DrJ CERTIFICATION

Technical Evaluation Report™

TER 2305-04

Cladding Attachment for Atlas EnergyShield® Ply, ThermalStar® Nailbase, and Wood Structural Panels Over Atlas ThermalStar® & EnergyShield® Products

Atlas Roofing Corporation

Product:

EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products

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SECTION: 06 16 00 - Sheathing	SECTION: 07 20 00 - Thermal Protection
SECTION: 06 16 13 - Insulated Sheathing	SECTION: 07 21 00 - Thermal Insulation
	SECTION: 07 27 00 - Air Barriers

1 Innovative Products Evaluated[1,2]

- 1.1 ThermalStar® Nailbase
- 1.2 ThermalStar® Products (ASTM C578 Type II)[3]
  - 1.2.1 ThermalStar® Structural Wall Insulation (SWI)
  - 1.2.2 ThermalStar® Laminated Wall Insulation (LWI)
  - 1.2.3 ThermalStar® Wall Insulation Board
  - 1.2.4 ThermalStar® Tongue & Groove (T&G) Insulation
- 1.3 EnergyShield® Ply
- 1.4 EnergyShield® Products
  - 1.4.1 EnergyShield®
  - 1.4.2 EnergyShield® CGF
  - 1.4.3 EnergyShield® Ply Pro
  - 1.4.4 EnergyShield® XR
  - 1.4.5 EnergyShield® Pro
  - 1.4.6 EnergyShield® CGF Pro

[1] For more information, visit drjcertification.org or call us at 608-310-6748.

[2] **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the building official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled**. Equipment, materials or products to which has been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

2 Applicable Codes and Standards[3,4]

2.1 *Codes*

2.1.1 *IBC—15, 18, 21: International Building Code®*

2.1.2 *IRC—15, 18, 21: International Residential Code®*

2.1.3 *IECC—15, 18, 21: International Energy Conservation Code®*

2.2 *Standards and Referenced Documents*

2.2.1 *AISI S100: North American Specification for the Design of Cold-formed Steel Structural Members*

2.2.2 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

2.2.3 *ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic*

2.2.4 *ASTM C90: Standard Specification for Loadbearing Concrete Masonry Units*

2.2.5 *ASTM C1019: Standard Test Method for Sampling and Testing Grout for Masonry*

2.2.6 *ASTM C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*

2.2.7 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

2.2.8 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

2.2.9 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

2.2.10 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

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

2.2.12 *UL 263: Standard for Fire Test of Building Construction and Materials*

[3] This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see IBC Section 1703.1) and/or an approved source (see IBC Section 1703.4.2). An approved agency is "approved" when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory). A professional engineer is "approved" as an approved source when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an approved source. (i.e., Registered Design Professional). DrJ is an ANAB accredited product certification body.

[4] Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

3 Performance Evaluation

3.1 Tests, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2016 (DTSA).[5]

3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory,[6] an ISO/IEC 17020 accredited inspection body,[7] which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).

3.3 Atlas EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® EPS foam products and EnergyShield® Polyiso foam products were evaluated to determine the following:

3.3.1 Thermal resistance for use as insulating sheathing in accordance with IECC Section R402.1 and IRC Section N1102.1

3.3.2 Foam plastic insulation performance in accordance with IRC Section R316

3.3.3 Connection to light-frame wood construction framing to support cladding weight in accordance with IBC Section 1604.2 and IRC Section R301.1.3

3.3.4 Connection to light-frame cold-formed steel framing to support cladding weight in accordance with IBC Section 1604.2

3.3.5 Connection to concrete substrate to support cladding weight in accordance with IBC Section 1901.3

3.3.6 Performance for use as an air barrier in accordance with IECC Section C402

3.3.7 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

3.4 Design of cladding being fastened to Atlas EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® EPS foam products, and EnergyShield® Polyiso foam products are outside the scope of this TER.

3.5 Seismic design is outside the scope of this TER.

3.6 Any building code and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[8] to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.

3.7 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope, which are also its areas of professional engineering competence.

