Technical Evaluation Report
TER 1701-03
Atlas ThermalStar One

Atlas Molded Products, a Division of Atlas Roofing

Product:
Atlas ThermalStar One

Issue Date:
April 18, 2017
Revision Date:
July 22, 2019
Subject to Renewal:
July 1, 2020
COMPANY INFORMATION:

Atlas Molded Products, a Division of Atlas Roofing
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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 21 00 - Thermal Insulation
SECTION: 07 25 00 - Water-Resistive Barriers/Weather Barriers
SECTION: 07 27 00 - Air Barriers

1 PRODUCT EVALUATED
1.1 Atlas ThermalStar One

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®

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.
2.1.3 IECC—12, 15, 18: International Energy Conservation Code®

2.2 Standards and Referenced Documents

2.2.1 AISI S213: North American Standard for Cold-Formed Steel Framing - Lateral Design
2.2.2 ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic
2.2.3 ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
2.2.5 ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
2.2.6 ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environment Chamber
2.2.7 ASTM E2178: Standard Test Method for Air Permeance of Building Materials
2.2.8 ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings
2.2.9 ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
2.2.10 ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials
2.2.11 ASTM G21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

3 PERFORMANCE EVALUATION

3.1 ThermalStar One was evaluated to determine the following:

3.1.1 Structural performance under lateral load conditions for use as an alternative to the IRC bracing methods using wood structural panels (WSP), including portal frames in accordance with IRC Section R602.10 and R602.12.

3.1.2 Structural performance under lateral load conditions for use as an alternative to the IBC Conventional Wall Bracing provisions, Section 2308.6, for Type V construction and the alternative bracing methods in accordance with Section 2308.6.5 and 2308.6.5.1.

3.1.3 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.

3.1.4 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with IBC Section 1609.1.1, 2304.6.1, and 2304.10.6 and IRC Section R301.2.1 and R602.37.

3.1.5 Uplift performance in accordance with IBC Section 1604.9 and IRC Section R602.3.5.

3.1.6 Performance for use as foam plastic insulation in accordance with the IBC Section 2603 and IRC Section R316.

3.1.7 Performance for use as insulated sheathing in accordance with the IECC Section R402.1.

3.1.8 Performance for use as an air barrier in accordance with the IECC Section R402.4.1.1.

3.2 Performance for use as a water-resistive barrier (WRB) in accordance with the IBC Section 1404.2 and IRC Section R703.2.

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

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

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4 2012 IBC Section 2308.9.3
5 2012 IBC Section 2308.9.3.1
6 2012 IBC Section 2308.9.3.2
7 2015 IRC Section R602.3 features updated table specifications for fasteners and fastener spacing and location.
4 PRODUCT DESCRIPTION AND MATERIALS

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

![Figure 1. THERMALSTAR ONE](image)

OSB is installed directly against the studs, which provides code prescriptive structural capacity

Second polymeric layer, serving as an additional layer of protection against moisture and eliminates traditional foam fastener penetrations

Polymeric film facer, fully tested and qualified as a water resistant barrier when seams are taped. No need to tape nail holes.

Durable expanded polystyrene core provides continuous exterior insulation, with a stable, long-term R-value

4.2 ThermalStar One is an insulated structural sheathing product with a polymeric film facer on both sides of either a gray graphite enhanced expanded polystyrene (EPS) rigid foam core or a durable orange or white EPS core, and an OSB facer on one side. The OSB side of ThermalStar One faces inward with the EPS on the exterior side. Standard features include:

4.2.1 11/16", 11/16", or 19/16" gray graphite enhanced EPS, laminated to a 7/16" Exposure I 24/16 rated OSB, for total thicknesses of 11/8" (R3), 11/2" (R5), and 2" (R7.5). Where 3/8" Exposure I 24/16 rated OSB is used, the total thickness decreases by 1/16".

