DrJ™ CERTIFICATION

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17065 PRODUCT CERTIFICATION BODY

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

Approved. Sealed. Code Compliant.

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:

December 31, 2020

Subject to Renewal:

December 31, 2020

LEGACY

COMPANY INFORMATION:

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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

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1 PRODUCT EVALUATED[1]

1.1 Atlas® ThermalStar® One™

2 APPLICABLE CODES AND STANDARDS[2,3]

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®*

2.2 *Standards and Referenced Documents*

2.2.1 *AISI S213: North American Standard for Cold-Formed Steel Framing - Lateral Design*

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[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 ANAB-Accredited Product Certification Body – Accreditation #1131.

Through ANAB 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.

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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*

2.2.4 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*

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*

2.2.12 *DOC PS 2: Performance Standard for Wood-based Structural-use Panels*

3 PERFORMANCE EVALUATION

3.1 ThermalStar® One™ was evaluated to determine the following:

3.1.1 Structural performance under lateral load conditions (wind and seismic) for use as an alternative to the intermittent wall bracing methods of *IRC* Section R602.10 Method WSP (wood structural panel) and the continuous wall bracing provisions of *IRC* Section R602.10.4 Method CS-WSP (continuously sheathed wood structural panel) and Method CS-PF (continuously sheathed portal frame).

3.1.2 Structural performance under lateral load conditions for use as an alternative to the simplified bracing method of *IRC* Section R602.12.

3.1.3 Structural performance under lateral load conditions for use as an alternative to the conventional wall bracing provisions of *IBC* Section 2308.6[4] Method WSP for Type V construction and the alternative bracing methods provisions of Section 2308.6.5[5] and 2308.6.5.1[6] Method ABW (alternate braced wall).

3.1.4 Structural performance under lateral load conditions (wind and seismic) for use with the *IBC* performance-based provisions, *IBC* Section 2306.1 and Section 2306.3 for light-frame wood wall assemblies.

3.1.5 Structural performance under lateral load conditions (wind and seismic) for use with the *IBC* performance-based provisions, *IBC* Section 2211, for light-frame steel wall assemblies.

3.1.6 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with *IBC* Section 1609.1.1, Section 2304.6.1, and Section 2304.10.6 and *IRC* Section R301.2.1 and Section R602.3.[7]

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

3.1.8 Performance for use as *insulating sheathing* in accordance with *IRC* Section N1102.1 and *IECC* Section R402.1.

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

3.1.10 Performance for use as an air barrier in accordance with *IRC* Section N1102.4.1.1 and *IECC* Section R402.4.1.1.

[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.

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3.1.11 Performance of surface burn characteristics in accordance with *IBC* Section 2603.3.

3.1.12 Resistance to mold and fungi growth.

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

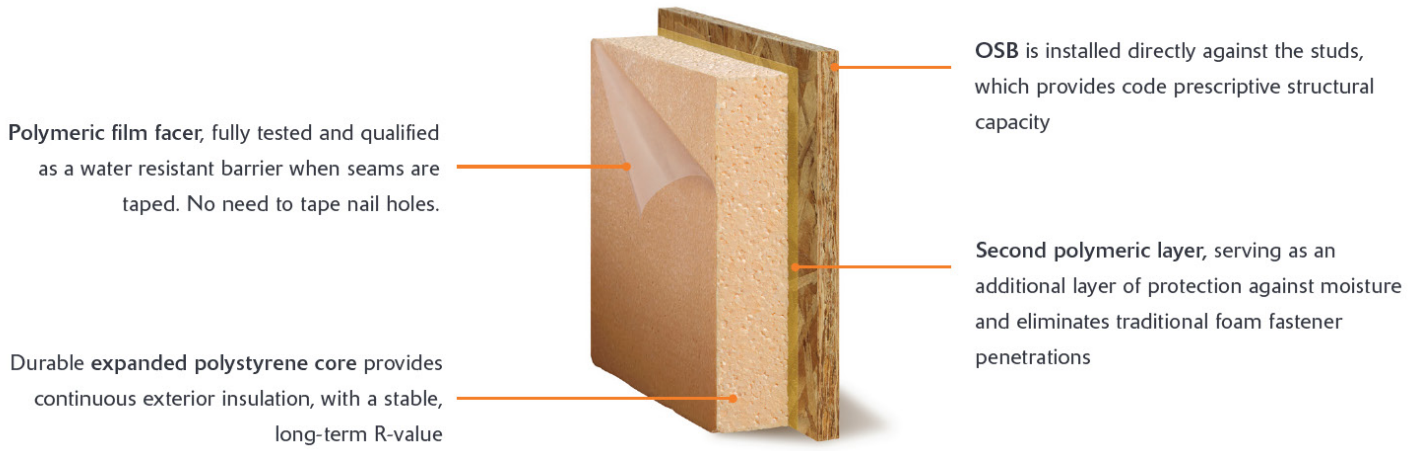


Figure 1. ThermalStar® One™ [8]

