CCMC CANADIAN CODE COMPLIANCE EVALUATION

CCMC EVALUATION

CCMC 14342-R

CCMC Canadian code compliance evaluation

CCMC number:	14342-R
Status:	Active
Issue date:	2020-09-28
Modified date:	2023-11-08
Evaluation holder:	**Zhejiang Yuansentai Wood Plastic Science And Technology Co., Ltd.** Si'an Town Industrial Function Area Huzhou City 313113 China Website: www.ystarwood.com Telephone: +86-182-5729-5662
Product name:	PE Coextrusion WPC Decking
Compliance:	NBC 2015
Criteria:	CCMC-TG-067315.01-15, "CCMC Technical Guide for wood thermoplastic composite (WPC) decking with polyethylene (PE) coextrusion"

In most jurisdictions this document is sufficient evidence for approval by Canadian authorities.
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Compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated product, when used as exterior decking and stair treads in accordance with the conditions and limitations stated in this evaluation, complies with the following code:

National Building Code of Canada 2015

Code provision	Solution type
9.3.2.9. Termite and Decay Protection	Alternative
9.4.2.3. Platforms Subject to Snow and Occupancy Loads	Acceptable
9.4.3.1. Deflections	Acceptable
9.8.9.1. Loads on Stairs and Ramps	Acceptable
9.23.3.1. Standards for Nails and Screws	Acceptable
9.23.15.5. Subfloor Thickness or Rating	Alternative

The above opinion(s) is/are based on the evaluation by the CCMC of technical evidence provided by the evaluation holder, and is bound by the stated conditions and limitations. For the benefit of the user, a summary of the technical information that forms the basis of this evaluation has been included.

Product information

Product name

PE Coextrusion WPC Decking

Product description

The product is made of profiled cellulosic/polymer composite extrusions (planks and trims). The extrusions contain cellulose-based fibres that are derived from wood residues or agricultural waste and high density polyethylene (HDPE). The deck planks are manufactured in hollow cross-sections with regular voids and walls of varying thickness. The planks are manufactured in nominal dimensions of 22.5 mm × 138 mm and are available in lengths of 2.44 m, 3.66 m and 4.88 m. The product is intended to be used as exterior decking installed over traditional structural wood framing.