4.2.2 3/4", 13/16", or 113/16" Orange or White EPS, laminated to a 7/16" Exposure I 24/16 rated OSB, for total thicknesses of 13/16" (R3), 15/8" (R5), and 21/4" (R7.5). Where 3/8" Exposure I 24/16 rated OSB is used, the total thickness decreases by 1/16".

4.2.3 Meets IRC and IECC requirements for continuous insulation.

4.2.4 Marked for fastener spacing.

4.3 When installed over wood framing, ThermalStar One is installed with a patent pending SENCO nailer. This nailer and the specified SENCO nails ensure that the sheathing nails are secured with the head seated on the surface of the OSB. STANDARD NAILERS MAY NOT BE USED FOR INSTALLATION OF ThermalStar One. Consult with ATLAS MOLDED PRODUCTS for other approved models.

4.4 Material Availability

4.4.1 ThermalStar One total thickness: Gray – 2", 11/2", and 11/8"; Orange or White – 2¼", 15/8", and 13/16"

4.4.2 Standard product width: 48"

4.4.3 Standard lengths: 96", 108", and 120"

5 APPLICATIONS

5.1 Bracing requirements for ThermalStar One are the same as the prescriptive bracing in the codes for WSP. Information in this report for structural and wind resistance is as found in the IBC and IRC.

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8 Figure is representative of the durable orange EPS core. ThermalStar One may also feature a gray or white EPS core.
5.2 General

5.2.1 ThermalStar One is a structural insulated sheathing product for use in conventional light-frame wood construction, braced wall panels within braced wall lines, and continuously sheathed braced wall lines. This product is used in structures complying with the IRC and in buildings of Type V construction per the IBC.

5.2.2 ThermalStar One is used as structural wall sheathing to provide resistance to transverse loads for wall assemblies used in wood construction in accordance with IBC Section 1609.1.1, 2304.6.1, and 2304.10.6 and IRC Section R301.2.1 and R602.3.9.

5.2.3 ThermalStar One is used as continuous insulation in accordance with IRC Section N1102 and IECC Section R402.1.

5.2.4 ThermalStar One contains foam plastics complying with IBC Section 2603 and IRC Section 316.

5.2.5 ThermalStar One contains OSB rated 24/16 Exposure 1 complying with PS 2 manufactured in accordance with IRC Section R604.

5.2.6 When ThermalStar One is installed as an approved WRB in accordance with IBC Section 1404.2 and IRC Section R703.2, all joints must be taped using ThermalStar 007, 3M 8777, or 3M 8067 tape, or equivalent.

5.2.7 When ThermalStar One is installed as an approved air barrier component in accordance with IECC Section R402.4.1.1, all joints and seams must be sealed including top and bottom edges of panels using ThermalStar 007 tape or equivalent.

5.2.8 ThermalStar One is a Class II vapor retarder, when tested in accordance with ASTM E96 Section 11 (dry cup) and 12 (wet cup), and shall be installed in accordance with IRC Section R702.7.1. ThermalStar One has a permeance ranging from 0.2 to 0.3 (wet cup), dependent on the permeance of the polymer film layers. ThermalStar One product should be selected based on the climate zone and framing, in accordance with IRC Table R702.7.1, to assure necessary condensation control. Depending on the application and internal vapor retarder selection, additional continuous insulation over ThermalStar One may be required.

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

5.3 Structural Applications

5.3.1 General Wall Bracing Provisions:

5.3.1.1 Except as otherwise described in this TER, ThermalStar One 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 WSP.

5.3.1.1.1 ThermalStar One 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.

5.3.1.1.2 ThermalStar One is permitted to be designed in accordance with AISI S213 for the design of cold-formed steel framed shear walls.

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

5.3.1.2.1 For wind design, anchor bolt spacing shall not exceed 6’ o.c.

5.3.1.2.2 For seismic design, anchor bolt spacing shall not exceed 4’ o.c.

5.3.1.3 The maximum aspect ratio for ThermalStar One on wood framing shall be 3.5:1.

5.3.1.4 The maximum aspect ratio for ThermalStar One on cold-formed steel framing shall be in accordance with Table 3 and Table 4.

