Evaluation Report CCMC 14307-R
Nichiha Premium Plank Siding

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "Nichiha Premium Plank Siding," when used as an exterior cladding in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 2015:

- Clause 1.2.1.1.(1)(a) of Division A, as an acceptable solution from Division B:
  - Subsection 9.27.2., Required Protection from Precipitation

- Clause 1.2.1.1.(1)(b) of Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
  - Subsection 9.27.5., Attachment of Cladding
  - Subsection 9.27.9., Hardboard

This opinion is based on the CCMC evaluation of the technical evidence in Section 4 provided by the Report Holder.

2. Description

The product is a cement-bonded particleboard composed primarily of hydraulic cement, other cementitious materials, fibrous wood particle, pigment and paint. The product is cast in moulds that produce different textures and then cured in the oven.

"Nichiha Premium Plank Siding" is available in different textures and styles, but is mainly available in two distinctive style categories: "Sierra Premium Shake" and "Savannah Smooth." "Sierra Premium Shake" comes with different surface textures and is available in dimensions of 2 845 mm in length, 225 mm in width and 12 mm in thickness. "Savannah Smooth" comes with a smooth surface and is available in dimensions of 2 845 mm in length, 159 mm, 184 mm or 210 mm in width and 12 mm in thickness.

Examples of "Sierra Premium Shake" and "Savannah Smooth" product are shown in Figures 1 and 2, respectively. The product is installed as horizontal lapped planks.

Figure 1. "Sierra Premium Shake"

Figure 2. "Savannah Smooth"

3. Conditions and Limitations

The CCMC compliance opinion in Section 1 is bound by "Nichiha Premium Plank Siding" being used in accordance with the conditions and limitations set out below.

3.1 General

- The product is limited to use as exterior cladding for buildings falling within the scope of Part 9, Housing and Small Buildings, of Division B of the NBC 2015.
- The product is limited for use in new construction with lightweight wood framing as shown in Table 4.1.2.1.
- The product shall be installed horizontally.
- The performance levels shown in Table 4.1.2.1 represent installations limited to non-post-disaster buildings which have a maximum building height of 12 m, 20 m or 40 m, depending on the geographical area and the respective hourly wind pressures (HWP). The performance levels in Table 4.1.2.1 for building heights of 20 m or 40 m are shown for information purposes only for use in the engineering designs by a professional engineer.
- Buildings up to three storeys high (12 m) fall under the scope of Part 9 of Division B of the NBC 2015.
- Buildings higher than 12 m fall under the scope of Part 4, Structural Design, of Division B of the NBC 2015. In accordance with the NBC 2015, the engineering design shall be prepared by a professional engineer who is licensed to practice in Canada and has expertise in a relevant area.
- A clearance of not less than 200 mm shall be provided between finished ground and the product.
- At least one layer of wall sheathing membrane that conforms to Article 9.27.3.2., Sheathing Membrane Material Standard, of Division B of the NBC 2015, shall be applied beneath the cladding products.
- Where no sheathing is used, at least two layers of sheathing membrane shall be applied beneath the cladding product in accordance with Article 9.27.3.5., Sheathing Membrane in lieu of Sheathing, of Division B of the NBC 2015.
- If sheathing is required as part of the structure of the wood-frame construction (e.g. braced walls), a proper second plane of protection shall be provided in accordance with Subsection 9.27.3., Second Plane of Protection, of Division B of the NBC 2015.
- Installation of the product shall meet the requirements of Article 9.27.3.7., Flashing Materials, Article 9.27.3.8., Flashing Installation, and Subsection 9.27.5., Attachment of Cladding, of Division B of the NBC 2015.
- Cladding attachments shall conform to Sentence 9.27.5.1.(1), Attachment (of Cladding), and Article 9.27.5.5., Fastener Materials, and Article 9.27.5.7., Penetration of Fasteners, of Division B of the NBC 2015.
- The product shall be installed over wood strapping to create a drained and vented air space not less than 10 mm deep behind the cladding.
- The requirements of Article 9.10.16.1., Required Fire Blocks in Concealed Spaces, of Division B of the NBC 2015, shall be met.
- Fire blocks shall be installed in accordance with the requirements of Article 9.10.16.2., Required Fire Blocks in Wall Assemblies, of Division B of the NBC 2015.
- The attachment of the cladding shall conform to Table 4.1.2.1 of this Report.
- The products shall be installed in accordance with the manufacturer's current installation instructions:
    - "Installation Guide "Savannah Smooth & Sierra Premium Shake" December 2020
- If there is any discrepancy between the Conditions and Limitation of this Evaluation Report and the proponent's installation instruction, the Conditions and Limitations of the Report supersede.
- The installation of "Sierra Premium Shake" and "Savannah Smooth" is limited to geographical areas depending on 1-in-50 year hourly wind pressure (HWP). Refer to Table 4.1.2.2. for the maximum HWP for each test assembly.
- If the fastening schedules in the manufacturer's installation instructions differ from those tested and reported in Table 4.1.2.1 of this Report, the ones in Table 4.1.2.1 supersede.
- The product shall be applied in geographical areas where the spectral response acceleration $S_a(0.2)$ is 1.2 or less and the building is on a Class C site or better, as defined in Article 4.1.8.4., Site Properties, of Division B of the NBC 2015. For the geographical areas where the spectral response acceleration $S_a(0.2)$ is greater than 1.2, the pre-engineered designs have been developed. Please refer to Section 4.2 for more details.
- In the event of any damage resulting from impact, the cladding units shall be replaced immediately.
- To obtain acceptable performance, a high level of quality control at all stages of the exterior wall construction is imperative.
- This Evaluation Report is applicable only to products identified with "CCMC 14307-R."