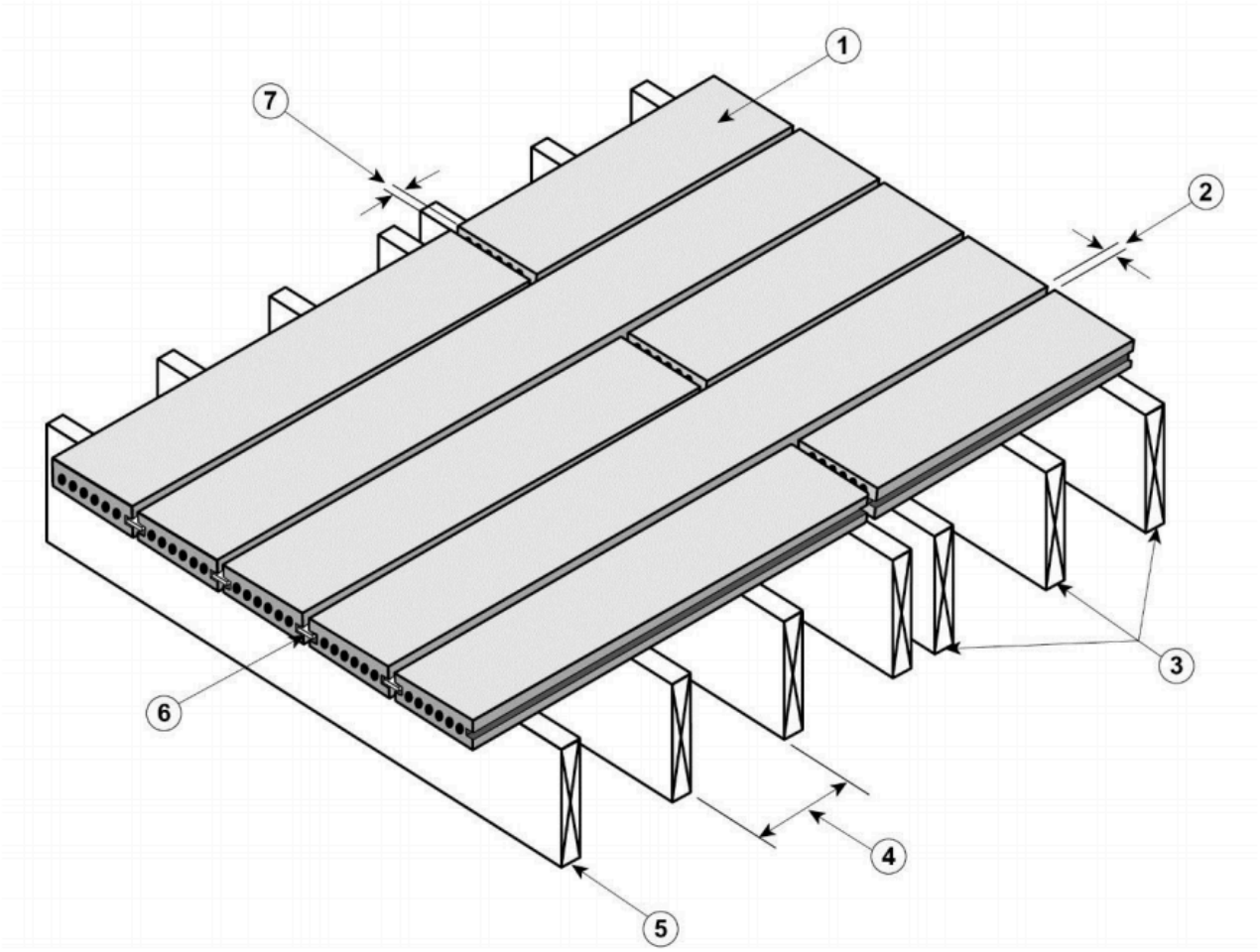

Figure 1. PE Coextrusion WPC Decking

1. PE Coextrusion WPC Decking
2. 3 mm to 6 mm spacing between sides of the planks
3. minimum of three joists per plank
4. maximum joist spacing of 300 mm on centre (o.c.) for 22.5-mm × 138-mm planks
5. joist designed to support applicable loads

6. two 25.4-mm-long fasteners with two SS304 stainless steel clips per plank at each intersecting joist
7. 3 mm to 10 mm minimum spacing between ends of the planks, depending on the length of the plank and temperature at installation

Manufacturing plant

This evaluation is valid only for products produced at the following plant:

Product name	Manufacturing plant
	Changxing County, Huzhou City, China
PE Coextrusion WPC Decking	✓

✓ Indicates that the product from this manufacturing facility has been evaluated by the CCMC

Conditions and limitations

The CCMC's compliance opinion is bound by this product being used in accordance with the conditions and limitations set out below.

- The product must be installed at a minimum 150-mm height above the finished grade.
- The products used as exterior decking are not to be considered equivalent to lumber decking in terms of slip resistance.
- When used as exterior decking, the product must be installed with joists spaced no greater than 300 mm o.c. Each plank must be supported by at least three joists.
- When used as stair treads, the product must be installed with stringers spaced no greater than 203 mm apart.
- Slip-resistant strips shall be provided in accordance with Article 9.8.9.6, Finish for Treads and Landings, of Division B of the NBC 2015.
- The product 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 2015 that have a corrosion protection coating [1] or are made of stainless steel. The planks must be fastened with at least one fastener per joist and the fasteners must be at least 25.4 mm long.
- The product must be installed according to the manufacturer's installation instructions.
- The product must be gapped end-to-end, based on the length of the plank and the temperature at installation in accordance with the manufacturer's recommendations. The width-to-width gapping must be at least 3 mm for all installation temperatures. The product must not be installed at temperature below 0°C.
- The product should be installed by a knowledgeable person familiar with the product installation guide.
- The product's label or packaging must be identified with the manufacturer's name or logo and the phrase "CCMC 14342-R."