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9 2015 IRC Section R602.3 features updated table specifications for fasteners and fastener spacing and location.

10 2015 IRC Table R702.7.1 calls for continuous insulation instead of insulated sheathing.
5.3.1.5 The minimum full height panel width shall be 24".

5.3.1.6 **Additional Provisions for Wood-Framed Shear Walls:**

5.3.1.6.1 All panel edges shall be blocked with a minimum 2" nominal lumber, except where noted in Section 6.

5.3.1.6.2 Only approved nail guns modified for proper installation of ThermalStar One shall be used to install ThermalStar One.

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

5.3.1.6.4 Where ThermalStar One is installed with ¼" gypsum wallboard on the interior side of the wall, the gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 type W or S screws spaced 16" o.c. at panel edges and 16" o.c. in the field of the panels.

5.3.2 **Prescriptive IRC Bracing Applications:**

5.3.2.1 ThermalStar One may be used on braced wall lines as an equivalent alternative to any method utilizing wood structural panels listed in the IRC for wind or seismic when installed in accordance with IRC Section R602.10, Section R603.9 and this TER.

5.3.2.2 For wood framing, required braced wall panel lengths for ThermalStar One shall be as determined by IRC Table R602.10.3(1) and R602.10.3(3), including all footnotes and as summarized in Table 1 and Table 2.

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

5.3.2.2.2 Bracing lengths are the result of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in Section 2 that are adopted into law and upheld by the manufacturers of those products. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.

5.3.2.3 For steel framing, required braced wall panel lengths for ThermalStar One shall be as determined by IRC Table R603.9.2(1) and R603.9.2(2), including all footnotes. For Seismic Design Category C where walls are supporting one story, roof and ceiling, see IRC Section R603.9.5.1. For steel framed walls supporting walls with stone or masonry veneer in Seismic Design Categories, D0, D1, or D2, see IRC Table R603.9.5(1), R603.9.5(2), R603.9.5(3), or R603.9.5(4), as applicable.

11 2009 IRC Table R602.10.1.2(1) and R602.10.1.2(2), 2015 IRC Table R602.10.3(1) and (3) feature updated ultimate design wind speeds and exposure category specifications.
### Table 1. Required IRC Bracing Lengths for ThermalStar One for Lateral Wind Loads

<table>
<thead>
<tr>
<th>Condition</th>
<th>Braced Wall Line Spacing (ft)</th>
<th>Length of Wall Line to be Braced (ft)</th>
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<td>≤ 140 mph</td>
<td>≤ 110 mph</td>
<td>≤ 115 mph</td>
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SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

1. With OSB (Method WSP) and a maximum 24" stud spacing
2. Sheathing must be installed with nails 6" o.c. on edges and 12" o.c. in the field.
3. Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied. Except when used with method CS-PF, a minimum of 1/2" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1/4" #6 type W or S screws spaced 16" o.c. at panel edges and 16" o.c. in the field of the panels.
4. Demonstrates equivalency to 2009 IRC Table R602.10.1.2(1). All adjustment factors from IRC Table R602.10.1.2(1) shall be applied. Except when used with method CS-PF, a minimum of 1/2" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1/4" #6 type W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
5. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 1.4.
### TABLE 2. REQUIRED IRC BRACING LENGTHS FOR THERMALSTAR ONE FOR LATERAL SEISMIC LOADS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Braced Wall Line Spacing (ft)</th>
<th>Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft)</th>
<th>Intermittent Sheathing</th>
<th>Continuous Sheathing</th>
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</table>

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St: 1" = 25.4 mm
1. With OSB (Method WSP) and a maximum 24” stud spacing
2. Sheathing must be installed with nails 6” o.c. on edges and 12” o.c. in the field.
3. Demonstrates equivalency to **IRC** Table R602.10.3(3).<sup>12</sup> All adjustment factors from **IRC** Table R602.10.3(4)<sup>13</sup> shall be applied. Except when used with method CS-PF, 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 type W or S screws spaced 16” o.c. at panel edges and 16” o.c. in the field of the panels.
4. 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’
5. Linear interpolation is permitted.

