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*EVALUATION  
REPORT*

**DIVISION 07256**

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**Re-Evaluation  
in process**

## *Nichiha Sierra Premium™ Series*

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### **1. Purpose of Evaluation**

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that "Nichiha Sierra Premium™ Series" can serve as a cladding system (lapped strip siding) in compliance with the intent of the National Building Code of Canada (NBC) 1995.

### **2. Opinion**

Subject to the limitations and conditions stated in this report, test and assessments provided by the proponent show that "Nichiha Sierra Premium™ Series" complies with CCMC's Technical Guide for Cladding Systems Using Exterior Cement-Bonded Fibrous Wood Particle Board, MasterFormat number 07256, dated 2002-01-04, and provides a level of performance equivalent to that required in:

- NBC 1995, Section 9.27.

Canada Mortgage and Housing Corporation permits the use of this product in construction

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### 3. Description

“Nichiha Sierra Premium™ Series” is a cladding system (lapped strip siding) consisting of autoclaved, cement-bonded, fibrous wood particle planks that are attached to the substrate at the studs, through 19-mm wood strapping.

“Nichiha Sierra Premium™ Series” is available in two designs: “Nichiha Sierra Premium™ Shake” and “Nichiha Sierra Premium™ Smooth.”

The “Nichiha Sierra Premium™ Shake” strip siding has a deep grain shake surface texture and is 2.4 m long, 229 mm wide and 12 mm thick.

“Nichiha Sierra Premium™ Smooth” strip siding has a smooth surface texture and is 3.0 m long, 175 mm wide and 12 mm thick.

“Nichiha Sierra Premium™ Series” strip siding is factory-primed, with all sides factory-sealed.

The “Nichiha Sierra Premium™ Series” strip siding is installed in a lapped application (a pattern of overlapping horizontal planks).

The installation details of “Nichiha Sierra Premium™ Series” are shown in Figure 1.

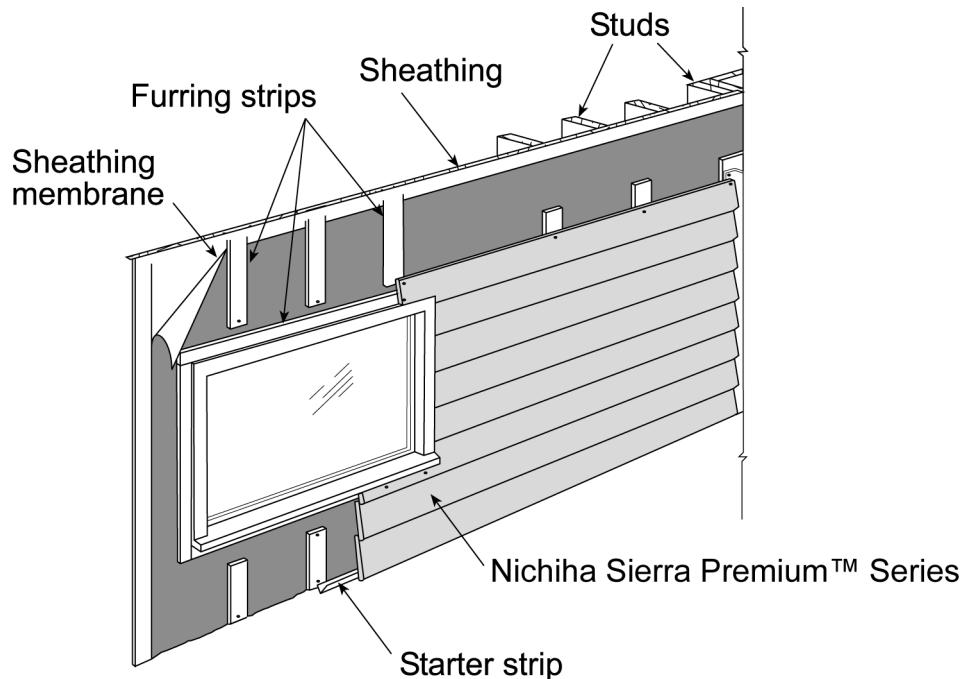


Figure 1. “Nichiha Sierra Premium™ Series”

### 4. Usage and Limitations

“Nichiha Sierra Premium™ Series” cladding is intended to be used in new and retrofit constructions (that are permitted to be combustible construction), that fall under the scope of Part 9 of the NBC 1995, over strapping for all geographical areas over concrete, masonry, wood or steel framing designed in

conformance with Part 4 of the NBC 1995 for the anticipated loads, including cladding.

“Nichiha Sierra Premium™ Series” is installed over the strapping using hot-dipped galvanized 8d nails (64 mm long) or stainless steel ring shank nails (2.33-mm-diameter x 38 mm long). The nails shall penetrate at least 25 mm into the studs.

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“Nichiha Sierra Premium™ Series” shall be limited to installations where the 1-in-10-year wind design value for the geographical area, as factored for the local exposure conditions and building height is  $Q_{10} < 0.80$  kPa.

