



Evaluation Report

CCMC 13399-R

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Crosstimbers[®] Classics

1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Crosstimbers[®] Classics,” when used as exterior decking in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code of Canada (NBC) 2005:

- Clause 1.2.1.1.(1)(b), 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 solution:
 - Article 9.23.14.5., Subfloor Thickness or Rating (when subjected to the loading and deflection limits implied in Subsection 9.4.2., Specified Loads, and Article 9.4.3.1., Deflections).

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4.1 provided by the Report holder.

2. Description

“Crosstimbers[®] Classics” is a thermoplastic composite lumber made primarily of polyethylene and rice hull flour. The “Crosstimbers[®] Classics” planks are manufactured by an extrusion process and are produced as decking 25.4 mm (1.0”) high by 141 mm (5.5”) wide with six (6) 15.5-mm-diameter (0.61”) longitudinal voids and 6.9-mm-wide (0.27”) by 5.3-mm-high (0.21”) longitudinal grooves on each side for concealed fastener attachment. The product is available in lengths of 3.66 m (12 ft), 4.88 m (16 ft) and 6.10 m (20 ft). The walking surface textures are an embossed simulated wood-grain pattern and a smooth as-extruded surface. The four (4) colours addressed herein are New Cedar, Pewter Grey, Sandalwood and Weatheredwood.

“Crosstimbers[®] Classics” is intended to be used as exterior decking installed over traditional structural wood framing.

3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is contingent upon "Crosstimbers® Classics" being used in accordance with the conditions and limitations set out below.

"Crosstimbers® Classics" may be used as exterior decking in combustible construction for light-duty applications, such as in residential occupancies, falling within the scope of Part 9 of Division B of the NBC 2005, when it is installed in conjunction with traditional structural wood framing designed to carry the applicable loads.

All deck boards have arrows imprinted on the side indicating the orientation. To obtain a uniform look, the boards must be installed such that all orientation arrows are pointing in the same direction.

The product must be installed in accordance with the manufacturer's usage guidelines for the Canadian market, and in accordance with the following limitations.

- "Crosstimbers® Classics" must be installed with supports spaced no greater than 300 mm on centre (o.c.).
- "Crosstimbers® Classics" must be attached to the supporting construction using the "EZ Build Deck Fastening System" provided by the manufacturer.
- "Crosstimbers® Classics" should be pre-drilled and countersunk prior to face fastening.
- "Crosstimbers® Classics" must be fastened to the wood joists with corrosion-resistant fasteners specified by the manufacturer and conforming to Article 9.23.3.1. of Division B of the NBC 2005. The planks must be fastened with at least two fasteners per support.
- "Crosstimbers® Classics" must be gapped end-to-end, based on the ambient temperature at the time of installation. The end-to-end gapping must be 4.7 mm (3/16") for installations below 60°C and 3.1 mm (1/8") for installations above 60°C. The width-to-width gapping is accomplished by installing the tongue into the groove with hand pressure only. The gap adjacent to the structure must be 6mm (1/4") for installations below 60°F and 9.5mm(3/8") for installations above 60°C.
- "Crosstimbers® Classics" is permitted to be used where termite and decay protection is required as per Article 9.3.2.9. of Division B of the NBC 2005.
- "Crosstimbers® Classics" is not to be used as stair treads. Only solid Crosstimbers® deck boards can be used as stair treads.
- "Crosstimbers® Classics" is not to be used as components of a substructure.
- "Crosstimbers® Classics" is not to be considered as an equivalent to dimensional lumber.
- The product must be identified with the manufacturer's name or logo and the phrase "CCMC 13399-R."

4. Technical Evidence

CCMC's Technical Guide for "Cellulosic/Polymer Composite Exterior Decking (Hollow Cross-Section)" sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the NBC 2005. The Report holder has submitted test results for CCMC's evaluation. Testing was conducted at an independent laboratory recognized by CCMC. The corresponding test results for "Crosstimbers® Classics" are summarized below.

4.1 NBC 2005 Compliance Data for “Crosstimbers® Classics” on which CCMC Based its Opinion in Section 1

Table 4.1.1 Basic Physical and Mechanical Properties of “Crosstimbers® Classics”

Property	Unit	Requirement	Result⁽¹⁾⁽²⁾
Dimensional Change			
Coefficient of linear expansion (swelling) • oven-dry to vacuum pressure soak	%	< 0.5, by 80% of specimens	0.02
Strength and Stiffness			
Flexural rigidity (EI) • span-to-depth ratio within 18 to 21	kN·mm ²	> 300 000	515 000
Moment capacity (Mr) • span-to-depth ratio within 18 to 21	N·mm	> 190 000	314 000
Creep, recovery and load duration	%	< 25 for creep > 75 for recovery No failure	40 ⁽³⁾ 75 Passed
Strength and Stiffness After Aging			
Weathering • impact resistance	%	> 75 of non-weathered value	93
Accelerated aging • MOE and MOR	%	> 50 of non-aged value	85 (MOE) 87 (MOR)
Fastener Holding Capacity			
• nail withdrawal strength	N	> 600	246 ⁽⁴⁾
• lateral nail strength	N	> 720	2 482
Flame-Spread Rating			
• flame-spread • smoke development	No unit	< 200 Report	70 >270

Notes to Table 4.1.1:

- (1) Average test results of six specimens, except for the “Creep, recovery and load duration” results, which are from three specimens.
- (2) Test results were obtained to classify the product and are not intended to be used as engineering design properties.
- (3) The product creep (deformation under constant load) will be greater than that of lumber planks for sustained loads. Deemed acceptable due to 300-mm spacing reduction from full-scale impact testing.
- (4) The nail withdrawal value is slightly lower than the target. The manufacturer specifies that screws with a higher capacity be used for installation.