5.3.3 **Prescriptive IBC Conventional Light-Frame Wood Construction:**

5.3.3.1 ThermalStar One may be used to brace exterior walls of buildings as an equivalent alternative to the conventional light-frame construction provisions, Method 3, of the **IBC** when installed with ½” gypsum in accordance with **IBC** Section 2308.6<sup>14</sup> and this TER.

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<sup>12</sup> 2009 **IRC** Table R602.10.1.2(2)
<sup>13</sup> 2009 **IRC** Table R602.10.1.2(2)
<sup>14</sup> 2012 **IBC** Section 2308.9.3

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5.3.4 Performance-Based Wood-Framed Construction:

5.3.4.1 ThermalStar One panels used in wall assemblies designed as shear walls are permitted to be designed in accordance with the methodology used in SDPWS for WSP.

5.3.4.2 ThermalStar One panel shear walls are permitted to resist horizontal wind and seismic load forces using the allowable shear loads (in pounds per linear foot) for OSB.

5.3.4.3 ThermalStar One panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) for OSB.

5.3.5 Performance-Based Cold-Formed Steel Construction:

5.3.5.1 ThermalStar One panels used in wall assemblies designed as shear walls are permitted to be designed in accordance with AISI S213.

5.3.5.2 ThermalStar One panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) for OSB.

5.3.5.3 ThermalStar One panel shear walls are permitted to resist lateral wind and seismic load forces using the nominal shear strengths provided in Table 3 and Table 4.

5.3.5.4 Studs shall be C-shape members with a minimum thickness of 33 mils, minimum flange width of 1\(\frac{5}{8}\) inches, minimum web depth of 3½ inches, and minimum edge stiffener of 3/8 inches.

5.3.5.5 Tracks shall be a minimum thickness of 33 mils with a minimum flange width of 1\(\frac{1}{4}\) inches and a minimum web depth of 3½ inches.

### Table 3. Nominal Shear Strength (RN) for In-Plane Wind Loads of Light-Gage Steel Shear Walls with ThermalStar One\(^{2,3,4}\) (PLF)

<table>
<thead>
<tr>
<th>Assembly Description(^1)</th>
<th>Maximum Aspect Ratio (h/w)</th>
<th>Fastener Spacing at Panel Edges (inches)(^{5,6})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>ThermalStar One, oriented parallel to framing</td>
<td>2:1</td>
<td>910</td>
</tr>
<tr>
<td>ThermalStar One, oriented perpendicular to framing</td>
<td>2:1</td>
<td>1020</td>
</tr>
<tr>
<td>ThermalStar One, oriented parallel to framing</td>
<td>2:1(^7)</td>
<td>-</td>
</tr>
</tbody>
</table>

St: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/ft = 0.0146 kN/m

1. Values apply to steel studs and tracks with a minimum design thickness of 33 mils.

2. Nominal strength shall be divided by the safety factor (Ω) to determine allowable strength or multiplied by the resistance factor (φ) to determine the design strength as set forth in AISI S213 Section C2.1.

3. Shear values are permitted for use in seismic design where the seismic response modification factor, R, is taken equal to or less than 3, subject to the limitations in AISI S213 Section C1.1.

4. Tabulated Rn values are applicable for short-term duration loads. For other in-plane lateral loads of permanent or normal load duration as defined by NDS, the Rn values provided in this table shall be multiplied by 0.56 (permanent) or 0.63 (normal).

5. Screws in the field of the panel shall be installed 12” o.c.

6. Screws shall be a minimum #8 countersunk tapping screws with a minimum 0.285” head diameter or #10 countersunk tapping screws with a minimum head diameter 0.333”.

