



Evaluation Report CCMC 13378-R DecKorators and Marine Wood/Plastic Composite Deck Board

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that DecKorators and Marine Wood/Plastic Composite Deck Board,” when used as both exterior decking planks and as stair treads in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 2010:

- 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 9.23.15.5., Subfloor Thickness or Rating

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

Ruling No. 10-16-253 (13378-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 2010-08-05 (revised on 2017-03-22) 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 solid deck boards intended for use as exterior decking installed over traditional structural wood framing (see Figures 1 and 2). Comprised of a wood, thermoplastic composite made primarily from wood fibre, virgin and reclaimed polyethylene and talc, the boards are rectangular in shape with rounded corners and slotted edges.

The DecKorators boards are solid deck boards with rounded corners and/or slotted edges. The Marine boards are embossed with a wood grain finish on one side and a combed finish on the other.

The DecKorators boards have a cap made of high-density polyethylene (HDPE).

The DecKorators boards have an average thickness of 21.2 mm and an average width of 139 mm. The Marine boards have an average thickness of 31.75 mm and an average width of 138.18 mm.

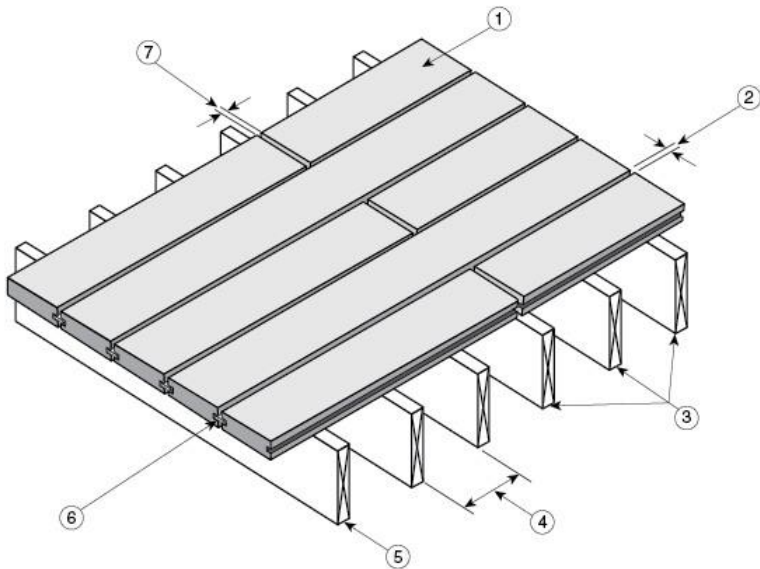


Figure 1. “DecKorators and Marine Wood/Plastic Composite Deck Board” with hidden fastener system

1. “DecKorators and Marine” deck boards
2. 6 mm minimum spacing between sides of the planks, depending on temperature at installation
3. minimum of three joists per plank
4. maximum joist spacing: DecKorators – 400 mm o.c.
Marine – 600 mm on centre (o.c.)
5. joist designed to support applicable loads
6. hidden plastic fasteners provided by manufacturer
7. 1.6 mm minimum spacing between ends of the planks, depending on length of plank and temperature at installation

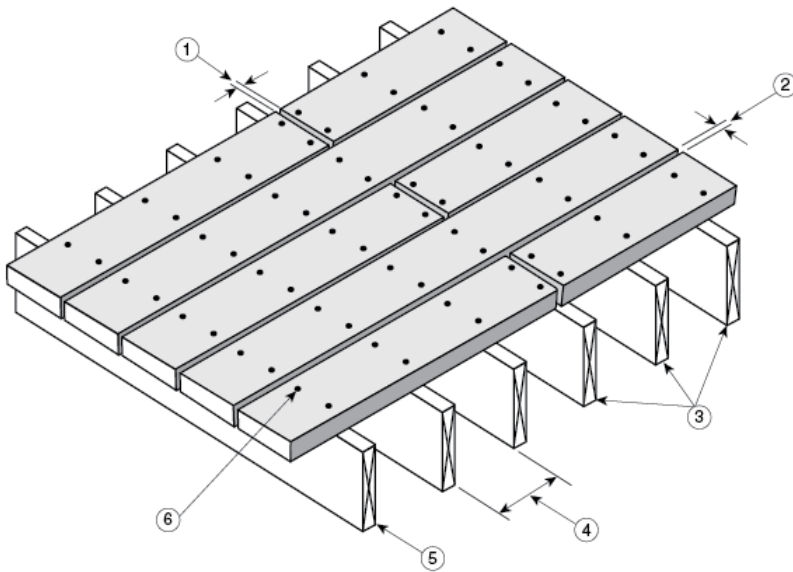


Figure 2. “DecKorators and Marine Wood/Plastic Composite Deck Board” with fasteners