4. Technical Evidence

The Report Holder has submitted technical documentation for the CCMC evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

4.1 Requirements

4.1.1 Material Requirements

Table 4.1.1.1 Results of Testing the Prescriptive Requirements of "Sierra Premium Shake"

Property		Unit	Requirement	Result
Dimensional tolerances	**length**	mm	≤ ± 3	Pass
	width	mm	≤ ± 3	Pass
	thickness	mm	≤ 1.6	Pass
	squareness	mm/m	≤ ± 1.3	Pass
	edge straightness	mm/m	≤ ± 1.3	Pass
Density		kg/m^3	Report value	1 256
Water absorption		%	≤ 40	14
Flexural strength	**equilibrium conditioning(1)**	MPa	> 7.0	12
	wet conditioning(2)	MPa	> 7.0	9
Dimensional change in length	**30% RH to 90% RH**	%	< 0.20	0.16
	48 h immersion in water	%	< 0.20	0.17
Water vapour permeance	**desiccant method**	$ng/(Pa·s·m^2)$	Report value	19
	water method	$ng/(Pa·s·m^2)$	Report value	135
Watertightness		–	No drops of water	Pass
Warm water resistance(3)	**loss in flexural strength(4)**	%	≤ 15	10
	deleterious effects	–	No visible deterioration	Pass
Freeze-thaw resistance (unidirectional)(5)	**loss in mass**	%	≤ 3	0
	deleterious effects	–	No visible deterioration	None
Fastener Pull-Through Resistance		N	≥ 336 (28×Z, where Z is the thickness = 12 mm)	1664

Notes to Table 4.1.1.1:

(1) The specimens were conditioned at 23±2°C and 50±5% RH for 4 days.

(2) The specimens were immersed in water at 23±4°C for 48 hours.

(3) The specimens were immersed in water at 60±2°C for 56 ± 2 days.

(4) The flexural strength was conducted in machine direction.

(5) The specimens were exposed to 12 freeze-thaw cycles between 20°C and –20°C and another 12 freeze-thaw cycles between 20°C and –5°C.

(6) The specimens were exposed to 50 freeze-thaw cycles between 20°C and –20°C.

4.1.2 Performance Requirements

Table 4.1.2.1 Results of Testing the Wind Load Resistance of the Product for Non-post-disaster Buildings

