



## Evaluation Report CCMC 13191-R ChoiceDek<sup>®</sup>, MoistureShield<sup>®</sup> Elite, Essential and Vantage Decking

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### 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “ChoiceDek<sup>®</sup>, MoistureShield<sup>®</sup> Elite, Essential and Vantage Decking,” 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) 2015:

- 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:
  - Article 9.3.2.9., Termite and Decay Protection
  - Subsection 9.4.2., Specified Loads
  - Article 9.4.3.1., Deflections
  - Article 9.8.9.1., Loads on Stairs and Ramps
  - Article 9.23.15.5., Subfloor Thickness or Rating

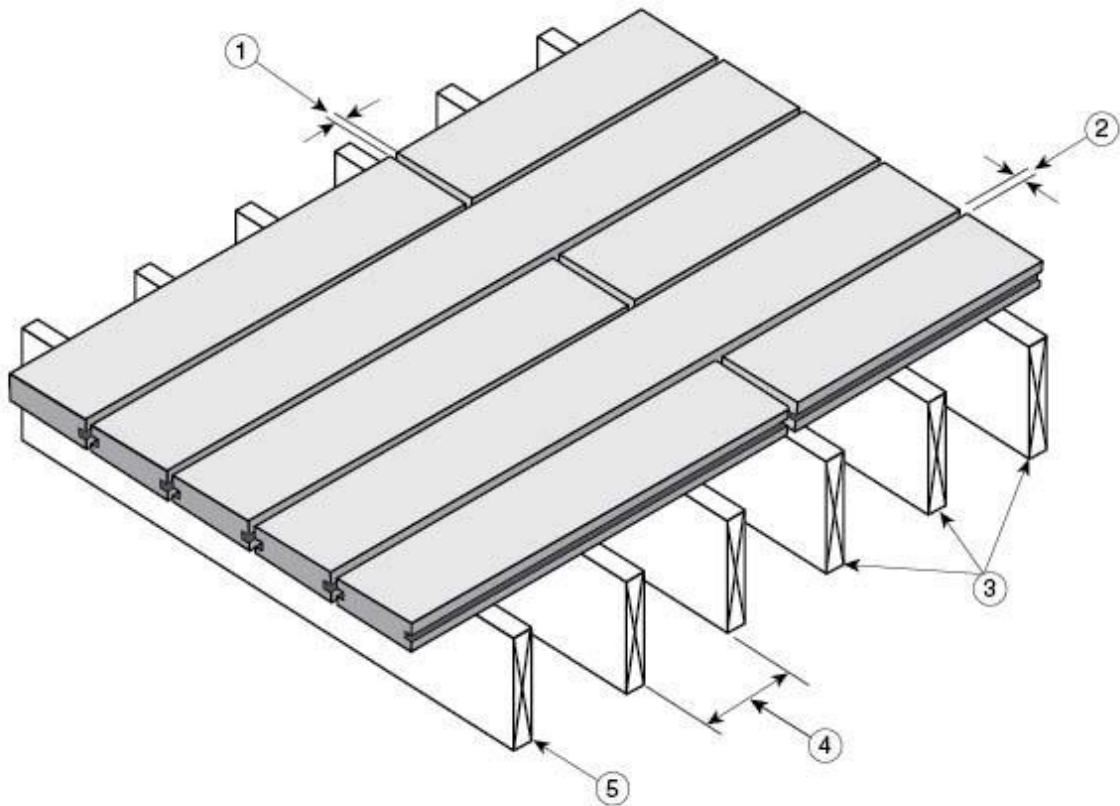
This opinion is based on CCMC’s evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 08-13-198 (13191-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2008-12-09 (revised on 2009-11-30) pursuant to s.29 of the *Building Code Act*, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

