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CCMC 13125-R

**CCMC**

EVALUATION  
REPORT

DIVISION 06522

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## *Trex Wood-Polymer® Composite Lumber - Decking*

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### **1. Purpose of Evaluation**

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that "Trex Wood-Polymer® Composite Lumber" decking can serve as exterior decking in combustible construction for light-duty applications, such as in residential occupancies, in compliance with the intent of the National Building Code of Canada (NBC) 1995.

### **2. Opinion**

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that "Trex Wood-Polymer® Composite Lumber" decking complies with CCMC's Technical Guide for Wood Thermoplastic Composite Lumber Used as Exterior Decking (Solid Cross-section), Masterformat number 06522, dated 2002-06-27, and provides a level of performance equivalent to subflooring materials inferred in:

- NBC 1995, Article 9.23.14.5., "Subfloor Thickness or Rating," when subjected to the loading and deflection limits implied in

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Subsection 9.4.2., "Specified Loads," and Article 9.4.3.1., "Deflections."

Canada Mortgage and Housing Corporation permits the use of this product in construction financed or insured under the National Housing Act.

### 3. Description

"Trex Wood-Polymer® Composite Lumber" decking is a wood thermoplastic composite made primarily from equal parts of reclaimed hardwood sawdust and reclaimed/recycled polyethylene. 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 x 140 mm, 38 x 89 mm, 38 x 140 mm and 38 x 184 mm. The planks are available in 3.66-m lengths. The 38 x 89 mm plank is also available in 4.88-m lengths, whereas the 32 x 140 mm and 38 x 140 mm planks are also available in 6.10-m lengths.

"Trex Wood-Polymer® Composite Lumber" decking is intended to be used as exterior decking installed over traditional structural wood framing (Figure 1).