1. 1.6 mm minimum spacing between ends of the planks, depending on length of plank and temperature at installation
2. 6 mm minimum spacing between sides of the planks, depending on temperature at installation
3. minimum of three joists per plank
4. maximum joist spacing: DecKorators – 400 mm o.c.
Marine – 600 mm o.c.
5. joist designed to support applicable loads
6. two 63.5-mm-long fasteners per support



Figure 3. “Marine” profile

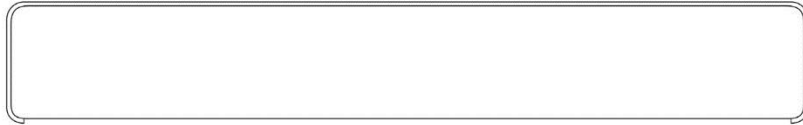


Figure 4. “DecKorators” solid profile (also known as DecKorators Classic-Solid, DecKorators Vista-Solid and DecKorators Heritage-Solid)

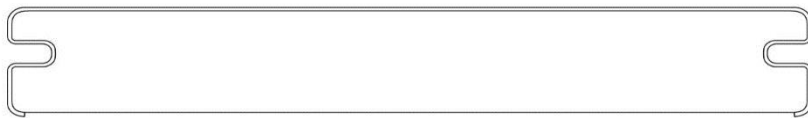


Figure 5. “DecKorators” slotted profile (also known as DecKorators Classic-Slotted, DecKorators Vista-Slotted and DecKorators Heritage-Slotted)

3. Conditions and Limitations

The CCMC compliance opinion in Section 1 is bound by the “DecKorators and Marine Wood/Plastic Composite Deck Board” being used in accordance with the conditions and limitations set out below:

- When the products are installed in conjunction with traditional structural wood framing designed to carry the applicable loads, the products may be used as exterior decking and as stair treads in combustible constructions for light duty applications such as residential occupancies that fall within the scope of Part 9, Housing and Small Buildings, of the NBC 2010, or for light commercial applications within the scope of Part 4, Structural Design, of Division B of the NBC 2010.
- The products must be installed in accordance with the manufacturer’s usage guidelines for the Canadian market and in accordance with the following limitations:
 - The planks must be installed with supports spaced at no greater than 400 mm o.c. for DecKorators, and 600 mm o.c. for Marine.
 - The products must be fastened to the wood joists with fasteners 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⁽¹⁾ or be made of stainless steel. The planks must be fastened with a minimum of two fasteners of 63.5 mm in length per support.

(1) As of January 2004, pressure-treated lumber requires specific hot-dipped galvanized fasteners for satisfactory performance.

- The products can also be installed using a hidden plastic fastening system as supplied by the manufacturer.
 - The products must be gapped end-to-end based on the length of the plank and the temperature at installation. The end-to-end gapping must be a minimum of 1.5 mm for every 11°C difference between the installation temperature and the hottest expected temperature. The width-to-width gapping must be 6 mm.
 - The products are not to be considered equivalent to dimensional lumber.
 - The products may be installed by a person familiar with the products installation guide.
 - The products are permitted to be installed where decay and termite resistance protection is required as per Article 9.3.2.9., Termite and Decay Protection, of Division B of the NBC 2010.
- Where possible, the label or packaging of the products must be identified with the manufacturer’s name or logo and the phrase “CCMC 13378-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 Performance Requirements

4.1.1 Basic Physical and Mechanical Properties

Table 4.1.1.1 Results of Testing the Basic Physical and Mechanical Properties of the Products

