Technical Evaluation Report

TER 1705-01

Vandermeer V-Plank Laminated Veneer Lumber (LVL)

Vandermeer Forest Products, Inc.

Product:

Vandermeer V-Plank Laminated Veneer Lumber (LVL)

Issue Date:
June 15, 2017

Revision Date:
June 28, 2019

Subject to Renewal:
July 1, 2020
COMPANY INFORMATION:

Vandermeer Forest Products, Inc.
5110 196th St. SW, Suite 200
Lynnwood, WA 98036
vandermeerfp.com

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES
SECTION: 06 17 00 - Shop-Fabricated Structural Wood
SECTION: 06 17 13 - Laminated Veneer Lumber

1 PRODUCT EVALUATED

1.1 Vandermeer V-Plank Laminated Veneer Lumber (LVL)

2 APPLICABLE CODES AND STANDARDS

2.1 Codes

2.1.1 IBC—12, 15, 18: International Building Code®
2.1.2 IRC—12, 15, 18: International Residential Code®
2.1.3 NBC—10, 15: National Building Code of Canada

2.2 Standards and Referenced Documents

2.2.1 ANSI A10.8: Scaffolding Safety Requirements
2.2.2 ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction
2.2.3 ASTM D143: Standard Test Methods for Small Clear Specimens of Timber
2.2.4 ASTM D198: Standard Test Methods of Static Tests of Lumber in Structural Sizes
2.2.5 ASTM D2559: Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions
2.2.6 ASTM D5456: Standard Specification for Evaluation of Structural Composite Lumber Products
2.2.7 CSA O86: Engineering Design in Wood
2.2.8 CSA S269.2: Access Scaffolding for Construction Purposes

1 Building codes require data from valid research reports be obtained from approved sources. An approved agency, which is an approved source, is defined as "an established and recognized agency that is regularly engaged in...furnishing product certification where such agency has been approved..." Being approved, defined as "acceptable to the building official," is accomplished via accreditation using ISO/IEC 17065 evaluation procedures meeting code requirements of independence, adequate equipment, and experienced personnel. DrJ is an ISO/IEC 17065 ANSI-Accredited Product Certification Body – Accreditation #1131.

Through ANSI accreditation, DrJ certification can be used to obtain product approval in any country that is an IAF MLA Signatory and covered by an IAF MLA Evaluation per the Purpose of the MLA – “certified once, accepted everywhere.” Manufacturers can go to jurisdictions in any IAF MLA Signatory Country and have their products readily approved by authorities having jurisdiction using DrJ’s ANSI accreditation.

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, see drjcertification.org.

2 Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein (e.g., ASCE 7, NDS, ASTM). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein. As required by code, where this TER is not approved, the building official shall respond in writing stating the reasons this TER was not approved. For any variations in state and local codes, see Section 8.

3 All terms defined in the applicable building codes are italicized.

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3 PERFORMANCE EVALUATION

3.1 V-Plank was evaluated to determine its resistance properties, which are used to develop reference design values for Allowable Stress Design (ASD) and specified strength and modulus of elasticity values for Limit States Design (LSD). This TER examines Vandermeer V-Plank for:

3.1.1 Use in flatwise bending as a scaffold plank as defined by ANSI A10.8 Section 3.59
3.1.2 Use in flatwise bending as a scaffold plank as defined by OSHA 29 CFR 1926.450(b)
3.1.3 Use in flatwise bending as a scaffold plank as defined by CSA S269.2

3.2 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

3.3 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within DrJ's professional scope of work.

4 PRODUCT DESCRIPTION AND MATERIALS

4.1 V-Plank is distributed by Vandermeer Forest Products at its facility in Lynnwood, Washington.

4.2 V-Plank is manufactured by laminating wood veneers with an exterior type adhesive (complying with ASTM D2559) in a continuous process with the grain of the wood oriented parallel to the length of the member in accordance with an ISO 9001 quality certification system.

4.3 The wood veneer properties and species, adhesive, manufacturing parameters, and finished product dimensions and tolerances are specified in the approved quality documentation and in-plant manufacturing standard.