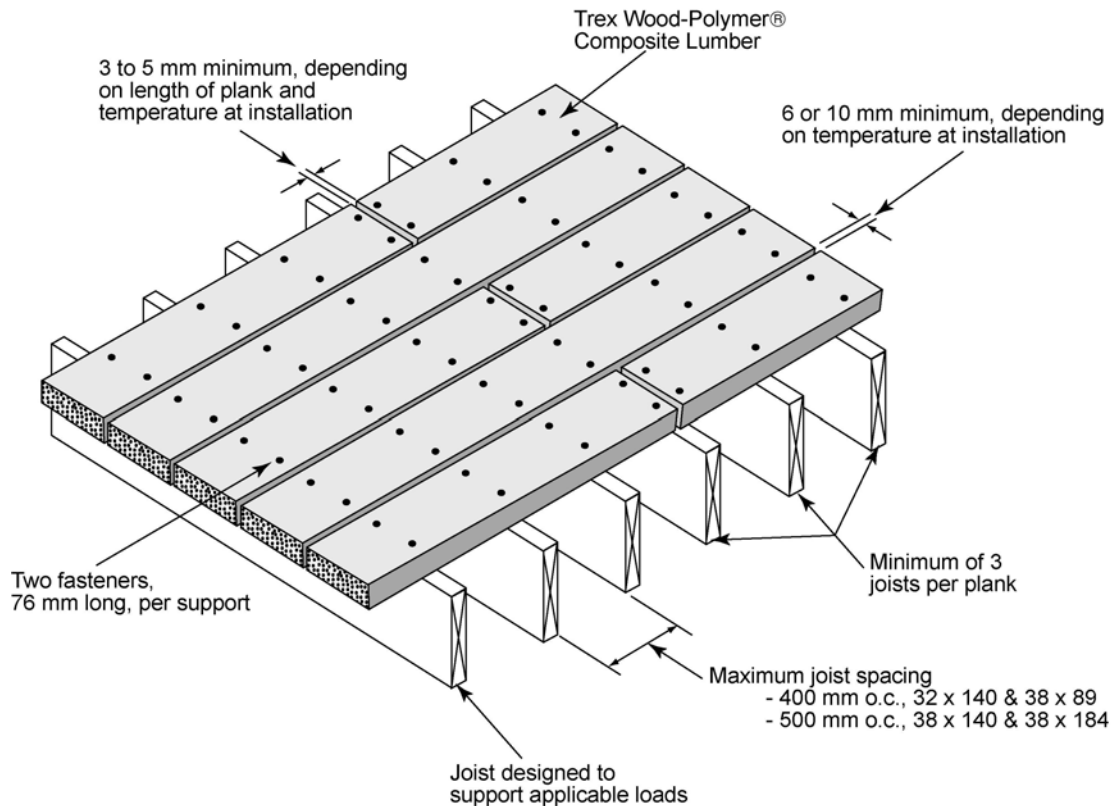


Figure 1. Installation of "Trex Wood-Polymer® Composite Lumber" Decking

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#### 4. Usage and Limitations

“Trex Wood-Polymer® Composite Lumber” decking 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 the NBC 1995 when installed in conjunction with traditional structural wood framing designed to carry the applicable loads. The product must be installed in accordance with the manufacturer’s usage guidelines for the Canadian market, and in accordance with the following limitations.

- The 32 x 140-mm and 38 x 89-mm planks must be installed with supports spaced no greater than 400 mm on center (o.c.), and the 38 x 140-mm and 38 x 184-mm planks with supports spaced no greater than 500 mm o.c. Each plank must be supported by at least 3 supports.
- “Trex Wood-Polymer® Composite Lumber” decking must be fastened to the wood joists with fasteners conforming with Article 9.23.3.1. of the NBC 1995. The fasteners must have a corrosion protection coating or be made of stainless steel. The planks must be fastened with at least two fasteners per support, and the fasteners must be at least 76 mm long.
- “Trex Wood-Polymer® Composite Lumber” decking 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 installations below 5°C.

- “Trex Wood-Polymer® Composite Lumber” decking is **not** to be used as stair treads.
- “Trex Wood-Polymer® Composite Lumber” decking is **not** to be used where termite and decay protection is required as per Article 9.3.2.9. of the NBC 1995.
- “Trex Wood-Polymer® Composite Lumber” decking is **not** to be considered as an equivalent to dimensional lumber.

The product must be identified with the following information:

- manufacturer’s name or logo; and
- the phrase “CCMC 13125-R.”

#### 5. Performance

Testing was conducted at an independent laboratories recognized by CCMC. The corresponding test results for “Trex Wood-Polymer® Composite Lumber” decking are summarized in Tables 1 to 4.

**Table 1. Basic Physical and Mechanical Properties of “Trex Wood-Polymer® Composite Lumber” Decking Material**

Property	Unit	Requirement	Result <sup>(1), (2)</sup>
Dimensional Change			
Coefficient of linear expansion (thermal) - longitudinal - cross-sectional	cm/cm/°C	< 2 × 10 <sup>-5</sup>	3.9 × 10 <sup>-5</sup> <sup>(3)</sup> 8.6 × 10 <sup>-5</sup> <sup>(3)</sup>
Coefficient of linear expansion (swelling) - oven dry to vacuum pressure soak	%	< 0.5, by 80% of specimens	≤ 0.03
Strength and Stiffness			
Modulus of elasticity (MOE) - span-to-depth ratio within 18 to 21	MPa	> 750	1083 (s.d. = 176)
Modulus of rupture (MOR) - span-to-depth ratio within 18 to 21	MPa	> 9	10.4 (s.d. = 1.3)
Impact resistance (Izod impact, notched)	J/m	> 53.4	41.0 <sup>(4)</sup>
Hardness (11.28-mm diameter ball)	kN	> 1.8	4.6
Creep, Recovery and Load Duration	%	< 25 for creep > 75 for recovery No failure	63.8 <sup>(5)</sup> 90.4 Passed
Strength and Stiffness after Aging			
Weathering - impact resistance	%	> 75 of non-weathered value	106
Accelerated aging - MOE and MOR	%	> 50 of non-aged value	110 (MOE) 100 (MOR)
Fastener Holding Capacity			
Nail withdrawal strength	N	> 600	869 (s.d. = 24.2)
Lateral nail strength	N	> 720	1982 (s.d. = 114)
Flame-Spread Rating (CAN/ULC-S102.2-M88)			
Flame-spread Smoke development		< 200 Report	120 > 500

