



## Evaluation Report CCMC 13500-R Fiberon® Solid Decking- Horizon, Horizon® Symmetry™, Sanctuary, and Protect Advantage

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### 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Fiberon® Solid Decking- Horizon, Horizon® Symmetry™, Sanctuary, and Protect Advantage”, 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 2010:

- 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 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

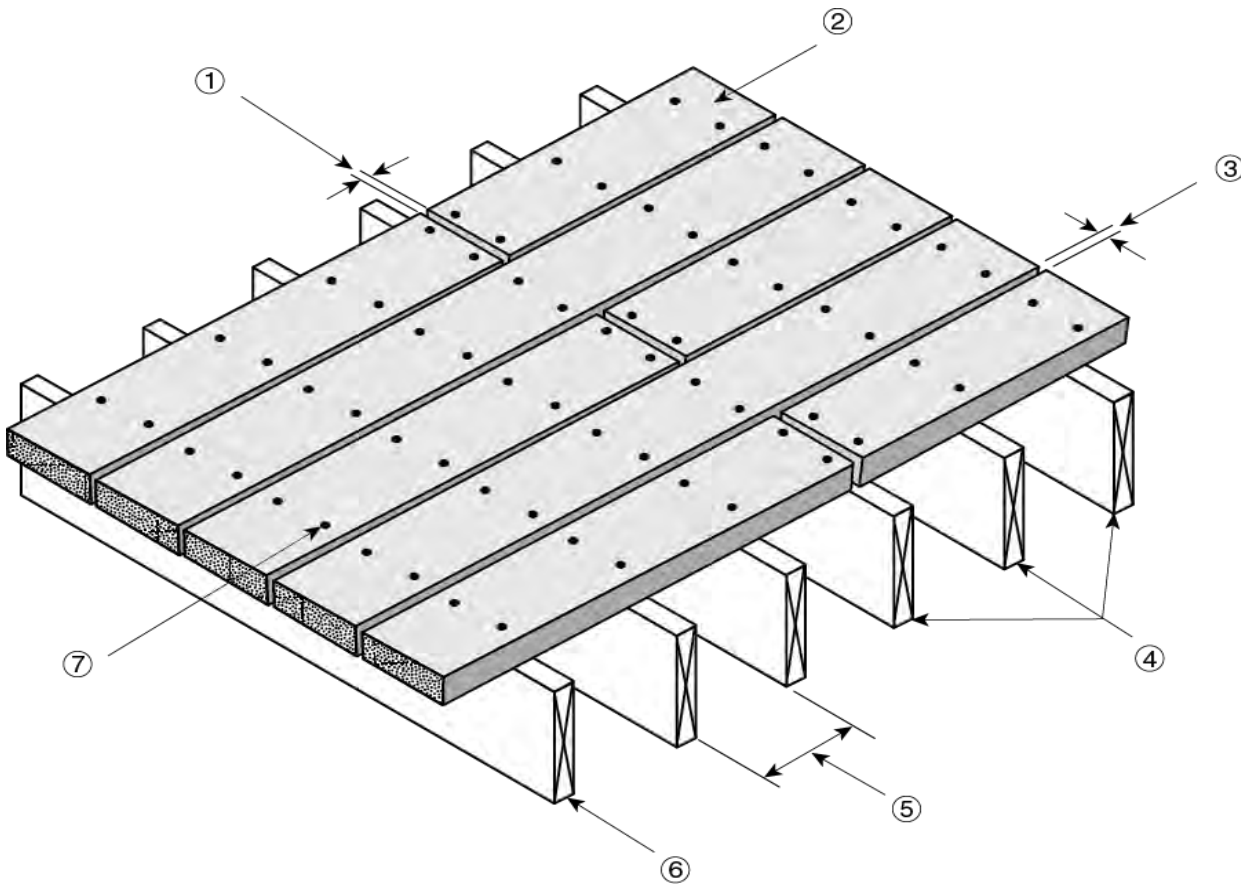
This opinion is based on CCMC’s evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 12-17-287 (13500-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 2012-10-11 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 product is a wood thermoplastic composite lumber (WTCL) made primarily from equal parts of reclaimed hardwood sawdust and reclaimed/recycled high density polyethylene (HDPE) with specifically engineered UV-resistant additives and colourants. The composite product is manufactured through a continuous co-extrusion process in planks of solid cross-section with a HDPE-based capping material for additional stain, fade, and scratch resistance. The planks are grooved or solid, are manufactured in nominal dimensions of 24 mm × 135 mm, and are available in 3.66-m, 4.88-m, and 6.1-m lengths.