Assembly ID[1]	Product	Product Dimension, mm	Product Installation Orientation / Joint Alignment	Frame, mm	Sheathing	Stud Spacing, on centre, mm	Fastener Spacing, mm	Fasteners / Fastened Substrate	Maximum Building Height[2], m	Hourly Wind Pressure, Q_{50}, kPa
1	Sierra Premium Shake	225 × 2 845 × 12	Horizontal / staggered at 406 mm	38 × 89 S-P-F No. 2 wood	11.1-mm oriented strandboard (OSB) + 10 mm plywood strapping at 406 mm	406	406	6d (Shank diameter 0.099 in.) 2.5 in. blind nail / on stud	12	$Q_{50} < 1.00$
									20	$Q_{50} < 1.00$
									40	$Q_{50} < 0.45$
2	Sierra Premium Shake	225 × 2 845 × 12	Horizontal / staggered at 406 mm	38 × 89 S-P-F No. 2 wood	11.1-mm OSB + 10 mm plywood strapping at 406 mm	406	406	#8 (Shank diameter 0.162 in.) × 2 in. blind nail / on stud	12	$Q_{50} < 1.00$
									20	$Q_{50} < 1.00$
									40	$Q_{50} < 0.45$
3	Sierra Premium Shake	225 × 2 845 × 12	Horizontal / staggered at 406 mm	38 × 89 S-P-F No. 2 wood	11.1-mm OSB + 10 mm plywood strapping at 203 mm	406	203	6d (Shank diameter 0.099 in.) 2 in. blind nail / on stud & sheathing	12	$Q_{50} < 1.00$
									20	$Q_{50} < 1.00$
									40	$Q_{50} < 0.45$
4	Sierra Premium Shake	225 × 2 845 × 12	Horizontal / staggered at 406 mm	38 × 89 S-P-F No. 2 wood	11.1-mm OSB + 12.7-mm exterior gypsum + 10 mm plywood strapping at 203 mm	406	203	6d (Shank diameter 0.099 in.) 2.5 in. blind nail / on stud & sheathing	12	$Q_{50} < 1.00$
									20	$Q_{50} < 1.00$
									40	$Q_{50} < 0.45$
5	Sierra Premium Shake	225 × 2 845 × 12	Horizontal / staggered at 406 mm	38 × 89 S-P-F No. 2 wood	11.1-mm OSB + 10 mm plywood strapping at 203 mm	406	203	#8 (Shank diameter 0.162 in.) × 1-5/8 in. blind nail / on sheathing only	12	$Q_{50} < 1.00$
									20	$Q_{50} < 1.00$
									40	$Q_{50} < 0.45$

Notes to Table 4.1.2.1:

(1) Some of the assemblies and fastening schedules listed in the table are not covered by the manufacturer's installation instructions.

(2) Buildings up to three storeys high (12 m) fall under the scope of Part 9 of Division B of the NBC 2015. Buildings higher than 12 m fall under the scope of Part 4 of Division B of the NBC 2015. In accordance with the NBC 2015, the engineering design must be prepared by a professional engineer licensed to practice in Canada who has expertise in the relevant area.

Table 4.1.2.2 Deflection Measurements from Wind Load Resistance Test

Assembly ID[1]	Wind Pressure at Deflection Measurements[2], Pa	Deflection Measurements[3], mm	
		Negative Pressure[4]	Positive Pressure[5]
1	2 410	28.84	40.80
2	2 410	32.12	36.20
3	2 410	24.66	27.80
4	2 410	25.22	31.92
5	2 410	33.18	39.48

Notes to Table 4.1.2.2:

(1) Assembly ID corresponds to the one in Table 4.1.2.1.

(2) Deflection measurement was taken at the gust wind pressure.

(3) Maximum deflection values among 12 sensor locations

(4) "Negative Pressure" denotes the positive wind load.

(5) "Positive Pressure" denotes the negative wind load.

Table 4.1.2.3 Results of Testing the Impact Resistance of the Product

Impact Body		Requirements		Results
		Dynamic Mass, kg	Energy, N·m	Assembly #4[(1)(2)]
Safety impact	large soft	50	100	Pass
	hard	1	10	Pass[(3)]
Retention of performance impact	large soft	50	34	Pass
	small soft	3	60	Pass[(4)]
	hard	1	10	Pass[(4)]

Notes to Table 4.1.2.3:

(1) Assembly ID corresponds to the one in Table 4.1.2.1.
(2) Assembly #4 was tested to demonstrate the impact resistance of the products in a typical installation.
(3) Some cracks were observed; however, the specimens retained safety characteristics.
(4) Some cracks were observed; however, the specimens retained their functional characteristics and overall appearance. In the event of any damage resulting from the impact, the cladding units must be replaced immediately.

4.2 Additional Performance Data

Data in this section does not form part of CCMC's opinion in Section 1.

4.2.1 Pre-engineered Design Solutions

The manufacturer has commissioned three (3) pre-engineered designs for a 3-storey multi-family buildings in a high seismic zone: La Malbaie, QC, $S_a(0.2)$= 1.73, a high wind zone: Cowley, AB, $q_{1/50}$ = 1.01 kPa, and a high snow load: Whistler, B.C., S_s = 9.5 kPa. The engineering analysis was conducted by BOCA Engineering CO. Report No. 0066-5, dated August 29, 2019. Contact the manufacturer to obtain these pre-engineered building designs.

Report Holder

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