- (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.
- (3) Deemed acceptable based on manufacturer’s gapping installation instructions.
- (4) Deemed acceptable based on the full-scale structural impact test results.
- (5) Deemed acceptable for decking application based on the other results of the test. The product creep (deformation under constant load) will be greater than that of lumber planks.

**Table 2. Performance under Concentrated Static Loads** <sup>(1)</sup>

Property	Requirement		Result <sup>(2)</sup>	
	Minimum Ultimate Load (kN)	Minimum 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	2.4	2.9 4.2 4.14	5.28 <sup>(4)</sup> 2.71 <sup>(3)</sup> 1.06

<sup>(1)</sup> Testing as per ASTM E 661, modified for the testing of planks.

<sup>(2)</sup> Test results for 38 x 140-mm planks with supports at 500 mm o.c.

<sup>(3)</sup> Deemed acceptable for the intended use, as the 0.31-mm deflection above the 2.4-mm requirement was not considered significant.

<sup>(4)</sup> Although 5.28 mm is greater than the 2.4-mm requirement, it was deemed acceptable for material at 50°C. However, the deflection of the decking will be slightly higher than that of wood-based panels conforming to NBC subfloor requirements at this high temperature.

**Table 3. Performance under Impact Loads** <sup>(1)</sup>

Property	Requirement		Result <sup>(2)</sup>	
	Minimum Ultimate Load of 1.78 kN following Impact Load of (N·m)	Minimum Deflection under 0.89-kN Load following Impact Load (mm)	Ultimate Load of 1.78 kN following Impact Load of (N·m)	Deflection under 0.89-kN Load following Impact Load (mm)
Impact Load - decking at 50°C - decking at -35°C	100	2.4	100 160	5.92 <sup>(3)</sup> 1.12

<sup>(1)</sup> Testing as per ASTM E 661, modified for the testing of planks.

<sup>(2)</sup> Test results for 38 x 140-mm planks with supports at 500 mm o.c.

<sup>(3)</sup> Although 5.92 mm is greater than the 2.4-mm requirement, the deflection of the plank increased by less than 1 mm after it was exposed to impact loads, thus it was deemed acceptable for material at 50°C.

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**Table 4. Durability**

<b>Property</b>	<b>Requirement</b>	<b>Result</b>
Modulus of elasticity Modulus of rupture	Mean percentage loss in MOE and MOR after UV-exposure <sup>(1)</sup> and accelerated aging <sup>(2)</sup> must be less than or equal to spruce lumber	Testing in progress <sup>(3)</sup>

<sup>(1)</sup> 4000 hours of cycle 1 of Appendix X3.1 of ASTM G 155.

<sup>(2)</sup> 5 cycles of accelerated aging (wetting, freezing, thawing and drying).

<sup>(3)</sup> The product was tested to date for 2000 hours of UV-exposure and 5 cycles of accelerated aging. Based on these test results and on other weathering test results, it is expected that the change in strength and stiffness of the product will be less than or equal to spruce lumber once the testing is completed. Thus, the product was deemed acceptable for the intended use based on the trend of the preliminary results. The final results and any adjustment, if necessary, will form part of the next revised CCMC Report.

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Manager, CCMC

*Note: Readers are asked to refer to limitations imposed by NRC on the interpretation and use of this report. These limitations are included in the introduction to CCMC's Registry of Product Evaluations, of which this report is part.*

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