Technical Evaluation Report
TER 1310-04
Thermo-Sheath (Green) Structural Sheathing

Fibre Converters, Inc.

Product:
Thermo-Sheath (Green) Structural Sheathing

Issue Date:
November 20, 2013
Revision Date:
December 13, 2019
Subject to Renewal:
January 1, 2021
DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 12 00 - Structural Panels

SECTION: 06 12 19 - Shear Wall Panels

SECTION: 06 16 00 - Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 25 00 - Water-Resistive Barriers/Weather Barriers

SECTION: 07 27 00 - Air Barriers

1 PRODUCT EVALUATED

1.1 Thermo-Sheath (Green) Structural Sheathing

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 IECC—12, 15, 18: International Energy Conservation Code

2.1.4 FBC—14, 17: Florida Building Code

1 Building codes require data from valid research reports be obtained from approved sources. Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the building official. DrJ is an ISO/IEC 17065 ANSI-Accredited Product Certification Body – Accreditation #1133. Through ANSI accreditation and the IAF MLA, DrJ certification can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere.”

Building official approval of a licensed registered design professional (RDP) is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant jurisdiction. Therefore, the work of licensed RDPs is accepted by building officials, except when plan (i.e. peer) review finds an error with respect to a specific section of the code. Where this TER is not approved, the building official responds in writing stating the reasons for disapproval.

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit drjcertification.org or call us at 608-310-6748.

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.

3 All terms defined in the applicable building codes are italicized.
2.2 Standards and Referenced Documents

2.2.1 ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic
2.2.2 ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
2.2.3 ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings
2.2.4 ASTM E2178: Standard Test Method for Air Permeance of Building Materials
2.2.5 ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
2.2.6 ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials

3 PERFORMANCE EVALUATION

3.1 Thermo-Sheath (Green) Structural Sheathing was evaluated to determine:

3.1.1 Structural performance under lateral load conditions (wind and seismic) for use as an alternative to the IRC Intermittent Wall Bracing provisions of IRC Section R602.10 Method WSP.
3.1.2 Structural performance under lateral load conditions for use as an alternative to the IRC Continuous Wall Bracing provisions of Section R602.10.4 Method CS-WSP.
3.1.3 Structural performance under lateral load conditions for use as an alternative to the IRC Continuous Wall Bracing provisions of Section R602.10.6.2 Method PFH.
3.1.4 Structural performance under lateral load conditions for use as an alternative to the IBC Conventional Wall Bracing provisions, Section 2308.6, Method 3, for Type V construction.
3.1.5 Structural performance under lateral load conditions for both wind and seismic loading for use with the IBC performance-based provisions, Section 2306.1 and 2306.3 for light-frame wood wall assemblies.

3.1.5.1 Table 6 provides seismic design coefficients (SDC) that conform to the requirements in ASCE/SEI 7 Section 12.2.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design in accordance with ASCE/SEI 7 (i.e., all seismic design categories).
3.1.5.2 The basis for equivalency testing is outlined in Section 12.2.1.1 of ASCE/SEI 7:

Use of seismic force-resisting systems not contained in Table 12.2-1 shall be permitted contingent on submittal to and approval by the Authority Having Jurisdiction and independent structural design review of an accompanying set of design criteria and substantiating analytical and test data. The design criteria shall specify any limitations on system use, including Seismic Design Category and height; required procedures for designing the system's components and connections; required detailing; and the values of the response modification coefficient, $R$; overstrength factor $\Omega$; and deflection amplification factor, $C_d$.

3.1.5.3 The SDC evaluation uses the approach found in documentation entitled “Establishing Seismic Equivalency for Proprietary Prefabricated Shear Panels”5 using code-defined accepted engineering procedures, experience, and technical judgment.

3.1.6 Structural performance under lateral load conditions for use as an alternative to SDPWS Section 4.3 Wood-Frame Shear Walls.
3.1.7 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with IRC Section R301.2.1 and IBC Section 1609.1.1.
3.1.8 Performance for use as a water-resistive barrier (WRB) in accordance with IBC Section 1403.2 and IRC Section R703.2.

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4 2012 IBC Section 2308.3
6 2015 IBC Section 1404.2
3.1.9 Performance for use as an air barrier in accordance with IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and C402.5.1.1.

3.2 Use of Thermo-Sheath (Green) Structural Sheathing in draftstop applications is outside the scope of this evaluation. For this application, see TER No. 1303-07: Thermo-Sheath Sheathing for Use as Draft Stops in the IBC & IRC.

3.3 Use of Thermo-Sheath (Green) Structural Sheathing in a CS-PF portal frame is outside the scope of this evaluation.

3.4 Use of Thermo-Sheath (Green) Structural Sheathing to resist uplift loads is outside the scope of this evaluation.

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

3.6 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 The product evaluated in this TER is shown in Figure 1.