4.2 ThermalStar® One™ is an insulated structural sheathing product with a polymeric film facer on both sides of a durable orange or white expanded polystyrene (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 $^{3}/_{4}$", $1^{3}/_{16}$", or $1^{13}/_{16}$" Orange or White EPS, laminated to a $^{7}/_{16}$" Exposure I 24/16 rated OSB, for total thicknesses of $1^{3}/_{16}$" (R3), $1^{5}/_{8}$" (R5), and $2^{1}/_{4}$" (R7.5). Where $^{3}/_{8}$" Exposure 1 24/16 rated OSB is used, the total thickness decreases by $^{1}/_{16}$".

4.2.2 OSB rated 24/16 Exposure 1 complies with *DOC PS 2* and is manufactured in accordance with *IRC* Section R604.

4.2.3 EPS complies with *ASTM C578* in accordance with *IBC* Section 2603 and *IRC* Section R316.

4.2.4 Meets *IRC* and *IECC* requirements for continuous insulation.

4.2.5 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: 2¼", $1^{5}/_{8}$", and $1^{3}/_{16}$"

4.4.2 Standard product width: 48"

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

[8] Figure is representative of the durable orange EPS core. ThermalStar® One™ may also feature a white EPS core.

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5 APPLICATIONS

5.1 ThermalStar® One™ is used in the following applications:

5.1.1 Wall sheathing in buildings constructed in accordance with the *IBC* and *IRC* for light-frame wood and steel construction.

5.1.2 Structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame construction.

5.1.3 Wall sheathing in buildings constructed in accordance with the *IBC* requirements for Type V light-frame construction.

5.1.4 Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light-frame wood construction.

5.2 When ThermalStar® One™ is installed with an approved construction tape or sheathing seams, it is an approved WRB in accordance with *IBC* Section 1403.2[9] and *IRC* Section R703.2.

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

5.4 *Structural Applications*

5.4.1 *General Wall Bracing Provisions:*

5.4.1.1 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.

5.4.1.1.1 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.

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

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

5.4.1.2.1 For wind design, anchor bolt spacing shall not exceed 6' o.c.

5.4.1.2.2 For seismic design, anchor bolt spacing shall not exceed 4' o.c.

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

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

5.4.1.5 The minimum full height panel width shall be 24".

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

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

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

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

5.4.1.6.4 Where ThermalStar® One™ is installed with ½" 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.

[9] 2015 *IBC* Section 1404.2

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5.4.2 *Prescriptive IRC Bracing Applications:*

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

5.4.2.2 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*.

5.4.2.3 For wood framing, required braced wall panel lengths for ThermalStar® One™ shall be as determined by *IRC* Table R602.10.3(1) and Table R602.10.3(3),[10] including all footnotes and as summarized in Table 1 and Table 2.

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

5.4.2.4 For steel framing, required braced wall panel lengths for ThermalStar® One™ shall be as determined by *IRC* Table R603.9.2(1) and Table 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, D_0, D_1, or D_2, see *IRC* Table R603.9.5(1), Table R603.9.5(2), Table R603.9.5(3), or Table R603.9.5(4) as applicable.

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[10] 2015 *IRC* Table R602.10.3(1) and Table R602.10.3(3) feature updated ultimate design wind speeds and exposure category specifications.