4.4 Material Availability

4.4.1 Thickness: 1½" (38 mm)
4.4.2 Widths: 87/8" (225 mm), 9¼" (235 mm), and 11¼" (286 mm)
4.4.3 Lengths: up to 60' (18.3 m)

5 APPLICATIONS

5.1 Structural applications include use in flatwise bending as a scaffold plank.

5.2 Design

5.2.1 Design of V-Plank is governed by the applicable code and the provisions for Structural Composite Lumber (SCL) in NDS and Structural Composite Lumber Products in CSA O86.

5.2.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

5.2.2.1 The design provisions for wood construction noted in IBC Section 2302.14 and IRC Section R301.1.3 apply to V-Plank for ASD, unless otherwise noted in this report. Allowable unit stresses for V-Plank are specified in Table 1.
### Table 1. Flatwise Use Reference Design Values for V-Plank (Allowable Stress Design)

<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>Bending, $F_b$ psi (MPa)</th>
<th>Horizontal Shear, $F_v$ psi (MPa)</th>
<th>Plank Modulus of Elasticity, $E$ psi (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plank$^{1,4}$</td>
<td>Plank$^{1,5}$</td>
<td>Apparent$^{3}$</td>
</tr>
<tr>
<td>MC $\leq$ 16%</td>
<td>2,900 (20.0)</td>
<td>100 (0.69)</td>
<td>1,900,000 (13,100)</td>
</tr>
<tr>
<td>16% &lt; MC $\leq$ 30%</td>
<td>2,300 (15.9)</td>
<td>100 (0.69)</td>
<td>1,500,000 (10,342)</td>
</tr>
</tbody>
</table>

SI: 1 psi = 0.00689 MPa

1. The reference design values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to $E$.

2. Orientation nomenclature for Vandermeer V-Plank

3. The Apparent $E$ can be used directly in traditional beam deflection formulas. Using True $E$, deflection is calculated as follows for uniformly loaded simple span beams.

   $$\Delta = \frac{5WL^4}{32Eb^3} + \frac{12WL^2}{5Ebh}$$

   where: $\Delta$ = deflection in inches
   $W$ = uniform load in psf
   $L$ = span in inches
   $E$ = modulus of elasticity in psi
   $b$ = width of beam in inches
   $h$ = depth of beam in inches

4. The bending values in these tables are based on a referenced depth of 1½”.

5. Horizontal shear value for X-L plane only

6. V-Planks are generally used in elevated locations with good air circulation conducive to drying of the wood fibers.

7. These design values have been developed in accordance with ANSI A10.8 Appendix C.

8. Values are for new or like-new product.
5.2.2.2 The design provisions for wood construction noted in CSA O86 Section 13.4 apply to V-Plank for Limit States Design, unless otherwise noted in this report. Specified strength and modulus of elasticity values for V-Plank are specified in Table 2.

<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>Bending, $F_b$ (psi (MPa))</th>
<th>Horizontal Shear, $F_v$ (psi (MPa))</th>
<th>Plank Modulus of Elasticity, $E$ (psi (MPa))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plank$^{1,4}$</td>
<td>Plank$^{1,5}$</td>
<td>Apparent$^{3}$</td>
</tr>
<tr>
<td>MC ≤ 16%</td>
<td>5,200 (35.9)</td>
<td>190 (1.31)</td>
<td>1,900,000 (13,100)</td>
</tr>
<tr>
<td>16% &lt; MC ≤ 30%</td>
<td>4,100 (28.3)</td>
<td>190 (1.31)</td>
<td>1,500,000 (10,342)</td>
</tr>
</tbody>
</table>

SI: 1 MPa = 145 psi

1. The reference design values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to $E$.

2. Orientation nomenclature for Vandermeer V-Plank

3. The Apparent $E$ can be used directly in traditional beam deflection formulas. Using True $E$, deflection is calculated as follows for uniformly loaded simple span beams:

$$\Delta = \frac{5WL^4}{384Eb^3} + \frac{12WL^2}{5Eb}$$

where: $\Delta$ = deflection in inches

$W$ = uniform load in psi

$L$ = span in inches

$E$ = modulus of elasticity in psi

$b$ = width of beam in inches

$h$ = depth of beam in inches

4. The bending values in these tables are based on a referenced depth of 1½”.

5. Horizontal shear value for X-L plane only

6. V-Planks are generally used in elevated locations with good air circulation conducive to drying of the wood fibers.

7. These design values have been developed in accordance with ANSI A10.8 Appendix C.

8. Values are for new or like-new product.
5.2.2.3 Allowable spans for live load conditions defined in ANSI A10.8 are provided in Table 3 for various member sizes.