![Thermo-Sheath Sheathing](image)

**FIGURE 1. THERMO-SHEATH (GREEN) STRUCTURAL SHEATHING**

4.2 Thermo-Sheath (Green) Structural Sheathing is a proprietary wall sheathing consisting of a proprietary fibrous sheathing board laminated with a water-resistant adhesive to facers on one or both sides. Facers may consist of aluminum foil, polyolefin film, aluminized polyolefin or kraft paper.

4.2.1 Material Availability:

4.2.1.1 Thickness: 0.078" (1.98 mm)

4.2.1.2 Standard product width: 48" (1219 mm) or 48¾" (1238 mm)

4.2.1.3 Standard lengths: 96" (2438 mm), 108" (2743 mm), 120" (3048 mm), and other sizes are available by request

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7 2012 IECC Section C402.4.1.1
5 APPLICATIONS

5.1 General

5.1.1 Thermo-Sheath (Green) Structural Sheathing is used as wall sheathing in buildings constructed in accordance with the IRC and IBC for light-frame wood construction.

5.1.2 Thermo-Sheath (Green) Structural Sheathing is used as structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame wood construction.

5.1.3 Thermo-Sheath (Green) Structural Sheathing panels are permitted to be used as wall sheathing in buildings constructed in accordance with the IBC requirements for Type V light-frame construction.

5.1.4 Thermo-Sheath (Green) Structural Sheathing panels are used as structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light-frame wood construction.

5.1.5 Thermo-Sheath (Green) Structural Sheathing is also used as sheathing applied as in-fill to portions of walls that are not designed as braced wall panels or shear walls.

5.1.6 When Thermo-Sheath (Green) Structural Sheathing is installed in accordance with Section 5.3, it is an approved alternative WRB in accordance with IRC Section R703.2 and IBC Section 1403.2.

5.1.7 Thermo-Sheath (Green) Structural Sheathing is an approved air barrier material when installed in accordance with Section 5.4.

5.2 Structural Applications

5.2.1 General Provisions:

5.2.1.1 Except as otherwise described in this TER, Thermo-Sheath (Green) Structural Sheathing shall be installed in accordance with the applicable building codes listed in Section 2 using the provisions set forth therein for the design and installation of wood structural panels (WSP).

5.2.1.1.1 Thermo-Sheath (Green) Structural Sheathing is permitted to be designed in accordance with SDPWS for the design of shear walls using the methods set forth therein, including the perforated shear wall methodology, and subject to the SDPWS boundary conditions, except as specifically allowed in this TER.

5.2.1.2 Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall.

5.2.1.2.1 For wind design, anchor bolt spacing shall not exceed 6' o.c. (1829 mm).

5.2.1.2.2 For seismic design, anchor bolt spacing shall not exceed 4' o.c. (1219 mm).

5.2.1.3 The maximum aspect ratio for Thermo-Sheath (Green) Structural Sheathing shall be 4:1.

5.2.1.4 The minimum full height panel width shall be 24" (610 mm).

5.2.1.5 All panel edges shall be supported with a minimum 2" (51 mm) nominal lumber.

5.2.1.6 Staples shall be a minimum 16 gauge, 15/16" crown and penetrate a minimum of 1" into the stud.

5.2.1.7 Installation is permitted for single top plate (advanced framing method) or double top plate applications.

5.2.1.8 Where the sheathing from an upper story extends over the rim joist and overlaps a lower story, the sheathing shall be fastened along the sole plate of the story above at 3" o.c. Further, one row of fasteners spaced 12" o.c. shall be located along the bottom third of the rim joist. The sheathing from the story above shall overlap the sheathing on the story below by a minimum of 2". Fastening along the bottom edge of the sheathing from the story above is not required.

5.2.1.9 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with code-defined accepted engineering procedures, experience, and technical judgment.

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8 2015 IBC Section 1404.2
5.2.2 **Prescriptive IRC Bracing Applications:**

5.2.2.1 Thermo-Sheath (Green) Structural Sheathing may be used on braced wall lines as an equivalent alternative to Method WSP of the *IRC*, when installed in accordance with *IRC Section R602.10* and this TER.

5.2.2.2 For wind design, required braced wall panel lengths for Thermo-Sheath (Green) Structural Sheathing shall be as shown in Table 1, and shall be used in conjunction with *IRC Table R602.10.3(2)*, which provides the required adjustments.

5.2.2.3 For seismic design, required braced wall panel lengths for Thermo-Sheath (Green) Structural Sheathing shall be as shown in Table 2, and shall be used in conjunction with *IRC Table R602.10.3(4)*, which provides the required adjustments.

5.2.2.4 Use of Thermo-Sheath (Green) Structural Sheathing with Method PFH is also permitted in accordance with Section 5.2.3, in lieu of WSP specified in accordance with *IRC Section R602.10.6.4*.

5.2.2.5 Where a building, or portion thereof, does not comply with one or more of the bracing requirements within the prescriptive section of the *IRC*, those portions shall be designed and constructed in accordance with *IRC Section R301.1*.