Property		Unit	Requirement	Result	
Dimensional change	coefficient of linear expansion (thermal)		$^{\circ}\text{C}^{-1}$	$\leq 2 \times 10^{-5}$	1.86^{-6}
	coefficient of linear expansion (swelling)		%	≤ 0.5 (by 80% of specimens)	0.26
Strength and stiffness	modulus of elasticity (MOE)		MPa	≥ 750	3 418
	modulus of rupture (MOR)			≥ 9	21
	impact resistance		J/m	≥ 53.4	22.2 ⁽¹⁾
	hardness		kN	≥ 1.8	10
	creep, recovery and load duration		%	$\leq 25\%$ for creep	51.4 ⁽²⁾
				$\geq 75\%$ for recovery	≥ 92.2
				No specimen failure in Step 6	No specimen failure ⁽²⁾
	impact resistance (after weathering)			$\geq 75\%$ of non-weathered value	98.2
MOE and MOR (after accelerated aging)			$\geq 50\%$ of non-aged value	97.3 (MOE) 104 (MOR)	
Fastener holding capacity ⁽³⁾	fastener withdrawal strength	proprietary clip system with screws only	N	≥ 600	2 813 (R), ⁽⁴⁾ 3 774 (WR)
		proprietary clip system			1 123 (R), 1 147 (WR)
		deck screws			3 691 (R), 3 762 (WR)
	lateral fastener strength	deck screws	≥ 720		4 097 (R), 3 830 (WR)
		proprietary clip system			1 313 (R), 1 287 (WR)

Notes to Table 4.1.1.1:

- (1) Deemed acceptable based on the full-scale structural impact test result.
- (2) The product creep (deformation under constant load) will be greater than that of lumber planks for sustained loads.
- (3) Sample preparation designation as per CAN/CSA-O325.1-88 (R2003), "Construction Sheathing."
- (4) R = redry; WR = wet/redry.

4.1.2 Performance Under Concentrated Static and Impact Loads

Table 4.1.2.1 Results of Testing the Concentrated Static Load for “DecKorators”⁽¹⁾

Property		Requirement		Result ⁽²⁾	
		Minimum Ultimate Load (kN)	Maximum Deflection under 0.89 kN Load for 400 mm Span (mm)	Ultimate Load (kN)	Deflection under 0.89 kN Load (mm)
Concentrated load	decking at 50°C	2.45	2.0	3.03	3.23 ⁽³⁾
	decking at 20°C			4.18	1.96
	decking at -35°C			5.31	1.30

Notes to Table 4.1.2.1:

- (1) Testing was done as per ASTM E 661-03(2009), “Standard Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads,” with modifications to suit the testing of planks.
- (2) Test results for 23.8 mm × 133.35 mm planks with supports at 400 mm o.c.
- (3) Deemed acceptable. Although the result of 3.23 mm is greater than the 2.0 mm requirement, the additional deflection amount of 1.23 mm is not considered significant at 50°C.

Table 4.1.2.2 Results of Testing the Concentrated Static Load for “Marine”⁽¹⁾

Property		Requirement		Result ⁽²⁾	
		Minimum Ultimate Load (kN)	Maximum Deflection under 0.89 kN Load for 600 mm Span (mm)	Ultimate Load (kN)	Deflection under 0.89 kN Load (mm)
Concentrated load	decking at 50°C ⁽³⁾	2.45	2.8	3.78	3.22 ⁽⁴⁾

Notes to Table 4.1.2.2:

- (1) Testing was done as per ASTM E 661 with modifications to suit the testing of planks.
- (2) Test results for 31.75 mm × 138.18 mm planks with supports at 600 mm o.c.
- (3) Deemed to be the worst-case scenario for the concentrated load testing. It was determined that no testing would be required at 20°C and -35°C.
- (4) Deemed acceptable. Although the result of 3.22 mm is greater than the 2.8 mm requirement, the additional deflection amount of 0.42 mm is not considered significant.