3.8 Any regulation specific issues not addressed in this section are outside the scope of this TER.

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[5] https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. As the National Society of Professional Engineers states, "Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve." Therefore, to protect intellectual property (IP) and TS, and to achieve compliance with public records and trade secret legislation, requires approval through the use of Listings, certified reports, technical evaluation reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

[6] Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

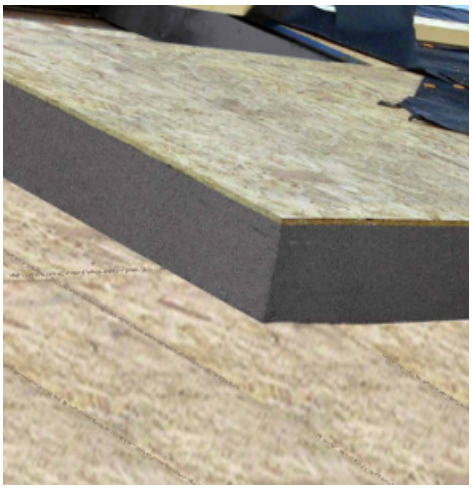
[7] Ibid.

[8] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

4 Product Description and Materials

4.1 The innovative products evaluated in this TER are shown in Figure 1, and Figure 2.

4.2 Details pertaining to the innovative products evaluated in this TER are provided in Table 1.



ThermalStar® Nailbase

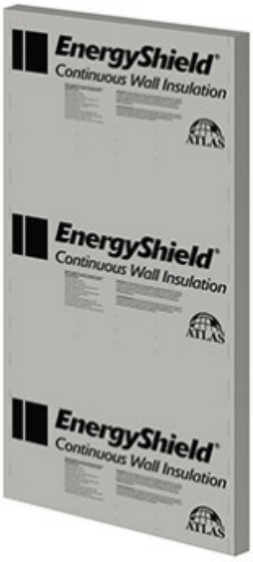
ThermalStar® SWI Insulation Boards

ThermalStar® LWI Insulation Boards

ThermalStar® Insulation Boards

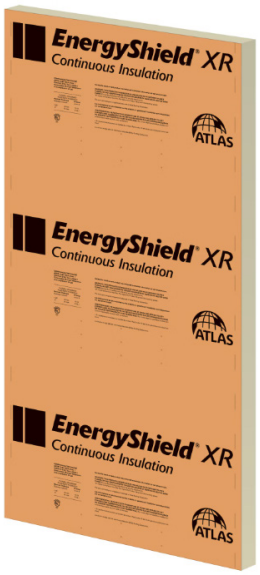
ThermalStar® T&G Insulation Boards

Figure 1. ThermalStar® EPS Wall Insulation Products

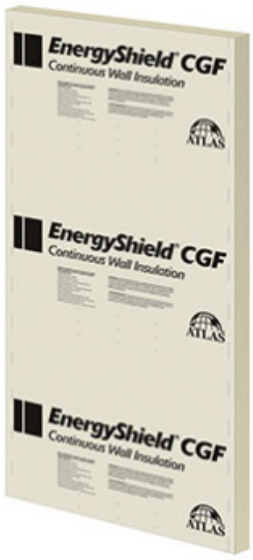


EnergyShield®
Insulation Boards

EnergyShield® Pro
Insulation Boards

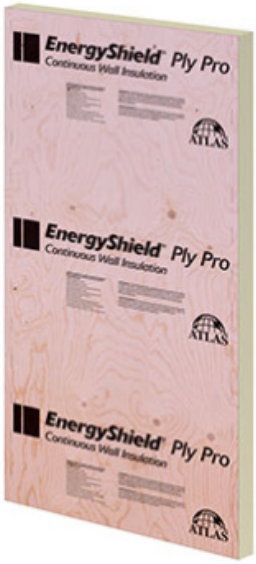


EnergyShield® XR
Insulation Boards



EnergyShield® CGF
Insulation Boards

EnergyShield® CGF Pro
Insulation Boards



EnergyShield® Ply Pro
Insulation Boards

Figure 2. EnergyShield® Polyiso Wall Insulation Products

Table 1. Product Information[1]