5.2.2.6 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.
### Table 1. Required Bracing Lengths for Thermo-Sheath (Green) Structural Sheathing Installed with ½" Gypsum Wallboard @ 16" o.c. Stud Spacing – Wind (V_{ult})

<table>
<thead>
<tr>
<th>Condition</th>
<th>Braced Wall Line Spacing (ft)</th>
<th>Thermo-Sheath (Green) Structural Sheathing</th>
<th>Thermo-Sheath (Green) Structural Sheathing</th>
<th>Length of Wall Line to be Braced (ft)</th>
<th>Length of Wall Line to be Braced (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Intermittent Sheathing</td>
<td>Continuous Sheathing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Story or the Top of Two or Three Stories</td>
<td>10</td>
<td>≤ 110 mph</td>
<td>≤ 115 mph</td>
<td>≤ 120 mph</td>
<td>≤ 130 mph</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0</td>
<td>2.0</td>
<td>2.5</td>
<td>2.5</td>
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<tr>
<td></td>
<td></td>
<td>3.0</td>
<td>3.5</td>
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<td>5.0</td>
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<td>5.4</td>
<td>5.9</td>
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<td>7.9</td>
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<td>6.4</td>
<td>6.9</td>
<td>7.9</td>
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<tr>
<td></td>
<td></td>
<td>9.4</td>
<td>10.4</td>
<td>11.4</td>
<td>12.9</td>
</tr>
<tr>
<td>First Story of Two Stories or Second Story of Three Stories</td>
<td>10</td>
<td>3.5</td>
<td>4.0</td>
<td>5.0</td>
<td>5.9</td>
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<td></td>
<td></td>
<td>5.4</td>
<td>6.4</td>
<td>7.9</td>
<td>10.9</td>
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<td>7.9</td>
<td>8.9</td>
<td>10.9</td>
<td>12.9</td>
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<td></td>
<td></td>
<td>10.9</td>
<td>12.9</td>
<td>14.9</td>
<td>16.8</td>
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<td>21.3</td>
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<tr>
<td></td>
<td></td>
<td>28.7</td>
<td>31.7</td>
<td>37.1</td>
<td>42.6</td>
</tr>
<tr>
<td>First Story of Three Stories</td>
<td>10</td>
<td>5.4</td>
<td>5.9</td>
<td>6.4</td>
<td>7.4</td>
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<td></td>
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<td>26.7</td>
<td>36.1</td>
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<td></td>
<td></td>
<td>28.7</td>
<td>31.7</td>
<td>37.1</td>
<td>42.6</td>
</tr>
</tbody>
</table>

1. Demonstrates equivalency to *IRC Table R602.10.3(1)*. All adjustment factors from *IRC Table R602.10.3(2)* shall be applied. A minimum of ½" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.

2. Thermo-Sheath (Green) shall be installed with minimum 0.120" x 1¼" galvanized roofing nail or minimum 15/16" crown x 1¾" leg 16 gauge galvanized staple.

3. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.3.

4. Linear interpolation is permitted.

5. Wind speeds shown are *V_{ast}* in accordance with ASCE 7-10 and ASCE 7-16. To convert to equivalent *V_{ast}* wind speed, *V_{ast} = V_{ult} / 1.26*
### Table 2. Required Bracing for Thermo-Sheath (Green) Structural Sheathing Installed with ½” Gypsum Wallboard @ 16” O.C. Stud Spacing – Seismic

<table>
<thead>
<tr>
<th>Condition</th>
<th>Braced Wall Line Length (ft)</th>
<th>Thermo-Sheath (Green) Structural Sheathing</th>
<th>Thermo-Sheath (Green) Structural Sheathing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Staples 3” o.c. Edges &amp; 3” o.c. in the Field</td>
<td>Staples 3” o.c. Edges &amp; 3” o.c. in the Field</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft)</td>
<td>Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SDC C (townhouses only)</td>
<td>SDC D₀</td>
</tr>
<tr>
<td>One Story or the Top of Two or Three Stories</td>
<td>10</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>3.1</td>
<td>3.6</td>
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<td></td>
<td>30</td>
<td>4.8</td>
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<td>6.3</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>7.9</td>
<td>8.9</td>
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<tr>
<td>First Story of Two Stories or Second Story of Three Stories</td>
<td>10</td>
<td>3.0</td>
<td>3.7</td>
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<tr>
<td></td>
<td>20</td>
<td>5.9</td>
<td>7.5</td>
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<td>20.8</td>
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<tr>
<td></td>
<td>50</td>
<td>22.3</td>
<td>26.0</td>
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</tbody>
</table>

1. Demonstrates equivalency to IRC Table R602.10.3(3). All adjustment factors from IRC Table R602.10.3(4) shall be applied. A minimum of ½” gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼” #6 types W or S screws spaced 8” o.c. at panel edges and 8” o.c. in the field of the panels.

2. Thermo-Sheath (Green) shall be installed with minimum 0.120” x 1¼” galvanized roofing nail or minimum 15/16” crown x 1¼” leg 16 gauge galvanized staples.

3. Tabulated bracing lengths are based on the following:
   a. Soil Class D
   b. Wall height= 10’
   c. 10 psf floor dead load
   d. 15 psf roof/ceiling dead load
   e. Braced wall line spacing ≤ 25’

4. Linear interpolation is permitted.

5. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.3.