7. Shear wall height to width aspect ratio (h/w) greater than 2:1, but not exceeding 4:1, shall be permitted provided the nominal strength values are multiplied by 2w/h. See AISI S213 Section C2.1.
### Table 4. Nominal Shear Strength (RN) for In-Plane Seismic Loads of Light-Gage Steel Shear Walls with ThermalStar One (PLF)\(^1,2\)

<table>
<thead>
<tr>
<th>Design Thickness of Stud, Track and Blocking(^3) (mils)</th>
<th>Maximum Aspect Ratio (h/w)</th>
<th>Fastener Spacing at Panel Edges(^4) (inches)</th>
<th>Required Sheathing Screw Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>2:1(^5)</td>
<td>700</td>
<td>-</td>
</tr>
<tr>
<td>43 or 54</td>
<td>2:1(^5)</td>
<td>825</td>
<td>1235</td>
</tr>
<tr>
<td>54</td>
<td>2:1</td>
<td>940</td>
<td>1410</td>
</tr>
<tr>
<td>68</td>
<td>2:1</td>
<td>1230</td>
<td>1845</td>
</tr>
</tbody>
</table>

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/ft = 0.0146 kN/m

1. Nominal strength shall be divided by the safety factor (Ω) to determine allowable strength or multiplied by the resistance factor (φ) to determine the design strength as set forth in AISI S213 Section C2.1.
2. Tabulated RN values are applicable for short-term duration loads. For other in-plane lateral loads of permanent or normal load duration as defined by NDS, the RN values provided in this table shall be multiplied by 0.56 (permanent) or 0.63 (normal).
3. Wall studs and track shall be of ASTM A1003 Structural Grade 33 Type H steel for 33 and 43 mil members and A1003 Structural Grade 50 Type H steel for members equal to or greater than 53 mils.
4. Screws in the field of the panel shall be installed 12" o.c.
5. Shear wall height to width aspect ratio (h/w) greater than 2:1, but not exceeding 4:1, shall be permitted provided the nominal strength values are multiplied by 2w/h. See AISI S213 Section C2.1.

### 5.3.6 Transverse Loads:

5.3.6.1 ThermalStar One installed over exterior framing and spaced a maximum of 24" o.c. without an interior covering can resist the wind loads as shown in Table 3. Where panel design is required, use of SDPWS Section 3.2 is permitted. Required components and cladding loads to be resisted are found in IBC Section 1609.1.1 and IRC Table 301.2(2)\(^15\) and 301.2(3).

### Table 5. Basic Wind Speed for ThermalStar One Used in Exterior Wall Covering Assemblies

<table>
<thead>
<tr>
<th>Type of Structural Sheathing</th>
<th>Maximum Stud Spacing (in)</th>
<th>Fastener Size</th>
<th>Minimum Fastener Penetration into the Stud (in)</th>
<th>Allowable Components &amp; Cladding Basic Wind Speed (V_{\text{East}}) per ASCE 7-05 (mph)</th>
<th>Allowable Components &amp; Cladding Basic Wind Speed (V_{\text{East}}) per ASCE 7-10 &amp; ASCE 7-16 (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>ThermalStar One</td>
<td>16 o.c.</td>
<td>0.113&quot; x 2.0&quot;</td>
<td>1.5</td>
<td>110</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.131&quot; x 2.5&quot;</td>
<td>1.75</td>
<td>130</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>24 o.c.</td>
<td>0.131&quot; x 2.5&quot;</td>
<td>1.75</td>
<td>110</td>
<td>90</td>
</tr>
</tbody>
</table>

SI: 1" = 25.4 mm, 1 mph = 1.61 km/h

1. Allowable wind speeds are based on the following: Mean roof height 30', 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration.