The wind design value has been validated for “Nichiha Sierra Premium™ Series” installed over No. 3 Grade, S-P-F nominal 19-mm x 63.5-mm furring, that in turn is installed over plywood structural sheathing having a minimum thickness of 13 mm (1/2”) and conforming to the applicable standards referenced 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 or masonry, 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 “Nichiha Sierra Premium™ Series.”

“Nichiha Sierra Premium™ Series” 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.

Flashing installed shall be in accordance with the requirements of the NBC 1995, Subsection 9.27.3.

The 19-mm air space that is created by the strapping shall remain unobstructed to form a clear drainage layer behind the “Nichiha Sierra Premium™ Series.”

The requirements of the NBC 1995, Subsection 3.1.11., Fire Stops in Concealed Spaces, and Subsection 9.10.15., Fire Stops, shall be respected.

“Nichiha Sierra Premium™ Series” shall be installed according to the manufacturer’s current requirements, some of which are listed below.

- “Nichiha Sierra Premium™ Series” must be installed working from bottom to top.
- The system must be used in conjunction with 6d or 8d, 50-mm, Z275-coated galvanized or stainless steel nails.
- Nailing must penetrate a minimum of 25 mm into the stud. Nailing must occur at a minimum of 25 mm from the top edge of the panels and at a minimum of 19 mm from the bottom edge of the panels. Nailing at vertical joints must be angled.
- The starter strip shall be applied at a minimum of 155 mm above the finished grade line.
- Vertical joints must be located at studs.
- Vertical joints at corners shall occur on studs.
- A minimum of 25 mm overlap must be provided at horizontal joints.
- When panels are to be butted next to wood trims, a 3-mm gap is required to allow for movement of the wood trim.

## **5. Performance**

Testing was conducted by an independent laboratory recognized by CCMC.

The results of testing “Nichiha Sierra Premium™ Series” are summarized in Tables 1 through 3.

**Table 1. Physical and Mechanical Properties of “Nichiha Sierra Premium™ Series”**

Test	Requirements	Results
Composition		
- fibrous wood particles by mass (%)	≤ 30	pass
- cement content by mass (%)	≥ 50	64.2
- length of wood fibres (mm)	≤ 15	≤ 10
- width of wood fibres (mm)	≤ 0.3	0.15 to 0.25
- thickness of wood fibres (mm)	≤ 0.3	0.15 to 0.25
Dimensional tolerances		
- length (mm)	±3	-1
- width (mm)	±3	±0.5
- thickness (mm)	±1.6	-1.5
- squareness (mm)	±4	0
Density (kg/m <sup>3</sup> )	≥ 950	1 160.0
Water absorption (% by mass)	≤ 40	14.5
Dimensional stability (mm/m)		
- @ 30% to 90% RH	< 2	MD <sup>(1)</sup> 0.14 <sup>(3)</sup> XD <sup>(2)</sup> 0.13 <sup>(3)</sup>
- after 48 hours immersion	< 2	MD 0.16 <sup>(3)</sup> XD 0.14 <sup>(3)</sup>
Flexural strength (MPa)	> 3.0	MD 11.92 XD 10.27
Fastener pull resistance (N)	> 28 Z (Z is the board thickness in mm)	1771
Water vapour transmission (ng/m <sup>2</sup> ·s·Pa)	Report value	253 <sup>(4)</sup> 198 <sup>(5)</sup>

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**Table 1. Physical and Mechanical Properties of “Nichiha Sierra Premium™ Series” (cont’d)**

Test	Requirement	Results
Watertightness	No formation of water drops underside	Pass
Warm water resistance (%)	< 45 loss in flexural strength	MD 24.5 XD 22.8
Freeze/thaw resistance		
- loss in mass (%)	$\leq 3$	0
- loss in flexural strength (%)	$\leq 15$	MD 7.2 XD 7.7
- physical changes	No delamination, crazing, spalling or cracking	Pass

**Notes to Table 1:**

- (1) MD is machine direction.
- (2) XD is cross direction.
- (3) The Technical Guide requires measuring the dimensional stability at 30% to 90% RH as well as after 48 hours immersion. The results obtained in Table 1 reflect the dimensional stability after 7 days and 14 days of immersion. The obtained results are considered to represent a more stringent case than the present requirements in the Guide. Consequently, the results are considered to be in full conformance with the requirements of the Guide.
- (4) Exterior surface exposed to water vapour.
- (5) Interior surface exposed to water vapour.