5.2.3 Thermo-Sheath (Green) Structural Sheathing Method PFH:

5.2.3.1 In accordance with the IRC Section R602.10.6.2, the PFH referenced in the IRC is permitted to be an equivalent replacement for a 4’ length of Method WSP bracing.

5.2.3.2 Testing of the Thermo-Sheath Structural Sheathing PFH assemblies was conducted and compared to testing of Method WSP braced wall panel assemblies using OSB to determine whether equivalence could be achieved for the Thermo-Sheath PFH.
5.2.3.3 The portal frames were tested in accordance with ASTM E2126 testing procedures. Testing determined their lateral resistance within an identical braced wall line using Method WSP braced wall panels so that a direct performance comparison could be made between the two series of tests.

5.2.3.4 The Thermo-Sheath (Green) Structural Sheathing 12" PFH and 24" PFH is constructed in accordance with Figure 2, Figure 3, and Figure 4.
Figure 2. Construction Details of Thermo-Sheath (Green) 12" to 24" PFH
FIGURE 3. PFH SECTION A-A
THERMO-SHEATH SHEATHING
FILL CAVITY OF PIER WITH 1-1/2"THICK PIECES OF DOW STYROFOAM (OR EQUIVALENT)

2x4's FLAT-WISE
2x4's STUD
7/16" OSB

SECTION 'B'-B
OPTIONAL INSULATION OF JOIST CAVITIES

FIGURE 4. PFH SECTION B-B
5.2.3.5 A comparison of the WSP braced wall lines, and the Thermo-Sheath Structural Sheathing 12" PFH and 24" PFH, is shown in Table 3.

5.2.3.6 The test data and subsequent engineering analysis provides confirmation that the performance of the Thermo-Sheath Structural Sheathing 12" PFH and 24" PFH provide comparable equivalence to the Method WSP braced wall panels.

### Table 3. Test Results Based on SPF Framing

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Sheathing Method</th>
<th>Fastener Size &amp; Spacing</th>
<th>Total Bracing Width (in)</th>
<th>Maximum Wall Height (ft)</th>
<th>ASD Allowable Design Value per Panel/Pier&lt;sup&gt;1,4,5&lt;/sup&gt; (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBC/IRC Benchmark</td>
<td>¼&quot; OSB, Isolated 4' x 8' panels</td>
<td>2¼&quot; x 0.113Ø nails, 6:12 spacing</td>
<td>96</td>
<td>Up to 10</td>
<td>1,400</td>
</tr>
<tr>
<td>12&quot; PFH</td>
<td>Thermo-Sheath (Green) Structural Sheathing</td>
<td>See Figure 2, Figure 3, &amp; Figure 4</td>
<td>12</td>
<td>8</td>
<td>1,410</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>1,060</td>
</tr>
<tr>
<td>24&quot; PFH</td>
<td>Thermo-Sheath (Green) Structural Sheathing</td>
<td>See Figure 2, Figure 3, &amp; Figure 4</td>
<td>24</td>
<td>8</td>
<td>2,560</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>1,920</td>
</tr>
</tbody>
</table>

St. 1 in = 25.4 mm, 1 lb = 4.45 N
1. Capacity derived from multiple full-scale tests at SBCRI, as well as testing from other labs, showing the capacity of OSB sheathing in buildings constructed in accordance with the minimum requirements of the IRC.
2. The PFH bracing type in the IRC/IBC is defined as equivalent to a 4' BWP using 3/8" WSP. Equivalent capacity is based on comparison of SBCRI testing of the PFH and ⅜" OSB as compared to the published capacities as defined in the IBC and SDPWS.
3. For seismic design, reduce capacities by a factor of 1.4.
4. Interpolation between the wall heights and pier widths for the 12" PFH & 24" PFH is permitted.
5. 10'-high wall design values are provided here that use a 75% factor to reduce the 8'-high wall design values generated by the SBCRI test data.

5.2.3.7 As detailed in Figure 2, Figure 3, and Figure 4, the maximum allowable compressive strength of the Thermo-Sheath (Green) 12" to 24" PFH is 11,156 lbs. per pier. Additional compressive capacity may be engineered into each pier. Structurally attaching full-height framing members within the pier cavity is one possible engineered option.

5.2.3.8 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

5.2.4 Alternative Prescriptive IRC Bracing Applications:

5.2.4.1 As an alternative to Section 5.2.2., the following provisions are permitted:

5.2.4.1.1 Thermo-Sheath (Green) Structural Sheathing may be used on braced wall lines as an equivalent alternative to Method WSP of the IRC, when installed in accordance with IRC Section R602.10 and this TER.

5.2.4.1.2 Thermo-Sheath (Green) Structural Sheathing may be used to brace walls of buildings as an alternative to the Continuous Wall Bracing provisions of IRC Section R602.10.4.

5.2.4.1.3 Required braced wall panel lengths for Thermo-Sheath (Green) Structural Sheathing shall be as determined by the equivalency factor shown in Table 4 and IRC Table R602.10.3(1) and R602.10.3(2), including all footnotes.