### 2. Description

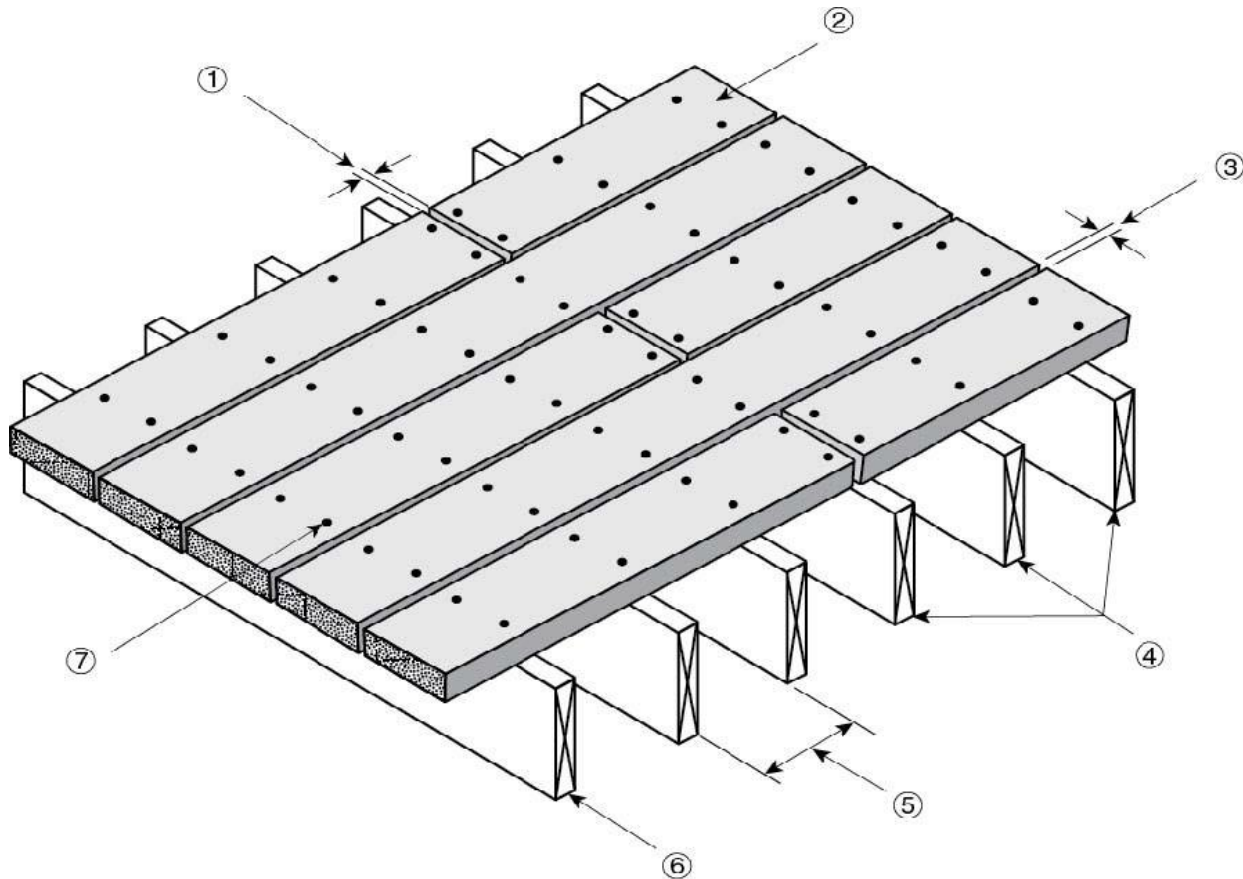
The products are a wood thermoplastic composite lumber (WTCL) made primarily from equal parts of reclaimed oak hardwood sawdust and reclaimed/recycled polyethylene (HDPE). The composite product is manufactured through a continuous extrusion process in planks of solid cross-section. The planks are manufactured in nominal dimensions of 32 mm × 140 mm and are available in 3.66 m and 4.88 m lengths (other lengths are available by special order).

The products are intended to be used as exterior decking to be installed over traditional structural wood framing spaced at 400 mm on center (o.c.) and stair treads installed on stringers spaced at 230 mm o.c.