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



**Figure 1. Installation details for the product**

1. 1.5-mm to 4.7-mm minimum end-to-end gapping, depending on length of plank and temperature at installation
2. “Fiberon® Solid Decking- Horizon, Horizon® Symmetry™, Sanctuary, and Protect Advantage”
3. 4.7-mm minimum width-to-width gapping, depending on temperature at installation
4. minimum of 3 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 “Fiberon® Solid Decking- Horizon, Horizon® Symmetry™, Sanctuary, and Protect Advantage” being used in accordance with the conditions and limitations set out below.

- The product must be installed with supports spaced no greater than 400 mm o.c. Each plank must be supported by at least three supports.
- The product must be fastened to the wood joists with fasteners specified by the manufacturer and conforming to Article 9.23.3.1., Standards for Nails and Screws, of Division B of the NBC 2010. The fasteners must have a corrosion protection 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 4.7 mm (3/16 in.) for installations below 7°C, 3.1 mm (1/8 in.) for installations between 7°C and 29°C, and 1.5 mm (1/16 in.) for installations over 29°C. The width-to-width gapping must be 4.7 mm (3/16 in.).
- The product can be used where termite protection is required as per Article 9.3.2.9. of Division B of the NBC 2010.
- The product can be used as stair treads at 230-mm (9 in.) o.c. spacing for “Horizon Symmetry” and 203-mm (8 in.) o.c. spacing for “Sanctuary & Protect Advantage”.
- The product is **not** to be considered as an equivalent to dimensional lumber.

### 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 of the Product

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	0.01	
Strength and stiffness	modulus of elasticity (MOE)	“Horizon Symmetry”	MPa	≥ 750	3 301	
	flexural rigidity (apparent MOE)	“Sanctuary”			3 260	
		“Protect Advantage”			3 016	
	modulus of rupture (MOR)	“Horizon Symmetry”	MPa	≥ 9	24	
	moment capacity (MOE)	“Sanctuary”			18.42	
		“Protect Advantage”			18.19	
creep, recovery and load duration			%	≤ 25 for creep	30 <sup>3</sup>	
				≥ 75 for recovery	80	
				No failure	Passed	
Strength and stiffness after aging	weathering	impact resistance	%	≥ 75 of non-weathered value	106.7	
	accelerated aging	MOE	“Horizon Symmetry”	%	≥ 50 of non-aged value	112.6
			“Sanctuary”			94.8
			“Protect Advantage”			97.2
		MOR	“Horizon Symmetry”			101.9
			“Sanctuary”			102.0
			“Protect Advantage”			103.7
	fastener holding capacity	nail withdrawal strength		N	≥ 600	2 828
		lateral nail strength		N	≥ 720	3 833
	flame-spread for “Protect Advantage”	flame-spread rating	“Horizon Symmetry”	–	≤ 200	70
“Sanctuary & Protect Advantage”			85			
smoke developed		capped	–	Report	390	

### Notes to Table 4.1.1:

- <sup>1</sup> Average test results of six specimens, except for the “Creep, recovery and load duration” results that are from three specimens.
- <sup>2</sup> Test results were obtained to classify the product and are not intended to be used as engineering design properties.
- <sup>3</sup> The product’s creep (deformation under constant load) will be greater than that of lumber planks for sustained loads.