5.2.4.1.3.1 Bracing lengths in these tables for Method WSP or CS-WSP shall be multiplied by the equivalency factor listed in Table 4.
TABLE 4. THERMO-SHEATH (GREEN) STRUCTURAL SHEATHING BRACED WALL LINE LENGTH EQUIVALENCY FACTORS BASED ON EQUIVALENCY TESTING FOR USE WITH THE IRC

<table>
<thead>
<tr>
<th>Structural Sheathing</th>
<th>Maximum Stud Spacing (in)</th>
<th>Fastener</th>
<th>Fastener Spacing (Edge:Field) (in)</th>
<th>Wind SPF Framing Equivalency Factors to IRC WSP or CS-WSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermo-Sheath (Green) Structural Sheathing</td>
<td>16 o.c.</td>
<td>15/16” Crown x 1¼” Leg Galvanized Staple or 0.120” x 1¼” Galvanized Roofing Nail</td>
<td>3:3</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Sl. 1 in = 25.4 mm

1. Fastener heads shall be installed flush to the surface of the sheathing. Staples shall be a minimum 16 gauge.
2. Multiply the bracing lengths in IRC Table R602.10.3(1) and IRC Table R602.10.3(2) Method WSP or CS-WSP (continuous sheathing) as applicable, including all footnotes, by the factors shown here to establish the required bracing length.
3. Multiply the bracing lengths in IRC Table R602.10.1.2 (1) Method WSP or CS-WSP (continuous sheathing) as applicable, including all footnotes, by the factors shown here to establish the required bracing length.
4. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.3.
5. Valid for single top plate (advanced framing method) wall installations or double top plate wall installations.

5.2.4.1.3.2 These braced wall line length equivalency factors are based on equivalency testing and are used to comply with Method WSP and CS-WSP of the IRC.

5.2.4.1.3.3 Thermo-Sheath (Green) Structural Sheathing tested equivalency factors in Table 4 allow the user to determine the length of bracing required, by multiplying the factor from Table 4 by the length shown in the WSP or CS columns in IRC Table R602.10.3(1), as modified by all applicable factors in Table R602.10.3(2) respectively.

5.2.4.1.4 All IRC prescriptive bracing minimums, spacing requirements, and rules must still be met.

5.2.5 Prescriptive IBC Conventional Light-Frame Wood Construction:

5.2.5.1 Thermo-Sheath (Green) Structural Sheathing may be used to brace exterior walls of buildings as an equivalent alternative to Method 3 of the IBC when installed with ½” (13 mm) gypsum fastened with a minimum 5d cooler nail or #6 Type W or S screw spaced a maximum of 8” o.c. (203 mm) at panel edges and 8” o.c. in the field. Bracing shall be in accordance with the conventional light-frame construction method of IBC Section 2308.69 and this TER.

5.2.6 Performance-Based Wood Framed Construction:

5.2.6.1 Thermo-Sheath (Green) Structural Sheathing panels used in wall assemblies designed as shear walls are permitted to be designed in accordance with the methodology used in SDPWS for WSP using the capacities shown in Table 5, Table 6, and Table 7.

5.2.6.2 Thermo-Sheath (Green) Structural Sheathing shear walls are permitted to resist horizontal wind load forces using the allowable shear loads (in pounds per linear foot) set forth in Table 5.

5.2.6.3 Thermo-Sheath (Green) Structural Sheathing shear walls that require seismic design in accordance with IBC Section 1613 shall use the seismic allowable unit shear capacities set forth in Table 6.

5.2.6.3.1 The response modification coefficient, R, system overstrength factor, \( \Omega_0 \), and deflection amplification factor, \( C_d \), indicated in Table 6 shall be used to determine the base shear, element design forces, and design story drift in accordance with ASCE/SEI 7 Chapter 12 and Section 14.5.

5.2.6.4 Thermo-Sheath (Green) Structural Sheathing panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) set forth in Table 7.
### Table 5. Allowable Unit Shear Design Values for Thermo-Sheath (Green) Structural Sheathing - Wind

<table>
<thead>
<tr>
<th>Structural Sheathing</th>
<th>Fastener Schedule</th>
<th>Joint Treatment</th>
<th>Maximum Stud Spacing (in)</th>
<th>Gypsum Wallboard (GWB)</th>
<th>Gypsum Wallboard Fastener Spacing (edge/field)</th>
<th>Allowable Unit Shear Capacity (plf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermo-Sheath (Green)</td>
<td>15/16” Crown x 1¼” Leg Galvanized Staples or 0.120” x 1¼” Galvanized Roofing Nail</td>
<td>Butted or Lapped</td>
<td>16 o.c.</td>
<td>½” GWB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4/16</td>
<td>425</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8/8</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8/16</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12/12</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16/16</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No GWB</td>
<td>200</td>
</tr>
</tbody>
</table>

1. Thermo-Sheath (Green) attached with a minimum 16 gauge, 15/16” crown x 1¼” leg staples or 0.120” x 1¼” roofing nail. Fasteners are to be spaced a maximum of 3” o.c. at the edges and 3” o.c. in the field with a minimum edge distance of ⅜”.
2. Gypsum attached with minimum 5d cooler nail or #6 type W or S screws 1¼” long. Fastener spacing shall be as required above.
3. Thermo-Sheath (Green) Structural Sheathing joints shall be butted at framing members and a single row of fasteners must be applied to each panel edge into the stud below. Alternately, joints may be lapped ¾” with a single row of fasteners along each framing member.
4. Linear interpolation between fastening patterns is permitted.