**TABLE 3. ALLOWABLE SPANS FOR V-PLANK USED IN THE UNITED STATES**

<table>
<thead>
<tr>
<th>Size</th>
<th>Live Load²</th>
<th>Allowable Spans, ft (mm)</th>
<th>MC ≤ 16 %</th>
<th>16% ≤ MC ≤ 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5&quot; x 8.85&quot;</td>
<td>One Person Load</td>
<td>9' - 10&quot; (2,995)</td>
<td>8' - 8&quot; (2,652)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Person Load</td>
<td>7' - 11&quot; (2,403)</td>
<td>7' - 2&quot; (2,178)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Three Person Load</td>
<td>6' - 2&quot; (1,885)</td>
<td>5' - 4&quot; (1,618)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Duty (25 psf)</td>
<td>9' - 10&quot; (2,995)</td>
<td>8' - 8&quot; (2,652)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Duty (50 psf)</td>
<td>9' - 10&quot; (2,995)</td>
<td>8' - 8&quot; (2,652)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heavy Duty (75 psf)</td>
<td>8' - 11&quot; (2,724)</td>
<td>8' - 3&quot; (2,506)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Person Load</td>
<td>10' - 0&quot; (3,054)</td>
<td>8' - 10&quot; (2,703)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Person Load</td>
<td>8' - 0&quot; (2,444)</td>
<td>7' - 3&quot; (2,214)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Three Person Load</td>
<td>6' - 4&quot; (1,941)</td>
<td>5' - 5&quot; (1,662)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Duty (25 psf)</td>
<td>10' - 0&quot; (3,054)</td>
<td>8' - 10&quot; (2,703)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium Duty (50 psf)</td>
<td>10' - 0&quot; (3,054)</td>
<td>8' - 10&quot; (2,703)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heavy Duty (75 psf)</td>
<td>8' - 11&quot; (2,724)</td>
<td>8' - 3&quot; (2,506)</td>
<td></td>
</tr>
<tr>
<td>1.5&quot; x 9.25&quot;</td>
<td>One Person Load</td>
<td>10' - 11&quot; (3,322)</td>
<td>9' - 8&quot; (2,938)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two Person Load</td>
<td>8' - 8&quot; (2,640)</td>
<td>7' - 10&quot; (2,383)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Three Person Load</td>
<td>7' - 2&quot; (2,174)</td>
<td>6' - 2&quot; (1,881)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Duty (25 psf)</td>
<td>10' - 11&quot; (3,322)</td>
<td>9' - 8&quot; (2,938)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium Duty (50 psf)</td>
<td>10' - 2&quot; (3,087)</td>
<td>9' - 4&quot; (2,834)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heavy Duty (75 psf)</td>
<td>8' - 11&quot; (2,724)</td>
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<td>8' - 11&quot; (2,724)</td>
<td>8' - 3&quot; (2,506)</td>
<td></td>
</tr>
</tbody>
</table>

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Allowable spans are determined through an evaluation of bending stress, horizontal shear stress, and an allowable deflection of L/60 using the live loads shown. The member self-weight is included in all span determinations. Spans shown are center of bearing to center of bearing. Always use appropriate length planks for the span condition. Refer to OSHA for minimum and maximum cantilever requirements.

2. Live loads are as defined in ANSI A10.8 Section 5.1.2. Proper scaffold plank selection must be based on the most restrictive load case anticipated when planks are in service.
5.2.2.4 Allowable spans for several live load conditions defined in CSA S269.2 are provided in Table 4 for various member sizes.