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

Technical information

This evaluation is based on demonstrated conformance with the following criteria:

Criteria number	Criteria name
CCMC-TG-067315.01-15	CCMC Technical Guide for wood thermoplastic composite (WPC) decking with polyethylene (PE) coextrusion

Material requirements

Table 1. Results of testing the physical properties of the product

Property			Unit	Requirement	Result [1] [2] [3]
Dimensional change	**coefficient of linear expansion (thermal)**	**longitudinal**	cm/cm/°C	$< 2 \times 10^{-5}$	5.3×10^{-5} [4]
	coefficient of linear expansion (swelling): oven-dry to vacuum-pressure soak		%	< 0.5 by 80% of specimens	0.1
Strength and stiffness	**modulus of elasticity (MOE)**	**span-to-depth ratio within 18 to 21**	MPa	> 750	2 294
	modulus of rupture (MOR)			> 9	25
Impact resistance (Izod impact, notched)			J/m	> 53.4	21.3 [5]
Creep, recovery and load duration			%	< 25 for creep	19
				> 75 for recovery	80
				No failure	Pass
Strength and stiffness after aging	**weathering: impact resistance**		%	> 75 of non-weathered value	97
	accelerated aging	**MOE**	%	> 50 of non-aged value	97
		MOR			99
Fastener holding capacity	**metal clip fastener withdrawal strength**		N	> 600	1 195
	metal clip fastener lateral strength			> 720	1 190
Flame-spread rating			-	≤ 200	80
Smoke development			-	Report value	445
Shrinkage			%	≤ 0.1	0.0

Notes:

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 Average readings from six specimens. All specimens were black in colour.

4 Performance result allowed based on the manufacturer's gapping installation instructions.

5 Performance result allowed based on the full-scale structural impact test results.

Performance requirements

Table 2. Results of testing the performance of the product under 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 static load	decking at 50°C	2.45	1.6	2.63	3.27 (2)
	decking at 20°C			3.57	2.21 (2)
	decking at –35°C			5.70	1.78 (2)
Impact load of 102 N·m	decking at 50°C	1.78	1.6	1.78	2.92 (2)

Notes:

1 Test results are for 22.5 mm × 138 mm planks with supports at 300 mm o.c.

2 Although this result exceeds the 1.6 mm requirement, the additional deflection is not considered significant based on the product's test results from creep and creep recovery testing reported in Table 1. Therefore, the result is deemed acceptable.

Table 3. Results of testing the performance of stair treads under a concentrated static load

Property		Requirement		Result (1)	
		Minimum ultimate load (kN)	Maximum deflection under 1 kN (mm)	Applied ultimate load (kN)	Deflection under 1 kN (mm)
Concentrated static load	stair tread	5 (2)	0.75	6.8	1.38 (3)
	stair tread nosing	5 (4)	-	20.7	-

otes:

1 Test results are for 50°C and 80% relative humidity (RH) test conditions for stair stringers spaced at 203 mm o.c. Three specimens were submitted for each test.

2 Applied through a 75-mm-diam disk positioned at the centre line of the plank and midway between stringers.

3 Although the deflection is slightly higher than the allowed limit, the applied ultimate load was 36% higher than the minimum required ultimate load, so this deflection result was deemed acceptable.

4 Applied through a 38-mm-diam disk positioned along the outside edge of the nosing at the stringer location.

Table 4. Test results for durability

Property	Requirement	Result	
		Spruce-Pine-Fir (S-P-F) lumber	PE Coextrusion WPC Decking
Bending stiffness	Mean percentage loss in bending stiffness (EI) after UV exposure (1) and accelerated aging (2) must be less than or equal to S-P-F lumber	21.9%	11.7%
Moment capacity	Mean percentage loss in moment capacity (M_r) after UV exposure (1) and accelerated aging (2) must be less than or equal to spruce lumber	28.5%	21.2%

Notes:

1 4 000 h of Cycle 1 as outlined in Appendix X3.1 of ASTM G 155-13, “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.

Table 5. Results of testing the durability, decay, termite and slip resistance properties of the product

Property		Requirement	Result
Decay resistance	**% loss in weight**	Mean percentage losses in weight and compressive strength after exposure to decay-causing fungi must be equal to or better than S-P-F dimensional lumber	Fail (1)
	% loss in compressive strength		
Termite resistance		Rating must be equal to or better than preservative-treated wood conforming to CSA O80.1-M97	Pass

Note:

1 Product did not meet the % loss in weight requirement for the fungi species of Aspergillus niger; however, the results are deemed acceptable based on minimum installation height of 150 mm above the finished ground.