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TABLE 1. REQUIRED BRACING LENGTHS FOR THERMALSTAR® ONE™ – WIND[1]

Condition	Braced Wall Line Spacing (ft)	Length of Wall Line to be Braced (ft)									
		Intermittent Sheathing[2]					Continuous Sheathing[2]				
		Wind Speeds (mph)									
		≤110	≤ 115	≤ 120	≤ 130	≤ 140	≤ 110	≤ 115	≤ 120	≤ 130	≤ 140
One Story or Top of Two Stories or Top of Three Stories	10	2.0	2.0	2.5	2.5	3.0	1.5	2.0	2.0	2.5	2.5
	20	3.5	3.5	4.0	5.0	5.5	3.0	3.5	3.5	4.0	5.0
	30	5.0	5.5	6.0	7.0	8.0	4.5	4.5	5.0	6.0	7.0
	40	6.5	7.0	8.0	9.0	10.5	5.5	6.0	6.5	7.5	9.0
	50	8.0	9.0	9.5	11.0	13.0	7.0	7.5	8.0	9.5	11.0
	60	9.5	10.5	11.5	13.0	15.0	8.0	9.0	9.5	11.0	13.0
First Story of Two Stories or Second Story of Three Stories	10	3.5	4.0	4.5	5.0	6.0	3.0	3.5	3.5	4.5	5.0
	20	6.5	7.5	8.0	9.5	11.0	5.5	6.5	7.0	8.0	9.0
	30	9.5	10.5	11.5	13.5	15.5	8.0	9.0	9.5	11.5	13.0
	40	12.5	13.5	15.0	17.5	20.0	10.5	11.5	12.5	15.0	17.0
	50	15.5	16.5	18.0	21.5	24.5	13.0	14.0	15.5	18.0	21.0
	60	18.0	20.0	21.5	25.0	29.0	15.5	17.0	18.5	21.5	25.0
First Story of Three Stories	10	5.5	6.0	6.5	7.5	8.5	4.5	5.0	5.5	6.5	7.5
	20	10.0	11.0	11.5	13.5	16.0	8.5	9.0	10.0	11.5	13.5
	30	14.0	15.5	17.0	19.5	23.0	12.0	13.0	14.5	17.0	19.5
	40	18.5	20.0	22.0	25.5	29.5	15.5	17.0	18.5	22.0	25.0
	50	22.5	24.5	27.0	31.5	36.5	19.0	21.0	23.0	26.5	31.0
	60	26.5	29.0	32.0	37.5	43.0	23.0	25.0	27.0	31.5	36.5

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 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. 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.

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TABLE 2. REQUIRED BRACING LENGTHS FOR THERMALSTAR® ONE™ – SEISMIC[1]

Condition	Braced Wall Line Spacing (ft)	Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft)							
		Intermittent Sheathing[2]				Continuous Sheathing[2]			
		Seismic Design Category (SDC)							
		C	D_0	D_1	D_2	C	D_0	D_1	D_2
One Story or Top of Two Stories or Top of Three Stories	10	1.6	1.8	2.0	2.5	1.4	1.6	1.7	2.1
	20	3.2	3.6	4.0	5.0	2.7	3.1	3.4	4.3
	30	4.8	5.4	6.0	7.5	4.1	4.6	5.1	6.4
	40	6.4	7.2	8.0	10.0	5.4	6.1	6.8	8.5
	50	8.0	9.0	10.0	12.5	6.8	7.7	8.5	10.6
First Story of Two Stories or Second Story of Three Stories	10	3.0	3.8	4.5	5.5	2.6	3.2	3.8	4.7
	20	6.0	7.5	9.0	11.0	5.1	6.4	7.7	9.4
	30	9.0	11.3	13.5	16.5	7.7	9.6	11.5	14.0
	40	12.0	15.0	18.0	22.0	10.2	12.8	15.3	18.7
	50	15.0	18.8	22.5	27.5	12.8	16.0	19.1	23.4
First Story of Three Stories	10	4.5	5.3	6.0	NP	3.8	4.5	5.1	NP
	20	9.0	10.5	12.0	NP	7.7	9.0	10.2	NP
	30	13.5	15.8	18.0	NP	11.5	13.4	15.3	NP
	40	18.0	21.0	24.0	NP	15.3	17.9	20.4	NP
	50	22.5	26.3	30.0	NP	19.1	22.3	25.5	NP

SI: 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). All adjustment factors from *IRC* Table R602.10.3(4) 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.

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

5.4.3.1 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[11] and this TER.

5.4.4 *Performance-Based Wood-Framed Construction:*

5.4.4.1 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.

5.4.4.2 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.

[11] 2012 *IBC* Section 2308.9.3

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

5.4.5 *Performance-Based Cold-Formed Steel Construction:*

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

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

5.4.5.3 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.