**Figure 1. Installation details for the products with hidden fasteners**

- 1. 3 mm to 5 mm minimum end-to-end gapping, depending on length of plank and temperature at installation**
- 2. 6 mm to 10 mm minimum width-to-width gapping, depending on temperature at installation**
- 3. minimum of three joists per plank**
- 4. maximum joist spacing of 400 mm o.c.**
- 5. joist designed to support applicable loads**



**Figure 2. Installation details for the products with exposed fasteners**

1. 3 mm to 5 mm minimum end-to-end gapping, depending on length of plank and temperature at installation
2. Choicedek® and MoistureShield® Elite, Essential and Vantage Decking
3. 6 mm to 10 mm minimum width-to-width gapping, depending on temperature at installation
4. minimum of three joists per plank
5. maximum joist spacing of 400 mm o.c.
6. joist designed to support applicable loads
7. two fasteners, 64 mm long, per support

### 3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "ChoiceDek®, MoistureShield® Elite, Essential and Vantage Decking" being used in accordance with the conditions and limitations set out below.

- The products must be installed with supports spaced no greater than 400 mm on centre (o.c.). Each plank must be supported by at least three supports.
- The products must be fastened to the wood joists with fasteners specified by the manufacturer that conform to Article 9.23.3.1., Standards for Nails and Screws, of Division B of the NBC 2015. The fasteners must have a corrosion-resistant coating or be made of stainless steel. The planks must be fastened with at least two 64-mm-long fasteners per support.

*Note: As of January 2004, pressure-treated lumber requires specific hot-dipped galvanized fasteners for satisfactory performance.*

- The product must be gapped end-to-end based upon the length of the plank and the temperature at installation.

The end-to-end gapping must be:

- 5 mm for installations below 15°C, and
- 3 mm for installations above 15°C.

The width-to-width gapping must be:

- 6 mm for installations above 5°C, and
- 10 mm for installation below 5°C.
- The product can be used where termite protection is required as per Article 9.3.2.9., Termite and Decay Protection, of Division B of the NBC2015.
- The product can be used as stair treads at 230 mm (9 in.) o.c. spacing.
- The product is not to be considered as an equivalent to dimensional lumber.
- The product is permitted where decay resistance is required as per Sentence 9.3.2.9.(3), of Division B of the NBC2015.

## 4. Technical Evidence

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

### 4.1 Material Requirements

**Table 4.1.1 Results of Testing of Basic Physical and Mechanical Properties**

Property			Unit	Requirement	Result <sup>(1)(2)</sup>
Dimensional change	coefficient of linear expansion (swelling)	oven-dry to vacuum pressure soak	%	≤ 0.5, by 80% of specimens	0.06
Strength and stiffness	modulus of elasticity (MOE)	span-to-depth ratio within 18 to 21	MPa	≥ 750	1 449
	modulus of rupture (MOR)	span-to-depth ratio within 18 to 21	MPa	≥ 9	24.42
	creep, recovery and load duration		%	≤ 25 for creep	11.3
				≥ 75 for	96.9
No failure				Pass	
Strength and stiffness after aging	weathering	impact resistance	%	≥ 75 of non-weathered value	103
	accelerated aging	MOE	%	≥ 50 of non-aged value	106
		MOR			100
	fastener holding capacity	nail withdrawal strength	N	≥ 600	3 219
		lateral nail strength	N	≥ 720	2 098

#### Notes to Table 4.1.1:

- (1) Average test results of six specimens, except for the “creep, recovery and load duration” results that are from three specimens.
- (2) Test results were obtained to classify the product and are not intended to be used as engineering design properties.

## 4.2 Performance Requirements

**Table 4.2.1 Results of Testing of Performance Under Both Concentrated Static Loads and Impact Loads**

Property		Requirement	Result <sup>(1)</sup>
Concentrated static load	decking at 50°C	minimum ultimate load (kN)	3.02
	decking at 20°C		4.03
	decking at 35°C		5.94
	decking at 50°C	maximum deflection under 0.89 kN load (mm)	5.32 <sup>(2)</sup>
	decking at 20°C		3.19 <sup>(3)</sup>
	decking at 35°C		2.31 <sup>(3)</sup>
Following impact load of 102 N·m	decking at 50°C	minimum ultimate load (kN)	≥ 1.78
		maximum deflection under 0.89-kN load (mm)	≤ 2.0

**Notes to Table 4.2.1:**

- (1) Test results for planks with supports at 400 mm o.c.
- (2) Deemed acceptable. Although this result exceeds the 2.0 mm requirement, the additional deflection is not considered significant for material at 50°C.
- (3) Deemed acceptable. Although this result exceeds the 2.0 mm requirement, the additional deflection is not considered significant based on the creep recovery value.