Additional performance data

Table 6. Test results for additional performance data

Property		Unit	Requirement	Result
Density		kg/m^3	Report value	1 237
Hardness (11.28-mm-diam ball)		kN	≥ 1.8	3.1
Slip resistance (longitudinal)	**dry condition**	-	≥ 0.5	0.2 (1)
	wet condition			0.3 (1)
Slip resistance (transverse)	**dry condition**	-	≥ 0.5	0.2 (1)
	wet condition			0.5

Note:

1 This criterion may not meet all occupant expectations. The manufacturer may be contacted for further information.

Administrative information

Use of Canadian Construction Materials Centre (CCMC) assessments

This assessment must be read in the context of the entire CCMC Registry of Product Assessments, any applicable building code or by-law requirements, and/or any other regulatory requirements (for example, the Canada Consumer Product Safety Act, the Canadian Environmental Protection Act, etc.).

It is the responsibility of the user to confirm that the assessment they are using is current and has not been withdrawn or superseded by a later version on the CCMC Registry of Product Assessments.

Disclaimer

The National Research Council of Canada (NRC) has evaluated only the characteristics of the specific product described herein. The information and opinions in this evaluation are directed to those who have the appropriate degree of experience to use and apply its contents (such as authorities having jurisdiction, design professionals and specifiers). This evaluation is valid when the product is used as part of permitted construction, respecting all conditions and limitations stated in the evaluation, and in accordance with applicable building codes and by-laws.

This evaluation is provided without representation, warranty or guarantee of any kind, expressed or implied, and the NRC provides no endorsement for any evaluated product. The NRC accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained herein or the use of any evaluated product. The NRC is not undertaking to render professional or other services on behalf of any person or entity nor to perform any duty owed by any person or entity to another person or entity.

Language

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In the case of any discrepancy between the English and French version of this document, the English version shall prevail.

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CCMC recognition

The Canadian Construction Materials Centre (CCMC) assesses compliance with Canadian building, energy and safety codes. We are the only construction code compliance service supported and operated by the Government of Canada. Trusted by over 6,000 regulators across Canada.

> Most Canadian authorities having jurisdiction (AHJs) consider CCMC product assessments acceptable as evidence for product approval.

CCMC assessments are recognized by construction authorities across Canada:

Alliance of Canadian Building Official Associations (ACBOA)	(Alliance of Canadian Building Official Associations (ACBOA))
First Nations National Building Officers Association (FNNBOA)	(First Nations National Building Officers Association (FNNBOA))
Canadian Home Builders' Association (CHBA)	(Canadian Home Builders' Association (CHBA))
Alberta Building Officials Association (ABOA)	(Alberta Building Officials Associations (ABOA))
Saskatchewan Building Officials Association (SBOA)	(Saskatchewan Building Officials Association (SBOA))
Manitoba Building Officials Association (MBOA)	(Manitoba Building Officials Association (MBOA))
Ontario Building Officials Association (OBOA)	(Ontario Building Officials Association (OBOA))
New Brunswick Building Officials Association (NBBOA)	(New Brunswick Building Officials Association (NBBOA))
Nova Scotia Building Officials Association (NSBOA)	(Nova Scotia Building Officials Association (NSBOA))

> The CCMC provides code compliance assessments to Canadian code requirements, consulting nationwide with construction regulators to elicit regional variations in code requirements as well as provincial and local interpretations. Users are advised to review the technical information presented in CCMC assessments when making approval decisions. Learn more about how the CCMC provides a unique service for Canada.

For more information, contact the CCMC by phone at (613) 993-6189 or by email at ccmc@nrc-cnrc.gc.ca

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Code compliance as an acceptable solution

Code Compliance via Acceptable Solutions

> If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable **acceptable solutions** in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code.
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(a)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Acceptable Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

The CCMC assesses compliance with Canadian building, energy and safety codes, and is trusted by over 6,000 regulators across Canada.

Code compliance as an alternative solution

Code Compliance via Alternative Solutions

> Where a design differs from the acceptable solutions in Division B, then it should be treated as an "**alternative solution**." A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions [...] Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not “well enough” but “as well as.”
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(b)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Alternative Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

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