5.4.5.4 Studs shall be C-shape members with a minimum thickness of 33 mils, minimum flange width of $1^{5}/_{8}$ inches, minimum web depth of 3½ inches, and minimum edge stiffener of $^{3}/_{8}$ inches.

5.4.5.5 Tracks shall be a minimum thickness of 33 mils with a minimum flange width of $1^{1}/_{4}$ inches and a minimum web depth of 3½ inches.

TABLE 3. NOMINAL SHEAR STRENGTH OF LIGHT-GAGE STEEL SHEAR WALLS WITH THERMALSTAR® ONE™ – WIND[2,3,4]

Assembly Description[1]	Maximum Aspect Ratio (h/w)	Nominal Shear Strength, R_N (plf)			
		Fastener Spacing at Panel Edges (in)[5,6]			
		6	4	3	2
ThermalStar® One™, oriented parallel to framing	2:1	910	1410	1735	1910
ThermalStar® One™, oriented perpendicular to framing	2:1	1020	-	-	-
ThermalStar® One™, oriented parallel to framing	2:1(7)	-	1025	1425	1825

SI: 1 in = 25.4 mm, 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 R_N 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 R_N 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.

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TABLE 4. NOMINAL SHEAR STRENGTH OF LIGHT-GAGE STEEL SHEAR WALLS WITH THERMALSTAR® ONE™ – SEISMIC[1,2]

Product	Design Thickness of Stud, Track, and Blocking[3] (mils)	Maximum Aspect Ratio (h/w)	Required Sheathing Screw Size	Nominal Shear Strength, R_N (plf)			
				Fastener Spacing at Panel Edges[4] (inches)			
				6	4	3	2
ThermalStar® One™	33	2:1[(5)]	#8	700	915	-	-
	43 or 54	2:1[(5)]	#8	825	1235	1545	2060
	54	2:1	#8	940	1410	1760	2350
	68	2:1	#10	1230	1845	2310	3080

SI: 1 in = 25.4 mm, 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 R_N 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 R_N 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 *ASTM 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.

5.4.6 *Transverse Loads:*

5.4.6.1 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 5. 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 R301.2(2)[12] and Table 301.2(3).

TABLE 5. BASIC WIND SPEED FOR USE IN EXTERIOR WALL COVERING ASSEMBLIES

Product	Maximum Stud Spacing (in)	Fastener Size	Minimum Fastener Penetration into the Stud (in)	Allowable Components & Cladding Basic Wind Speed (mph)					
				ASCE 7-05 (V_{asd})			*ASCE 7-10* and *7-16* (V_{ult})		
				Wind Exposure Category					
				B	C	D	B	C	D
ThermalStar® One™	16 o.c.	0.113" x 2.0"	1.5	110	100	90	139	126	114
		0.131" x 2.5"	1.75	130	110	105	164	139	133
	24 o.c.	0.131" x 2.5"	1.75	110	90	85	139	114	108

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.

[12] 2015 *IRC* Table 301.2(2) features updated table values.

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5.5 *Thermal Resistance*

5.5.1 ThermalStar® One™ meets the continuous insulated sheathing requirements complying with the provisions of *IRC* Section N1102, *IECC* Section R402, and *IECC* Section R402.1.

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

TABLE 6. THERMALSTAR® ONE™ THERMAL RESISTANCE PROPERTIES

Product	Thickness (in)	R-Value (h·ft²·°F/Btu)
Orange or White EPS Core	2 1/4" (1 13/16" EPS + 7/16" OSB)	7.5
	1 5/8" (1 3/16" EPS + 7/16" OSB)	5.0
	1 3/16" (3/4" EPS + 7/16" OSB)	3.0

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.

5.6 *Water-Resistive Barrier*

5.6.1 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.

5.6.2 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.

5.6.3 All joints between boards shall be sealed by ThermalStar® 007, 3M 8777, or 3M 8067 tape or other approved equivalent.

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

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

5.7 *Air Barrier*

5.7.1 ThermalStar® One™ may be used as an air barrier material as prescribed *IECC* Section C402.5.1.2.1 and *IECC* Section R402.4.1.1 in accordance with *ASTM E2178*.

5.7.1.1 7/16" OSB exceeds minimum material thickness.