**Table 4.2.2 Results of Testing of Durability**

Property	Requirement	Result	
		SPF Lumber	ChoiceDek <sup>®</sup> MoistureShield <sup>®</sup> Elite
<b>Bending stiffness</b>	Mean percentage loss in bending modulus of elasticity (MOE) after ultraviolet (UV) exposure <sup>(1)</sup> and accelerated aging <sup>(2)</sup> must be less than or equal to spruce lumber	30.8%	31.3% <sup>(3)</sup>
<b>Bending strength</b>	Mean percentage loss in bending stress (MOR) after UV exposure <sup>(1)</sup> and accelerated aging <sup>(2)</sup> must be less than or equal to spruce lumber	28.7%	25.8%

**Notes to Table 4.2.2:**

- (1) 4 500 hours of Xenon-Arc exposure following Cycle 1 of ASTM D 2565-99, “Xenon-Arc Exposure of Plastics Intended for Outdoor Applications.”
- (2) Five cycles of accelerated aging (wetting, freezing, thawing and drying).
- (3) Deemed to be acceptable based on the negligible difference between the percentage loss between composite decking and spruce lumber.

**Table 4.2.3 Results of Testing of Decay and Termite Resistance**

Property		Requirement	Result
Decay resistance	% loss in weight	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 <sup>(1)</sup>
	compressive strength		
Termite resistance		Rating must be equal to or better than preservative-treated wood conforming to CAN/CSA-O80.1	Passed <sup>(1)</sup>

**Note to Table 4.2.3:**

- (1) Data presented was not in accordance with CCMC's evaluation requirements, however, the test results submitted demonstrated a resistance to decay-causing fungi that was deemed to meet the intent of CCMC's requirements.

**Table 4.2.4 Results of Testing of Performance Under Concentrated Static Load - Stair Tread**

Property			Requirement	Result <sup>(1)</sup>
Concentrated static load	stair tread	minimum ultimate load (kN)	5 <sup>(2)</sup>	5.44
	stair tread nosing		5 <sup>(3)</sup>	7.04
	stair tread	maximum deflection under 1 kN (mm)	0.75	2.50 <sup>(4)</sup>
	stair tread nosing			

**Notes to Table 4.2.4:**

- (1) Test results are for stair stringers spaced at 400 mm o.c. at a test condition of 50°C and 80% RH. Three specimens were tested for each test.
- (2) Applied through a 75-mm-diam disk positioned at the centreline of the plank and midway between stringers.
- (3) Applied through a 38-mm-diam disk positioned along the outside edge of the nosing at the stringer location.
- (4) Deemed acceptable as the deflection is still low at 50°C and the ultimate load is very high as well. Stringer spacing must be at 230 mm o.c.

**4.3 Additional Performance Data**

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

**Table 4.3.1 Results of Testing of Additional Performance Data**

Property		Unit	Reference	Result
Coefficient of linear expansion (thermal)	longitudinal	cm/cm/°C	$\leq 2 \times 10^{-5}$	$3.63 \times 10^{-5(1)}$
Impact resistance (Izod impact, notched)		J/m	$\geq 53.4$	29.9 <sup>(2)</sup>
Hardness (11.28-mm-diam ball)		kN	$\geq 1.8$	4.724
Slip resistance (longitudinal)	wet condition	slip index	$\geq 0.5$	0.38 <sup>(3)</sup>
	dry condition			0.33 <sup>(3)</sup>

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## Notes to Table 4.3.1:

Results provided in this table do not invalidate CCMC's opinion concerning the products' compliance with the NBC 2015.

- (1) The manufacturer's gapping installation instructions must address the linear expansion values.
- (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 impact strength 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 and the product passes the large-scale impact floor tests.
- (3) Having fallen to 0.38 under the dry condition and 0.33 under the wet condition, no surface finishes met the 0.5 criterion. This criterion may not meet all occupant expectations. The manufacturer may be contacted for further information.

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## Report Holder

Advanced Environmental Recycling Technologies Inc.  
914 N. Jefferson  
Springdale, AR 72764  
USA

**Telephone:** 479-756-7400  
**Fax:** 479-756-7410

## Plant(s)

Springdale, AR, USA

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