Table 4.1.2.3 Results of Testing the Impact Load for “DecKorators”⁽¹⁾

Property		Requirement		Result ⁽²⁾	
		Minimum Ultimate Load following Impact Load of 100 N·m (kN)	Maximum Deflection under 0.89 kN Load following Impact Load for 400 mm Span (mm)	Load of 1.78 kN following Impact Load of 100 N·m	Deflection under 0.89 kN Load following Impact Load (mm)
Impact load	decking at 50°C	1.78	2.0	No break	2.42 ⁽³⁾

Notes to Table 4.1.2.3:

- (1) Testing was done as per ASTM E 661 with modifications to suit the testing of planks.
- (2) Test results for 23.8 mm × 133.35 mm planks with supports at 400 mm o.c.
- (3) Deemed to be acceptable. Although the result of 2.42 mm is greater than the 2.0 mm requirement, the additional deflection amount of 0.42 mm is not considered significant.

Table 4.1.2.4 Results of Testing the Impact Load for “Marine”⁽¹⁾

Property		Requirement		Result ⁽²⁾	
		Minimum Ultimate Load following Impact Load of 100 N·m (kN)	Maximum Deflection under 0.89 kN Load following Impact Load for 600 mm Span (mm)	Load of 1.78 kN following Impact Load of 100 N·m	Deflection under 0.89 kN Load following Impact Load (mm)
Impact load	decking at 50°C	1.78	2.8	No break	3.74 ⁽³⁾

Notes to Table 4.1.2.4:

- (1) Testing was done as per ASTM E 661 with modifications to suit the testing of planks.
- (2) Test results for 31.75 mm × 138.18 mm planks with supports at 600 mm o.c.
- (3) Deemed to be acceptable. Although the result of 3.74 mm is greater than the 2.8 mm requirement, the additional deflection amount of less than 1.0 mm is not considered significant.

4.1.3 Durability**Table 4.1.3.1 Results of Testing the Durability of the Products**

Property	Requirement	Result
MOE and MOR	Mean percentage loss in MOE and MOR after UV exposure. ⁽¹⁾ Accelerated aging ⁽²⁾ must be less than or equal to spruce lumber.	Pass

Notes to Table 4.1.3.1:

- (1) 4 000 h of Cycle 1 as outlined in Appendix X3.1 of ASTM G 155-05a, “Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.”
- (2) The accelerated aging cycle, which includes wetting, freezing, thawing and drying, is repeated five times.

4.1.4 Walking Surface Finish Quality and Slip Resistance**Table 4.1.4.1 Results of Testing the Slip Resistance Properties of the Products**

Property		Reference Value	Result
Slip resistance (longitudinal)	dry condition	> 0.5 ASTM F 1679-04, “Standard Test Method for Using a Variable Incidence Tribometer (VIT)”	Pass
	wet condition		Fail ⁽¹⁾

Note to Table 4.1.4.1:

- (1) The combed finish met the 0.5 criteria under the wet condition. The embossed/combed combination finish fell to 0.46 and 0.47, respectively, under the wet condition. The embossed finish fell to 0.47 and 0.48, respectively, under wet conditions. These criteria may not meet all occupant expectations. Deemed to be acceptable due to the tested values being slightly less than the reference value. The manufacturer may be contacted for further information.

4.1.5 Decay Resistance**Table 4.1.5.1 Results of Testing the Decay Resistance Properties of the Products**

Property	Requirement	Result
Percentage loss in weight and compressive strength	Mean percentage loss in weight and compressive strength after exposure to decay-causing fungi must be equal or better than preservative-treated wood conforming to CAN/CSA-O80.1-M97, “Preservative Treatment of All Timber Products by Pressure Processes.”	Pass ⁽¹⁾

Note to Table 4.1.5.1:

- (1) The data presented was not in accordance with the CCMC evaluation requirements, but demonstrated a resistance to decay-causing

fungi that was deemed to meet the intent of the CCMC requirements.

4.1.6 Termite Resistance

Table 4.1.6.1 Results of Testing the Termite Resistance Properties of the Products

Property	Requirement	Result
ASTM D 3345 rating	Rating must be equal to or better than preservative-treated wood conforming to CAN/CSA-O80.1-M97.	Pass ⁽¹⁾

Note to Table 4.1.6.1:

- (1) The data presented was not in accordance with the CCMC evaluation requirements. However, the data did demonstrate a termite resistance that was deemed to meet the intent of the CCMC requirements.

4.1.7 Flame-spread Rating and Flammability

The flame-spread rating of the products is 81, which is in accordance with CAN/ULC-S102.2-M88, “Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies,” whose requirement is < 200. The smoke development rating of the products is 100.

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