### 5.4 Water-Resistive Barrier

5.4.1 ThermalStar One may be used as a WRB as prescribed in IBC Section 1404.2 and IRC Section R703.2 when installed on exterior walls as described in this section.

5.4.2 ThermalStar One shall be installed with board joints placed directly over exterior framing spaced a maximum of 24" o.c. The fasteners used to attach the board shall be installed in accordance Section 6 as applicable.

\(^15\) 2015 IRC Table 301.2(2) features updated table values.
5.4.3 All joints between boards shall be sealed by ThermalStar 007, 3M 8777, or 3M 8067 tape or other approved equivalent.

5.4.4 Where a separate WRB is provided, taping of the sheathing joints is not required.

5.4.5 Flashing of penetrations shall comply with the applicable code and must be installed at all sheathing penetrations. ThermalStar 007, 3M 8777, or 3M 8067 tape or an equivalent adhesive-backed flashing tape shall be employed.

5.5 **International Energy Conservation Code Compliance**

5.5.1 ThermalStar One meets the continuous insulated sheathing requirements complying with the provisions of *IECC* Section R402.

5.5.2 ThermalStar One has thermal resistance as shown in Table 6.

<table>
<thead>
<tr>
<th>Gray Graphite Enhanced Core</th>
<th>Orange or White EPS Core</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thickness</strong> (in)</td>
<td><strong>R-Value</strong> (h·ft²·°F/Btu)</td>
</tr>
<tr>
<td>2&quot; (13/16&quot; EPS + 7/16&quot; OSB)</td>
<td>7.5</td>
</tr>
<tr>
<td>1 1/2&quot; (11/16&quot; EPS + 7/16&quot; OSB)</td>
<td>5.0</td>
</tr>
<tr>
<td>1 1/4&quot; (11/16&quot; EPS + 7/16&quot; OSB)</td>
<td>3.0</td>
</tr>
</tbody>
</table>

SI: 1" = 25.4 mm
1. Tested in accordance with ASTM C518 @ 75°F mean temperature
2. Stated values are for EPS only. Add 0.6 to the listed R-value to include OSB in the total product R-value.
3. Total thickness of all products decreases by 1/16" where 3/8" OSB is used.

5.5.3 ThermalStar One meets the requirements of *IECC* Section C402 for use as a component of the air barrier assembly, when installed in accordance with the manufacturer’s installation instructions and this TER, with all seams, including the top and bottom edges, taped. ThermalStar One complies with *IECC* Section C402.5.1.2.1 materials deemed to comply, since it incorporates 7/16" OSB, which is thicker than the minimum required 3/8" OSB. In addition, the polymer faced foam sheathing portion of ThermalStar One was tested in accordance with ASTM E2178 and meets the requirements for use as an air barrier material in accordance with *IECC* Section C402.5.1.2.1.

5.6 **Fire Resistance Properties Applications**

5.6.1 **Surface Burn Characteristics:**

<table>
<thead>
<tr>
<th>Structural Sheathing</th>
<th>Code Performance</th>
<th>Flame Spread</th>
<th>Smoke Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ThermalStar One</td>
<td>U.S. Codes¹</td>
<td>&lt; 25</td>
<td>&lt; 450</td>
</tr>
<tr>
<td></td>
<td>Canadian Codes²</td>
<td>&lt; 175</td>
<td>&lt; 500</td>
</tr>
</tbody>
</table>

1. Tested in accordance with ASTM E84, foam core only
2. Tested in accordance with CAN ULC S102.2, foam core only

5.7 **Thermal Barrier Requirements – Attic, Crawlspace, or Other Uninhabitable Space Applications**

5.7.1 When installed inside an attic, crawlspace or other uninhabited space, the OSB backing on ThermalStar One qualifies as an approved ignition barrier, and thus may be used without a thermal barrier installed in accordance with *IRC* Section R316.5.3. The following conditions must be observed:

5.7.1.1 Access to the space is required by *IRC* Section R807.1 or R408.4.

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¹²012 IECC Section C402.4.1.2.1
5.7.1.2 Entry is made only for the purposes of repairs or maintenance.