### Table 4. Allowable Spans for V-Plank Used in Canada

<table>
<thead>
<tr>
<th>Size</th>
<th>Live Load²</th>
<th>Allowable Span,1 ft (mm)</th>
<th>16% ≤ MC ≤ 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5&quot; x 8.85&quot;</td>
<td>50 psf</td>
<td>9' - 6&quot; (2,895)</td>
<td>8' - 9&quot; (2,667)</td>
</tr>
<tr>
<td>(38mm x 225mm)</td>
<td>75 psf</td>
<td>8' - 3&quot; (2,514)</td>
<td>7' - 8&quot; (2,336)</td>
</tr>
<tr>
<td></td>
<td>500 lbs</td>
<td>5' - 1&quot; (1,549)</td>
<td>4' - 1&quot; (1,244)</td>
</tr>
<tr>
<td></td>
<td>25 psf + 250 plf</td>
<td>8' - 4&quot; (2,540)</td>
<td>7' - 6&quot; (2,286)</td>
</tr>
<tr>
<td></td>
<td>75 psf + 265 plf</td>
<td>6' - 8&quot; (2,032)</td>
<td>5' - 8&quot; (1,727)</td>
</tr>
<tr>
<td>1.5&quot; x 9.25&quot;</td>
<td>50 psf</td>
<td>9' - 6&quot; (2,895)</td>
<td>8' - 9&quot; (2,667)</td>
</tr>
<tr>
<td>(38mm x 235mm)</td>
<td>75 psf</td>
<td>8' - 3&quot; (2,514)</td>
<td>7' - 8&quot; (2,336)</td>
</tr>
<tr>
<td></td>
<td>500 lbs</td>
<td>5' - 4&quot; (1,633)</td>
<td>4' - 3&quot; (1,295)</td>
</tr>
<tr>
<td></td>
<td>25 psf + 250 plf</td>
<td>8' - 4&quot; (2,554)</td>
<td>7' - 6&quot; (2,286)</td>
</tr>
<tr>
<td></td>
<td>75 psf + 265 plf</td>
<td>6' - 8&quot; (2,032)</td>
<td>5' - 8&quot; (1,730)</td>
</tr>
<tr>
<td>1.5&quot; x 11.25&quot;</td>
<td>50 psf</td>
<td>9' - 6&quot; (2,895)</td>
<td>8' - 9&quot; (2,667)</td>
</tr>
<tr>
<td>(38mm x 286mm)</td>
<td>75 psf</td>
<td>8' - 3&quot; (2,514)</td>
<td>7' - 8&quot; (2,336)</td>
</tr>
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<td></td>
<td>500 lbs</td>
<td>6' - 5&quot; (1,995)</td>
<td>5' - 1&quot; (1,549)</td>
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<td>8' - 4&quot; (2,540)</td>
<td>7' - 6&quot; (2,286)</td>
</tr>
<tr>
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<td>5' - 8&quot; (1,727)</td>
</tr>
</tbody>
</table>

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Allowable spans are determined through an evaluation of ultimate bending strength/4, ultimate horizontal shear strength/4, Live Load/80. The member self-weight is included in the span checks for bending and shear strength. Spans shown are center of bearing to center of bearing. Always use appropriate length planks for the span condition. Refer to CSA for minimum and maximum cantilever requirements.

2. Loads are as defined in CSA S269.2 Clause 6. PLF loads are applied across the plank width at mid span. Proper scaffold plank selection must be based on the most restrictive load case anticipated when planks are in service.
7.3 Where appropriate, DrJ’s analysis is based on design values that have been codified into law through codes and standards (e.g., IBC, IRC, NDS®, and SDPWS). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8 FINDINGS

8.1 When used and installed in accordance with this TER and the manufacturer’s installation instructions, the product(s) listed in Section 1.1 are approved for the following:

8.1.1 V-Plank meets all applicable requirements for use as scaffold plank in accordance with ANSI A10.8, CSA O86, and CSA S269.2.

8.1.2 V-Plank meets the requirements of OSHA 29 CFR 1926.451 and the NBC.

8.2 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code... Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

8.3 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this evaluation, they are listed here.

8.3.1 No known variations

9 CONDITIONS OF USE

9.1 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.

9.2 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.

9.3 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., owner or registered design professional).

9.4 At a minimum, this product shall be installed per Section 6 of this TER.

9.5 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.

9.6 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent. Therefore, the TER shall be reviewed for code compliance by the building official for acceptance.

9.7 The use of this TER is dependent on the manufacturer’s in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer’s instructions, the building official’s inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.
10 IDENTIFICATION

10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer’s name, product name, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at vandermeerfp.com.

11 REVIEW SCHEDULE

11.1 This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjcertification.org.

11.2 For information on the current status of this TER, contact DrJ Certification.