### Table 6. Seismic Performance of Thermo-Sheath (Green) Structural Sheathing

<table>
<thead>
<tr>
<th>Seismic Force-Resisting System</th>
<th>Maximum Stud Spacing (in)</th>
<th>Gypsum Wallboard (GWB)</th>
<th>Seismic Allowable Unit Shear Capacity (plf)</th>
<th>Apparent Shear Stiffness, Gs (kips/in)</th>
<th>Response Modification Factor, R3</th>
<th>System Overstrength Factor, Ω0</th>
<th>Deflection Amplification Coefficient, Cd</th>
<th>Structural System Limitations and Building Height Limit (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light-Frame (Wood) Walls Sheathed with Thermo-Sheath (Green) Structural Sheathing</td>
<td>16 o.c.</td>
<td>½” GWB</td>
<td>290</td>
<td>16.5</td>
<td>6.5</td>
<td>3</td>
<td>4</td>
<td>NL NL 65 65 65</td>
</tr>
</tbody>
</table>

1. All seismic design coefficients follow the equivalency procedures as defined in Section 3 of this TER.
2. Allowable Unit shear capacity is based on a safety factor of 2.5 in accordance with ASCE/SEI 7 Chapter 12.
3. Response modification factor, R, for use throughout ASCE/SEI 7. Note R reduces forces to a strength level, not an allowable stress level.
4. The tabulated value of the overstrength factor, Ω0, is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.
5. Deflection amplification factor, Cd, for use with ASCE/SEI 7 Sections 12.8.6, 12.8.7, and 12.9.2.
6. NL = Not Limited. Heights are measured from the base of the structure as defined in ASCE/SEI 7 Section 11.2.
7. Gypsum attached with minimum #6 type W or S screws 1¼” long spaced 8” o.c. at panel edges and in the field. Maximum stud spacing is 16” o.c.
### Table 7. Allowable Design Values (psf) for Thermo-Sheath (Green) Structural Sheathing Resisting Out-of-Plane Wind Loads

<table>
<thead>
<tr>
<th>Structural Sheathing</th>
<th>Allowable Design Value (psf)</th>
<th>Maximum Stud Spacing (in)</th>
<th>Fastener Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermo-Sheath (Green) Structural Sheathing</td>
<td>135</td>
<td>16 o.c.</td>
<td>15/16” crown, 1¼” leg 16 gage galvanized staples, 3” o.c. at the perimeter, 3” o.c. in the field. Staple crowns to be installed parallel to grain.</td>
</tr>
</tbody>
</table>

St. 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²
1. Design wind load shall be in accordance with IBC Section 1609.1.1.

### Table 8. Basic Wind Speed (mph) for Thermo-Sheath (Green) Structural Sheathing Used in Exterior Wall Covering Assemblies

<table>
<thead>
<tr>
<th>Structural Sheathing</th>
<th>Allowable Components &amp; Cladding Basic Wind Speed $V_{asd}$ per ASCE/SEI-05 (mph)</th>
<th>Allowable Components &amp; Cladding Basic Wind Speed $V_{ult}$ per ASCE/SEI 7-10 &amp; 7-16 (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermo-Sheath (Green) Structural Sheathing</td>
<td>&gt; 170</td>
<td>&gt; 215</td>
</tr>
</tbody>
</table>

St. 1 in = 25.4 mm, 1 mph = 1.61 km/h
1. Allowable wind speeds are based on the following: Mean roof height 30’, Exposure B, 10 sq. ft. effective wind area. See the applicable building code for any adjustment need for specific building location and configuration.

5.3 Water-Resistive Barrier

5.3.1 Thermo-Sheath (Green) Structural Sheathing may be used as a WRB as prescribed in IBC Section 1403.2 and IRC Section R703.2 when installed on exterior walls as described in this section.

5.3.2 Thermo-Sheath (Green) Structural Sheathing shall be installed in the vertical or horizontal orientation with board joints placed directly over exterior framing (e.g., studs, plates or blocking) spaced a maximum of 16” (406 mm) o.c. The fasteners used to attach the board shall be installed in accordance with Section 6.

5.3.3 All seams and joints between boards shall be overlapped ¾” (19 mm) or covered by minimum 1.5” (38 mm) wide DRYline® Sheathing Tape or equivalent.