5.7.2 When installed in an attic and the foam is exposed to the interior of the building, such as in a knee wall application, a thermal barrier is not required in accordance with IBC Section 2603.917 and IRC Section R316.5.3 and R316.5.4.

6 INSTALLATION

6.1 General

6.1.1 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.

6.1.2 Always check the installation to ensure fastener heads are seated against the structural OSB backing material to obtain the expected braced wall capacity.

6.1.3 Where required, gypsum wallboard shall be a minimum ½” thickness.

6.2 Orientation

6.2.1 ThermalStar One may be installed vertically or horizontally over wood studs, with framing that has a nominal thickness of not less than 2” and spaced a maximum of 24” o.c.

6.2.2 ThermalStar One may be installed vertically or horizontally over steel studs, spaced a maximum of 24” o.c.

6.2.3 The OSB backing shall be installed with a small gap, about 1/8”, to allow for normal expansion of the OSB. Where used as a braced wall panel or shear wall, all panel edges shall be blocked, except blocking shall not be required on the mid-height horizontal panel edges when installed horizontally and fastening is in accordance with Section 6.4.1.2.

6.3 Fastening

6.3.1 ThermalStar One: Wood Framing

6.3.1.1 ThermalStar One shall be installed using only the SENCO nailers listed in the following sections. The nailer and the specified SENCO nails ensure the nails are secured with the head seated on the surface of the OSB. Standard nailers may not be used for installation of ThermalStar One. Consult with Atlas EPS for other approved models.

6.3.1.2 ThermalStar One R3 and R5 shall be installed with a SENCO model SCN63LDXP nail gun. Use the 3/8” thick R3 spacer when fastening ThermalStar One R3.

6.3.1.3 ThermalStar One R7.5 shall be installed with a SENCO model SCN75LDXP nail gun.

6.3.1.4 ThermalStar One shall be fastened with 0.113” x 23/8” 15° SENCO model GD24APBF or 0.131” x 2½” 15° SENCO model KD25APBF nails.

6.3.1.5 Fasteners shall be a maximum of 6” o.c. along the edge and 12” o.c. in the field, as required for WSP installation per code.

6.3.1.6 When installed horizontally without blocking along the mid-height panel joint, fastener spacing shall be a maximum of 6” o.c. along the edge and 6” o.c. in the field. Additionally, at each location where the horizontal panel crosses a stud, a second fastener shall be installed within 4” of the mid-height panel edges.

6.3.2 ThermalStar One: Steel Framing

6.3.2.1 ThermalStar One shall be installed using minimum #8 countersunk tapping screws with a minimum 0.285” head diameter or #10 countersunk tapping screws with a minimum head diameter 0.333”. Fasteners shall penetrate the stud a minimum of 3 threads.

6.3.2.2 Fastener spacing shall be in accordance with Table 2 and Table 3, as applicable.

6.3.3 Gypsum Wallboard:

17 2012 IBC Section 2603.10
6.3.3.1 Where required, gypsum wallboard shall be installed with a minimum:
   6.3.3.1.1 #6 x 1¼” Type W or S screws
   6.3.3.1.2 5d cooler nails

6.3.4 Gypsum Wallboard:
   6.3.4.1 Nails – 16" or 24" o.c. framing; maximum of 8" o.c. at panel edges and 8" o.c. in the field
   6.3.4.2 Screws – 16" o.c. framing; maximum of 16" o.c. at panel edges and 16" o.c. in the field
   6.3.4.3 Screws – 24" o.c. framing; maximum of 12" o.c. at panel edges and 12" o.c. in the field

6.4 Fastener Edge Distance
   6.4.1 Fastener edge distance is a minimum of 3/8" for ThermalStar One and gypsum.
   6.4.2 Fastener installation must be periodically inspected to ensure complete penetration to studs and seating of fastener head to OSB.