**Table 2. Test Results for Wind Load Resistance of “Nichiha Sierra Premium™ Series”**

Positive/Negative Pressure (Pa)	Deflection Point									
	1	2	3	4	5	6	7	8	9	10
	Deflection (mm)									
Sustained Loads										
200	0.069/0.066	0.229/0.067	0.072/0.066	0.074/0.067	0.073/0.062	0.005/0.004	0.006/0.007	NM/ NM	NM/ NM	NM/ NM
400	0.148/NM	0.309/NM	0.153/NM	0.17/NM	0.154/NM	0.009/NM	0.014/NM	NM/ NM	NM/ NM	NM/ NM
600	0.235/ NM	0.395/NM	0.239/NM	0.244/NM	0.239/NM	0.013/NM	0.022/NM	NM/ NM	NM/ NM	NM/ NM
15 min. @ 800 Pa	0.325/0.317	0.487/NM	0.0.331/0.331	0.339/0.338	0.332/0.325	0.017/0.022	0.032/0.037	-0.208/NM	NM/0.198	- 0.200/0.200
Residual deflection	0.036/0.015	0.196/NM	0.038/0.014	0.039/0.015	0.042/0.013	0.003/0.001	0.006/0.004	-0.046/0.007	NM/0.007	-0.045/NM
Cyclic loads: 2 stages of 1000 cycles @ 1060 Pa										
Residual deflection	0.056/0.572	0.058/0.570	0.059/0.569	0.433/0.563	0.937/1.066	0.006/0.508	0.018/0.021	NM/0.057	- 0.068/0.066	- 0.071/0.070
Gust load @ 1600	NM/ NM	NM/ NM	0.698/1.781	NM/ NM	NM/ NM	0.033/0.566	0.071/0.152	NM/NM	- 0.468/0.489	NM/ NM
Residual deflection	NM/ NM	NM/ NM	0.073/0.022	NM/ NM	NM/ NM	0.005/0.004	0.018/0.001	NM/NM	- 0.084/0.046	NM/NM
D <sub>0.80</sub> @ 2640	NM/ NM	NM/ NM	0.106/0.037	NM/ NM	NM/ NM	0.008/NM	0.028/NM	NM/NM	- 0.118/0.046	NM/ NM

**General Notes to Table 2:**

- NM is not measured.
- The test was conducted for the cladding system installed over a substrate wall consisting of 38-mm x 89-mm studs at 400 mm (16") on centre, with 12.7-mm, A-C Grade plywood sheathing. The overall dimensions of the test specimen were 3 048 mm x 3 048 mm.
- The test specimen consisted of rows of “Nichiha Sierra Premium™ Series” panels: 2 438 mm long, 241 mm wide and 9.5 mm thick.
- The cladding was fastened to furring consisting of No. 3 Grade, S-P-F nominal 19-mm x 63.5-mm lumber, using 64-mm-long siding nails.
- Deflection gauges are located as indicated in Figure 2.
- D<sub>0.80</sub> @ 2 640 represents the maximum deflection recorded at 3.3 times the 1-in-10-year hourly wind pressure (Q<sub>10</sub>) for the case of Q<sub>10</sub> < 0.80 kPa.

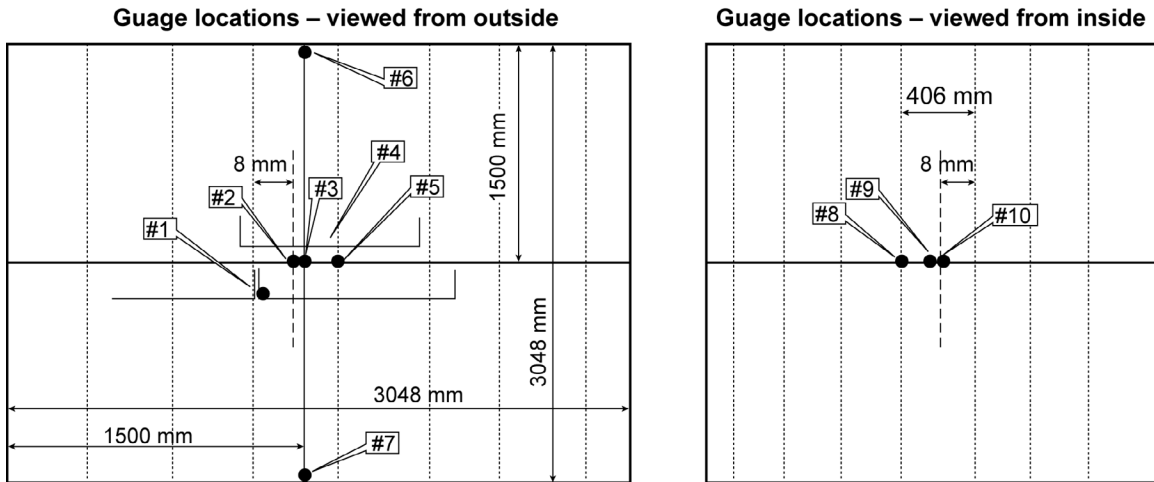


Figure 2: Gauge locations for “Nichiha Sierra Premium™ Series” wind load resistance test

Table 3. Test Results for Impact Resistance of “Nichiha Sierra Premium™ Series”

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

**Note to Table 3:**

(1) At the 60 N•m energy level, the product experienced an “H” shaped crack and indentation. In addition, pieces of the panel became loose. Despite the fact that the product didn’t meet the requirements for the 60 N•m energy level, as the cladding system can be repaired or replaced, lower impact resistance values, down to 6 N•m, may be accepted. Additional Small Soft Body Impact Resistance testing was carried out at increasingly reduced energy levels. “Nichiha Sierra Premium™ Series” was successfully tested at the 15 N•m energy level, and the results are considered in compliance with the requirements of Impact Resistance.

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