5.3.4 Thermo-Sheath (Green) Structural Sheathing may be installed as a WRB in a non-structural capacity with the fasteners used to attach the board installed in accordance with Section 5.5. All butt joints between sheathing panels shall be sealed with minimum 1.5” (38 mm) wide DRYline® Sheathing Tape or equivalent.

5.3.5 Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.

5.3.6 Thermo-Sheath (Green) Structural Sheathing has water-resistance properties as shown in Table 9.

### Table 9. Thermo-Sheath (Green) Structural Sheathing Water-Resistance Properties (g/s m² Pa)

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Vapor Transmission</td>
<td>ASTM E96</td>
<td>&lt; 0.6 Perm</td>
</tr>
</tbody>
</table>

5.4 Air Barrier

5.4.1 Thermo-Sheath (Green) Structural Sheathing may be used as an air barrier material as prescribed in IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and C402.5.1.

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10. 2015 IBC Section 1403.2

11. 2012 IECC Section C402.4.1
5.4.2 When used as part of a continuous air barrier assembly, Thermo-Sheath (Green) Structural Sheathing shall be installed in accordance with Section 6. When installed as part of a continuous air barrier in a non structural capacity, the fasteners used to attach the board may be installed in accordance with Section 5.5.

5.4.3 All sheathing panel edges at the top and bottom of the wall assemblies shall be sealed in accordance with IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and C402.5.112. All joints between sheathing panels shall be overlapped \(\frac{3}{4}''\) (19 mm) or covered by minimum 1.5'' (38 mm) wide DRYline® Sheathing Tape or equivalent.

5.4.4 Thermo-Sheath (Green) Structural Sheathing is qualified as an air barrier material as shown in Table 10.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Barrier Material Properties</td>
<td>ASTM E2178</td>
<td>&lt; 0.02 perm</td>
</tr>
</tbody>
</table>

1. The Air Barrier Association of America defines an air barrier as a material with a permeance of less than 0.02 \(L/(s\cdot m^2)\) @ 75 Pa.

5.5 Non-Structural Applications

5.5.1 Where other means of wall bracing are provided, or are not required, and an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing, Thermo-Sheath (Green) Structural Sheathing may be used.

5.5.2 The sheathing panels are applied to wall framing with minimum 0.120'' x 1¼'' (3 mm x 32 mm) galvanized roofing nails or 16 ga galvanized staples having a 7/16'' (11 mm) crown and 1¼'' (32 mm) leg lengths.

5.5.3 Fastener spacing shall be a maximum of 6'' (152 mm) at the edges and 12'' (305 mm) on intermediate members.

5.5.4 Stud spacing shall be a maximum of 24'' (610 mm) o.c.

5.5.5 Minimum fastener penetration into the framing members is \(\frac{3}{4}''\) (19 mm).

6 INSTALLATION

6.1 Installation shall comply with the manufacturer’s installation instructions and this TER. In the event of a conflict between the manufacturer’s installation instructions and this TER, the more restrictive shall govern.

6.2 Installation Procedure

6.2.1 General

6.2.1.1 A copy of the manufacturer’s published installation instructions shall be available at all times on the jobsite during installation.

6.2.1.2 Where required, gypsum wallboard shall be a minimum \(\frac{1}{2}''\) (13 mm) thickness.

6.2.2 Orientation

6.2.2.1 Thermo-Sheath (Green) Structural Sheathing must be installed vertically or horizontally with all panel edges supported by framing or blocking.

6.2.2.2 Thermo-Sheath (Green) Structural Sheathing must be installed over studs, with framing that has a nominal thickness of not less than 2'' (51 mm) and spaced a maximum of 16'' (610 mm) o.c.

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12 2012 IECC Section C402.4.1
6.2.3  Fastener Type

6.2.3.1  Thermo-Sheath (Green) Structural Sheathing:

6.2.3.1.1  Minimum 15/16” crown x 1¼” leg, 16 gauge galvanized staples installed with the underside of the crown flush with the surface of the sheathing.

6.2.3.1.2  Minimum 0.120” x 1¼” (3 mm x 32 mm) galvanized roofing nail installed with the underside of the head flush with the surface of the sheathing.

6.2.3.2  Gypsum Wallboard:

6.2.3.2.1  Where required, gypsum wallboard shall be installed with a minimum:

   6.2.3.2.1.1  #6 x 1¼” (32 mm) Type W or S screws
   6.2.3.2.1.2  5d cooler nails

6.2.4  Fastener Spacing

6.2.4.1  Thermo-Sheath (Green) Structural Sheathing:

6.2.4.1.1  Maximum of 3” o.c. (76 mm) along the edge and 3” o.c. in the field.

6.2.4.2  Gypsum Wallboard:

6.2.4.2.1  For IRC and IBC prescriptive applications, gypsum fasteners shall be spaced 8” (203 mm) o.c. at panel edges and 8” o.c. at intermediated framing. For engineered design, see Table 5.

6.2.5  Fastener Edge Distance

6.2.5.1  Fastener edge distance is a minimum of ⅜” (10 mm) for both Thermo-Sheath (Green) Structural Sheathing and gypsum.