ThermalStar® Nailbase	
Description	Atlas ThermalStar® Nailbase is a composite product that consists of a ThermalStar® EPS foam insulation boards adhered to nominal $^{7}/_{16}$" oriented strand boards (OSB).
Facer Material(s)	The OSB facer is compliant with DOC PS 2 for compliance with IRC Section R604.1
Dimensions (in)	Standard product width: 48" Standard product length: 96"
Available Thicknesses (in)	Nominal 2" or 4" · Additional thicknesses can be accommodated using a second layer of EPS foam insulation boards.
ThermalStar® EPS Foam Insulation	
Description	Atlas ThermalStar® insulation boards are molded, closed-cell expanded polystyrene (EPS) plastic insulation boards complying with ASTM C578 requirements. · Minimum density of EPS foam complying with ASTM C578 Type II is 1.35 pcf.
Facer Material(s)	ThermalStar® Structural Wall Insulation (SWI): · Film facer (serves as a Water Resistive Barrier, WRB, when properly flashed and taped) · 0.108" fiberboard facer ThermalStar® Laminated Wall Insulation (LWI): · Film facer ThermalStar® Wall Insulation Board: · No facer ThermalStar® Tongue & Groove (T&G) Insulation: · No facer
Dimensions	Standard product width: 48" Standard product length: 96", 108", or 120" (Nominal 16" or 24" widths for use in cavity wall applications are available as well as custom sizes).
Available Thicknesses	ThermalStar® Structural Wall Insulation (SWI) : · $^{1}/_{2}$" and $1^{1}/_{8}$" ThermalStar® Laminated Wall Insulation (LWI): · $^{3}/_{4}$" through 3" · $^{3}/_{8}$" and $^{1}/_{2}$" (fanfold thicknesses) ThermalStar® Wall Insulation Board: · $^{1}/_{2}$" through 4" ThermalStar® Tongue & Groove (T&G) Insulation: · $^{1}/_{2}$" through 2"

Table 1. Product Information[1]

EnergyShield® Ply	
Description	Atlas EnergyShield® Ply is composed of a glass-faced, closed-cell, rigid polyisocyanurate (polyiso) foam core complying with ASTM C1289, Type V bonded to plywood. · Nominal density of the polyiso foam core is 2.0 pcf.
Facer Material(s)	Coated glass facers, laminated to a 5/8" or 3/4" PS 2 compliant plywood panel
Dimensions (in)	Standard product width: 48" Standard product length: 96" or 108"
Available Thicknesses (in)	· 1 5/8" through 4 1/8" (5/8" plywood) · 1 3/4" through 4 1/4" (3/4" plywood)
EnergyShield® Ply Pro	
Description	Atlas EnergyShield® Ply Pro is composed of a glass-faced, closed-cell, rigid polyisocyanurate (polyiso) foam core complying with ASTM C1289, Type V bonded to fire treated plywood. · Nominal density of the polyiso foam core is 2.0 pcf. · Foam core for EnergyShield® Ply and EnergyShield® Ply Pro is Class A, NFPA 285 compliant.
Facer Material(s)	Coated glass facers, laminated to a 5/8" or 3/4" fire treated PS 2 compliant plywood panel
Dimensions (in)	Standard product width: 48" Standard product length: 96" or 108"
Available Thicknesses (in)	· 1 5/8" through 4 1/8" (5/8" fire-treated plywood) · 1 3/4" through 4 1/4" (3/4" fire-treated plywood)
EnergyShield® Polyiso Foam Insulation	
Description	Atlas EnergyShield® insulation boards consist of closed-cell, rigid polyisocyanurate (polyiso) foam cores complying with ASTM D1289 Type 1, Class 1, or Type II, Class 2. · Nominal density of the polyiso foam core is 2.0 pcf. · Foam core for EnergyShield® Pro, and EnergyShield® CGF Pro is Class A fire-rated.
Facer Material(s)	EnergyShield®: · Tri-laminate foil on both sides. EnergyShield® CGF: · Non-reflective, coated glass-mat facer on both sides. EnergyShield® XR: · Impermeable facers on both sides. EnergyShield® Pro: · Reflective, 12 mil reinforced foil facer on one side and a white, 12 mil reinforced acrylic-coated aluminum facer on the other side. EnergyShield® CGF Pro: · High performance coated glass facer on front and back. One side is dark gray for use in open joint Rainscreen applications.
Dimensions	Standard product width: 48" Standard product length: 96" or 108" (Nominal 16" or 24" widths for use in cavity wall applications are available as well as custom sizes). EnergyShield® XR is only available in 48"x96", 16"x 96" or 24" x 96"

Table 1. Product Information[1]

Available Thicknesses	EnergyShield®, EnergyShield® CGF: · 1/2" through 4" EnergyShield® XR: · 1 1/2" (1.55") through 3" EnergyShield® Pro: · 3/4" through 4" EnergyShield® CGF Pro: · 1/2" through 3 1/2"