5.7.1.2 Polymer-faced foam sheathing tested in accordance with *ASTM E2178*.

5.7.2 When ThermalStar® One™ is installed as an approved air barrier component in accordance with *IECC* Section C402 and *IECC* Section R402.4.1.1, all joints and seams must be sealed including top and bottom edges of panels in accordance with the manufacturer's installation instructions and this TER.

5.7.3 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,[13] to assure necessary condensation control. Depending on the application and internal vapor retarder selection, additional continuous insulation over ThermalStar® One™ may be required.

[13] 2015 *IRC* Table R702.7.1 calls for continuous insulation instead of insulated sheathing.

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5.8 *Surface Burn Characteristics*

5.8.1 ThermalStar® One™ has the flame spread characteristics shown in Table 7.

TABLE 7. SURFACE BURN CHARACTERISTICS

Structural Sheathing	Code Performance	Flame Spread	Smoke Developed
ThermalStar® One™	U.S. Codes[1]	< 25	< 450
	Canadian Codes[2]	< 175	< 500

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

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

5.9.1 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:

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

5.9.1.2 Entry is made only for the purposes of repairs or maintenance.

5.9.2 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 2603.9[14] and *IRC* Section R316.5.3 and Section R316.5.4.

5.10 *Mildew Resistance*

5.10.1 ThermalStar® One™ has excellent mildew resistance in accordance with *ASTM G21* and *ASTM D3273*.

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 6.3.

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.

[14] 2012 *IBC* Section 2603.10

LEGACY

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 2 3/8" 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:*

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

6.3.3.2 Fastening Pattern

6.3.3.2.1 Nails – 16" or 24" o.c. framing; maximum of 8" o.c. at panel edges and 8" o.c. in the field

6.3.3.2.2 Screws – 16" o.c. framing; maximum of 16" o.c. at panel edges and 16" o.c. in the field

6.3.3.2.3 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 per permitted in accordance with accepted engineering practice.

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7 TEST ENGINEERING SUBSTANTIATING DATA

7.1 Physical properties testing in accordance with *ASTM C578* conducted by BASF

7.2 Physical property testing of foam sheathing component in accordance with *ASTM C578* conducted by UL

7.3 Lateral load testing in accordance with *ASTM E564* conducted by an ISO/IEC 17025 accredited testing laboratory under contract with Qualtim, Inc.

7.4 Water-resistive barrier testing in accordance with *ASTM E331* conducted by RADCO and NTA

7.5 Water vapor permeance testing in accordance with *ASTM E96* conducted by Intertek

7.6 Air permeance testing in accordance with *ASTM E2178* conducted by QAI Laboratories

7.7 Thermal resistance values determined in accordance with *ASTM C518* conducted by UL

7.8 Surface burning characteristics in accordance with *ASTM E84* conducted by Intertek and *CAN ULC S102.2* conducted by UL. See also UL BRYX.R16529 listing.

7.9 Mildew challenge testing in accordance with *ASTM G21* and *ASTM D3273* conducted by LanXESS

7.10 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.

7.11 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, *IBC* Section 2306.1 and Section 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, Section 2304.6.1, and Section 2304.10.6[15] and *IRC* Section R301.2.1 and Section R602.3.[16]

8.1.4 Performance of the foam plastic component of ThermalStar® One™ for conformance to *IBC* Section 2603 and *IRC* Section R316.

8.1.5 Performance for use as insulating sheathing in accordance with *IRC* Section N1102.1 and Section N1102.2 and *IECC* Section R402.

8.1.6 Performance for use as a WRB in accordance with *IBC* Section 1404.2 and *IRC* Section R703.2.

8.1.7 Performance for use as an air barrier component in accordance with *IRC* Section N1102.4 and *IECC* Section R402.

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[15] 2012 *IBC* Section 2304.9.6

[16] 2015 *IRC* Section R602.3 features updated table specifications for fasteners and fastener spacing and location.

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 TER, they are listed here.

8.3.1 No known variations

9 Conditions of Use

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

9.2 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.

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

9.4 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.

9.5 When used in accordance with the *IBC* in high wind areas, special inspections shall comply with *IBC* Section 1705.11.[17]

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

9.7 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.

9.8 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.

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

9.10 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*).

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

9.12 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.

9.13 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.

9.14 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.

[17] 2009 *IBC* Section 1705.4, 2012 *IBC* Section 1705.10

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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.

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