Table 4.1.2 Performance Under Both Concentrated Static Loads and Impact Loads

Property	Requirement		Result ⁽¹⁾	
	Minimum Ultimate Load (kN)	Maximum Deflection Under 0.89-kN Load (mm)	Ultimate Load (kN)	Deflection Under 0.89-kN Load (mm)
Concentrated load • decking at 50°C • decking at 20°C • decking at -35°C	2.45	2.0	3.07 3.55 4.81	3.47 ⁽²⁾ 2.79 ⁽²⁾ 1.56
	Minimum Ultimate Load Following Impact Load of 102 N·m (kN)	Maximum Deflection Under 0.89-kN Load Following Impact Load of 102 N·m (mm)	Ultimate Load Following Impact Load of 102 N·m (kN)	Deflection Under 0.89-kN Load Following Impact Load of 102 N·m (mm)
Impact load • decking at 50°C	1.78	1.6	> 1.78	1.1

Notes to Table 4.1.2:

- (1) Test results are for profiled planks with plank supports at 300 mm o.c.
- (2) Although the results, 3.47 mm and 2.79 mm, are greater than the 2.0-mm requirement, these deflections were deemed acceptable since the concentrated static load after impact passed for 300-mm spacing and the deflections resulted from 400-mm spacing. It was expected that the deflection of the decking would be slightly higher than that of wood-based panels conforming to the NBC 2005 subfloor requirements at these temperatures.

Table 4.1.3 Durability

Property	Durability Requirement	Result	
		Spruce Lumber	Crossttimbers® Classics
Bending stiffness	Mean percentage loss in bending stiffness (EI) after ultraviolet (UV) exposure ⁽¹⁾ and accelerated aging ⁽²⁾ must be less than or equal to spruce lumber	32%	35% ⁽³⁾
Bending capacity	Mean percentage loss in bending capacity (M_F) after UV exposure ⁽¹⁾ and accelerated aging ⁽²⁾ must be less than or equal to spruce lumber	46%	46%

Notes to Table 4.1.3:

- (1) 4 061 hours of Xenon-Arc exposure following Cycle 1 of ASTM D 2565-99, “Standard Practice for Xenon Arc Exposure of Plastics Intended for Outdoor Applications.”
- (2) Five cycles of accelerated aging (wetting, freezing, thawing and drying).
- (3) Deemed as an acceptable performance in comparison to percentage loss of stiffness in lumber after aging.

Table 4.1.4 Decay and Termite Resistance

Property	Requirement	Result
Decay resistance <ul style="list-style-type: none"> • % loss in weight • compressive strength 	Mean percentage loss in weight and compressive strength after exposure to decay-causing fungi must be equal to or better than preservative-treated wood conforming to CAN/CSA-O80.1-M97, “Preservative Treatment of All Timber Products by Pressure Processes”	Passed
Termite resistance	Rating must be equal to or better than preservative-treated wood conforming to CAN/CSA-O80.1-M97	Passed

4.2 Additional Performance Data for “Crosstimbers® Classics”

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

Table 4.2.1 Additional Performance Data⁽¹⁾

Property	Unit	Reference value	Result
Coefficient of linear expansion (thermal) <ul style="list-style-type: none"> • longitudinal • cross-sectional 	cm/cm/°C	$< 2 \times 10^{-5}$	1.44×10^{-6} 1.62×10^{-6}
Impact resistance (Izod impact, notched)	J/m	> 53.4	18.0 ⁽²⁾
Hardness (11.28-mm-diameter ball)	kN	> 1.8	5.6
Slip resistance (longitudinal) <ul style="list-style-type: none"> • dry condition • wet condition 		> 0.5 ASTM F 1679-04, “Standard Test Method for Using a Variable Incidence Tribometer (VIT)”	Passed Passed

Conditions and limitations related to Table 4.2

Failure to conform to the conditions and limitations set out hereunder does not invalidate Comic's opinion concerning “Crosstimbers® Classics” with the National Building Code 2005.

- (1) Failure to conform to the conditions and limitations set out in this table does not invalidate CCMC’s opinion concerning the compliance of “Crosstimbers® Classics” with the National Building Code 2005.
- (2) The IZOD impact is a small-scale test used to characterize the material. Very low performance values show a sensitivity to a loss of strength following impact when the product is significantly damaged by a notch, cut or split. The results of the large-scale impact floor tests are the primary performance indicator with respect to floor impact loads.

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