6.2.5.2  Always fasten staples parallel to the framing member.

6.2.6  Treatment of Joints

6.2.6.1  Thermo-Sheath (Green) Structural Sheathing joints shall be lapped ¾” (19 mm) with a single row of fasteners along each framing member.

6.2.6.1.1  Alternately, joints may be butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.

6.2.6.2  Do not tack Thermo-Sheath (Green) Structural Sheathing to framing, but fasten each panel completely once fastening begins.

6.2.7  Window Treatments

6.2.7.1  If windows are made to accommodate traditional ½” (13 mm) sheathing materials, order windows with adjustable nailing fins from the supplier. Door brick moldings may be planed or routed ⅜” (10 mm), in order to accommodate the different sheathing thickness, either at the jobsite or by the millwork supplier.

6.2.7.2  Thermo-Sheath (Green) Structural Sheathing must be installed with appropriate flashing and counter flashing in conformance with accepted building standards and in compliance with local building codes and the flashing manufacturer’s installation instructions.
Fastening Schedule:
At each 2x (stud or plate), fasten at 3” o.c. with 15/16” crown x 1-1/4” leg 16 gauge galvanized staple running parallel to the 2x or .120” x 1-1/4” galvanized roofing nail.

If using 3/4” overlap joint, fasten through both sheets with each fastener.

A1↓ B1→ B2↓ C1→ C2↓ D1→ D2↓

A2→ B3→ C3→

2x Frame

FIGURE 5. INSTALLATION INSTRUCTIONS
7 TEST ENGINEERING SUBSTANTIATING DATA

7.1 Lateral load testing by SBCRI, based on ASTM E2126
7.2 Transverse load testing by SBCRI, based on ASTM E330
7.3 Water-resistive barrier testing by PEI
7.4 Water vapor transmission testing by Intertek based on ASTM E96
7.5 Air barrier material testing by ATI, based on ASTM E2178
7.6 Thermo-Sheath 12" PFH and 24" PFH Braced Wall Panel Testing in a 23' wall using a PFH Double Portal Frame Under Laterally Applied Cyclic Loading, conducted by SBCRI, based on ASTM E2126.
7.7 Comparison Braced Wall Panel testing using Method WSP with ¾" OSB. Multiple tests conducted using ASTM E2126 cyclic loading protocols and ASTM E564 for Monotonic testing. Multiple tests conducted providing continued confirmation of the capacity of ¾" OSB performance in a braced wall line. Testing conducted by SBCRI.
7.8 Some information contained herein is the result of testing and/or data analysis by other sources which conform to IBC Section 1703 and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
7.9 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 Lateral load resistance due to wind and seismic loads carried by shear walls.
8.1.2 Use as an equivalent alternative to Method PFH as described in IRC Section R602.10.6.2.
8.1.3 Transverse load resistance due to components and cladding pressures on building surfaces.
8.1.4 Performance for use as a WRB in accordance with IBC Section 1403.2 and IRC Section R703.2.
8.1.5 Performance for use as an air barrier material in accordance with IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and C402.5.1.14.

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.

13 2015 IBC Section 1404.2
14 2012 IECC Section C402.4.1.1
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 Thermo-Sheath (Green) Structural Sheathing shall not be used as a nailing base.

9.2 Walls sheathed with Thermo-Sheath (Green) Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.

9.3 When Thermo-Sheath (Green) Structural Sheathing is not installed for use as wall bracing, as described in this TER, the walls shall be braced by other materials, in accordance with the applicable code.

9.4 When used as a WRB, Thermo-Sheath (Green) Structural Sheathing seams shall be overlapped ¾" (19 mm) or covered with minimum 1.5" (38 mm) wide DRYline® Sheathing Tape or equivalent.

9.5 When used as part of a continuous air barrier assembly, all sheathing panel edges at the top and bottom of the wall assemblies, and all joints between sheathing panels, shall be sealed in accordance with IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and C402.5.1.115.

9.6 When used in accordance with the IBC in Seismic Design Categories C, D, E or F, special inspections shall comply with IBC Section 1705.1216.

9.7 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.1117.

9.8 Loads applied shall not exceed those recommended by the manufacturer as follows:

9.8.1 Allowable shear loads do not exceed values in Table 5 for wind loads and Table 6 for seismic loads.

9.8.2 Transverse design loads shall not exceed those described in Table 7, unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.

9.9 The manufacturer’s installation instructions shall be available on the jobsite for inspection.

9.10 All panel edges shall be supported by wall framing or solid blocking a minimum of 2" (51 mm) nominal in thickness.

9.11 Thermo-Sheath (Green) Structural Sheathing is manufactured in Constantine, MI, under a quality control program with quality control inspections in accordance with IBC Sections 110.3.918 and 110.4 and IRC Section R109.2.

9.12 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.

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

9.14 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).

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

9.16 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.

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15 2012 IECC Section C402.4.1
16 2012 IBC Section 1705.11
17 2012 IBC Section 1705.10
18 2015 IBC Section 110.3.8
9.17 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.

9.18 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 fibreconverters.com or nationalshelter.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.