6.5 Treatment of Joints
   6.5.1 ThermalStar One sheathing joints must be butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.

6.6 Window Treatments
   6.6.1 ThermalStar One 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.
   6.6.2 Where the application exceeds the limitations set forth herein, design shall be performed in accordance with accepted engineering practice.

7 TEST ENGINEERING SUBSTANTIATING DATA
   7.1 Single panel lateral wall research and development testing conducted by SBCRI for lateral loading equivalency of ThermalStar One to OSB in accordance with ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings, where applicable.
   7.2 Tests on ThermalStar Joint Tape for use with ThermalStar One when used as a water-resistive barrier conducted by RADCO and by NTA.
   7.3 Water vapor permeance testing in accordance with ASTM E96 conducted by Intertek.
   7.4 Air permeance testing in accordance with ASTM E2178: Standard Test Method for Air Permeance of Building Materials conducted by QAI Laboratories.
   7.6 Surface burning characteristics performed in accordance with ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials conducted by Intertek, and CAN UL S102.2: Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies conducted by UL. See also UL BRYX.R16529 listing.
   7.7 Physical property testing of foam sheathing component in accordance with ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation conducted by Underwriters Laboratories.
   7.9 Physical properties testing, in accordance with ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation, conducted by BASF.
7.10 ThermalStar One Quality Control Manual in accordance with a third-party quality control program with inspections conducted by an approved agency.

7.11 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.

7.12 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 in accordance with the IBC performance-based provisions, Section 2306.1 and 2306.3 for light-frame wood wall assemblies.

8.1.2 Use as an equivalent alternative to any of the bracing methods using WSP as described in IRC Section R602.10.

8.1.3 Transverse load resistance due to components and cladding pressures on building surfaces in accordance with IBC Section 1609.1.1, 2304.6.1, and 2304.10.618 and IRC Section R301.2.1 and R602.3.19

8.1.4 Performance of the foam plastic component of ThermalStar One for conformance to IBC Section 2603 and IRC Section R402.

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

18 2012 IBC Section 2304.9.6

19 2015 IRC Section R602.3 features updated table specifications for fasteners and fastener spacing and location.
9 CONDITIONS OF USE

9.1 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.

9.2 ThermalStar One described in this TER complies with, or is a suitable alternative to, the applicable sections of the IBC, IRC, and IECC listed in Section 2 of this TER and are subject to the following conditions:

9.2.1 Walls sheathed with ThermalStar One shall not be used to resist horizontal loads from concrete and masonry walls.

9.2.2 When ThermalStar One is not installed for use as wall bracing, as described in this TER, the stud walls shall be braced by other materials, in accordance with the applicable code.

9.2.3 When used as a WRB, ThermalStar One seams shall be taped with ThermalStar 007, 3M 8777, or 3M 8067 tape or equivalent.

9.2.4 When used as an air barrier component, all ThermalStar One panel edges, including top and bottom edges, shall be sealed with ThermalStar 007, 3M 8777, or 3M 8067 tape or equivalent.

9.2.5 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.11.20

9.2.6 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.

9.2.7 The manufacturer’s installation instructions shall be shipped to the jobsite with the materials or otherwise be available on the jobsite for inspection.

9.2.8 Where used as wall bracing or as part of a shear wall, all panel edges shall be supported by wall framing or solid blocking a minimum of 2" nominal in thickness.

9.2.9 The foam core of ThermalStar One is manufactured in Byron Center, MI; Tijuana, Mexico; Martinsville, VA; or Perryville, MO, under a quality control program with quality control inspections in accordance with IBC Section 110.3.8 and 110.4 and IRC Section R109.2.

9.3 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.

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

9.5 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).

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

9.7 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.

9.8 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.

9.9 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.

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20 2009 IBC Section 1705.4, 2012 IBC Section 1705.10
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 atlasmoldedproducts.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.