deflection	1.9/3.3	2.0/3.7	2.0/3.4	NM ⁽⁵⁾	2.3/4.8	2.4/4.5	2.8/5.1	2.4/4.0	1.9/2.3	1.8/2.4	1.8/2.5	2.0/3.0	
Cyclic Loads 2 stages of 1000 cycles @ 1060 ⁽³⁾	0.2	0.2	0.2	NM	0.3	0.3	0.4	0.3	0.2	0.2	0.0	0.1	
Gust Load ⁽⁶⁾ @ 1320	7.5/6.7	7.4/8.3	7.6/7.7	NM/8.9	8.2/10.1	7.6/9.5	8.1/10.9	6.9/8.7	6.0/5.9	9.4/7.2	5.9/7.0	6.7/8.8	
Residual Deflection	8.1/7.6	8.6/10.3	8.9/11.1	11.3/11.7	9.0/11.7	8.5/9.9	8.7/11.4	7.2/9.8	6.7/6.2	6.7/6.0	6.7/8.7	7.2/9.9	
D _{0.40} @ 1320	1.3	1.3	1.3	0.0	1.2	1.3	1.3	1.2	0.7	0.5	0.5	0.6	
	8.1/7.6	8.6/10.3	8.8/11.1	11.3/11.7	9.0/11.7	8.5/9.9	8.7/11.4	7.2/9.8	6.7/6.2	6.7/6.0	6.7/9.7	7.2/9.9	

- (1) The test was conducted on a 3048 x 3048 mm specimen of 38 mm x 89 mm (2" x 4") studs, @ 600 mm (24") on centre with 12.5 mm (½") plywood sheathing. The plywood sheathing was secured to the framing using #6 x 41-mm (1-5/8") nails spaced at 200 mm (8") at the perimeter of each sheet and 300 mm (12") at the intermediates.
- (2) The test specimen consisted of 7 rows of 460 mm (18") wide panels. The panels were installed in such a way as to have a continuous vertical joint at 2/3 point from one edge of the specimen. The cladding was fastened to the wall using clips that were attached to the studs using # 9 x 26-mm galvanized screws that go through the sheathing and into the stud.
- (3) Tested at 1200 while the requirement for the D_{0.40} is 800.
- (4) Gauges 1, 2, 3, 4, 5, 6 and 7 are located along the exterior side. Gauges 9, 10, 11 and 12 are located along the interior side of the specimen. Gauges 1, 2 and 3 are located along the vertical joint that is located at the second stud from the vertical edge of the specimen, at the top, middle and bottom of panel 4. Gauges 4 and 5 are located along the vertical line between the second and third studs from the edge of the specimen, at top and middle of panel 4. Gauge 6 is located at the third stud from the vertical edge of the specimen at the top edge of panel 4. Gauge 7 is located along the vertical line between the third and fourth studs at the middle of panel 4. Gauge 8 is located along the fourth stud at the bottom edge of panel 4. Gauges 9 and 12 are located at mid-span of the second and third studs from the edge of the specimen, while gauge 10 is located at mid-span between the second and third studs and gauge 11 is the exact opposite of gauge 6.
- (5) NM = Not measured.
- (6) The panel failed at a Gust Load of 1650 (Pa) tested at a stud spacing of 600 mm (24").

Table 3. Impact Resistance of “Ceraclad Fibre-Cement Rain Screen System”

Impact Body to be Used	Dynamic Mass (kg)	Energy (N-m)	Requirements	Results ⁽¹⁾
For Safety Impact				
Large Soft	50	100	The cladding may be damaged but must not: <ul style="list-style-type: none"> - allow the impact body to penetrate it; - be dislodged from its fixings; - generate falling debris capable of injuring people; and - impair the safety of the structure if the cladding has a structural function or is fixed to a structural element. 	Passed
Hard	1	10	The cladding must fulfill the above requirements but the impact body may pass through the cladding.	Passed
For Retention of Performance Impact				
Large Soft	50	34	The cladding system must retain all its functional characteristics and its overall appearance.	Passed
Small Soft	3	60		Passed
Hard	1	10		Passed

(1) Results of testing conducted on 16-mm-thick panels.

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