## 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)	≥ 2.45	4.89
	decking at 20°C			5.56
	decking at –35°C			9.05
	decking at 50°C	maximum deflection under 0.89-kN load (mm)	≤ 2.0	2.54
	decking at 20°C			1.74
	decking at –35°C			1.74
Following impact	decking at 50°C	minimum ultimate load (kN)	≥ 1.78	≥ 1.78

load of 102 N·m	maximum deflection under 0.89-kN load (mm)	≤ 2.0	4.02 <sup>2</sup>
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**Notes to Table 4.2.1:**

- <sup>1</sup> Test results for planks with supports at 400 mm o.c.
- <sup>2</sup> Deemed acceptable. Although this result (4.02 mm) exceeds the 2.0-mm requirement, the additional deflection is not considered significant for material at 50°C.

**Table 4.2.2 Results of Testing of Durability of the Product**

Property	Requirement	Result	
		SPF Lumber	“Horizon”
Bending stiffness	Mean percentage loss in bending modulus of elasticity (MOE) after ultraviolet (UV) exposure and accelerated aging must be less than or equal to spruce lumber	-40%	+1%
Bending strength	Mean percentage loss in bending stress (MOR) after UV exposure and accelerated aging must be less than or equal to spruce lumber	-24%	+3%

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

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
	compressive strength		
Termite resistance		Rating must be equal to or better than preservative-treated wood conforming to CAN/CSA-O80.1	Passed

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

Property		Requirement		Result <sup>1</sup>	
		Minimum Ultimate Load (kN)	Maximum Deflection Under 1 kN (mm)	Applied Ultimate Load (kN)	Deflection Under 1 kN (mm)
Concentrated load:	stair tread	5 <sup>2</sup>	0.75	8.90	1.55 <sup>4</sup>
	stair tread nosing	5 <sup>3</sup>		7.04	

**Notes to Table 4.2.4:**

- <sup>1</sup> Test results are for “Horizon Symmetry” stair stringers spaced at 230 mm o.c. at a test condition of 50°C and 80% RH. Three specimens were tested for each test.
- <sup>2</sup> Applied through a 75-mm-diameter disk positioned at the centreline of the plank and midway between stringers.
- <sup>3</sup> Applied through a 38-mm-diameter disk positioned along the outside edge of the nosing at the stringer location.
- <sup>4</sup> Deemed acceptable as the deflection is still very low at 50°C and the ultimate load is very high as well.

**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 Value	Result
Coefficient of linear expansion (thermal)	longitudinal	cm/cm/°C	≤ 2 × 10 <sup>-5</sup>	3.01 × 10 <sup>-5</sup> <sup>1</sup>
	cross-sectional			6.5 × 10 <sup>-5</sup> <sup>1</sup>
Impact resistance (Izod impact, notched)		J/m	≥ 53.4	32.7 <sup>2</sup>
Hardness (11.28-mm-diameter ball)		kN	≥ 1.8	8.0
Slip resistance (average slip index) “Sanctuary, Protect Advantage”	dry condition	-	≥ 0.5 ASTM F 1679-04, “Standard Test Method for Using a Variable Incidence Tribometer (VIT)”	0.37 <sup>3</sup>
	wet condition			0.36 <sup>3</sup>
Slip resistance (average slip index) “Horizon Symmetry”	dry condition			0.38 <sup>3</sup>
	Wet 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 product's compliance with the NBC 2010.

- 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.
  - 3 Having fallen to 0.37 under the dry condition and 0.36 under the wet condition, no surface finishes met the 0.5 criterion. This criterion may not meet all occupant expectations.
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## Report Holder

Fiberon  
181 Random Drive  
New London, NC 28127  
U.S.A.

**Telephone:** 704-463-7120

**Fax:** 704-463-2187

**Email:** [info@fiberondecking.com](mailto:info@fiberondecking.com)

**Web:** [www.fiberondecking.com](http://www.fiberondecking.com)

## Plant(s)

New London, NC, U.S.A.

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