SI: 1 in = 25.4 mm, 1 psi = 0.0069 MPa

1. Minimum compressive strength of 15 psi

5 Applications

5.1 *General*

5.1.1 Atlas EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, and EnergyShield® products are evaluated for the following applications:

5.1.1.1 Continuous insulation on buildings constructed in accordance with the IBC and IRC for light-frame wood construction

5.1.1.2 Continuous insulation providing a nail base for cladding materials used in light-frame wood construction

5.1.1.3 Continuous insulation on buildings constructed in accordance with the IBC for light-frame cold-formed steel construction or metal buildings

5.1.1.4 Continuous insulation providing a nail base for cladding materials used in light-frame cold-formed steel construction or metal buildings

5.1.1.5 Continuous insulation on buildings constructed in accordance with the IBC for concrete masonry buildings or concrete buildings

5.1.1.6 Continuous insulation providing a nail base for cladding materials used in concrete masonry buildings or concrete buildings

5.2 *Thermal Insulation*

5.2.1 Atlas EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, and EnergyShield® products are intended to be used as exterior continuous insulation under any type of permitted cladding.

5.3 *Air Barrier*

5.3.1 Atlas EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, and EnergyShield® products meet the requirements of IECC Section C402.5 and IECC Section R402.4 for use as a component of the air barrier, when installed in accordance with the manufacturer installation instructions and this TER with all seams, including the top and bottom edges, treated.

5.3.2 The air permeance of an air barrier material is defined in IECC Section C402.5.1.3[9] and IECC Section R303.1.5 as being no greater than 0.02 liter per second per square meter (L/(s·m^2)) at 75 Pa (0.004 cfm/ft^2 at 1.57 psf) pressure difference when tested in accordance with ASTM E2178.

5.3.2.1 *ThermalStar®:*

5.3.2.1.1 ThermalStar® SWI and ThermalStar® LWI at a minimum thickness of 1/2", meet this criteria.

9 2018 IECC Section C402.5.1.2.1

5.3.2.2 *EnergyShield®:*

5.3.2.2.1 EnergyShield® CGF, and EnergyShield® CGF Pro at a minimum thickness of 1.1″, meet this criteria.

5.3.2.2.2 EnergyShield® at a minimum thickness of 3/4″, meets this criteria.

5.3.2.2.3 Additional information can be found in TER 2202-01.

5.4 *Surface Burn Characteristics*

5.4.1 ThermalStar® products have a flame-spread index of less than 25 and a smoke-developed index of less than 450 when tested in accordance with ASTM E84.

5.4.2 Additional information regarding ThermalStar® SWI can be found in TER 1905-02.

5.4.3 Fire performance for EnergyShield® products are evaluated in TER 1306-03.

5.5 *Wind Pressure Resistance*

5.5.1 EnergyShield® Ply, ThermalStar® Nailbase, and ThermalStar® and EnergyShield® foam products under Wood Structural Panels (WSP) are permitted to be used where the maximum nominal design wind speed is as set forth in Table 2.

Table 2. Transverse Load Performance of ThermalStar® Nailbase Structural Sheathing[1,2]

Minimum Fastener Specification		Max. Wall Stud Spacing (in)	Max. Panel Nail Spacing		Maximum Nominal Design Wind Speed, (V_{ult})/(V_{asd}) (mph)		
Fastener	Minimum Penetration (in)		Edge (in. o.c.)	Field (in. o.c.)	Wind Exposure Category		
					B	C	D
8d common (0.131 diameter)	1.25	24	4	12	220/170	220/170	220/170
			6	12	220/170	200/155	190/147
			8	12	200/155	180/139	170/132
			12	12	180/139	150/116	140/108
			16	16	160/124	130/101	120/93
			24	24	120/93	-	-
12d common (0.148 diameter)	1.25	24	4	12	220/170	220/170	220/170
			6	12	220/170	200/155	200/155
			8	12	220/170	190/147	170/132
			12	12	190/147	160/124	150/116
			16	16	160/124	140/108	130/101
			24	24	130/101	110/85	-
FastenMaster® HeadLOK®, or TRUFAST® SIPTP	1.25	24	4	12	220/170	220/170	220/170
			6	12			
			8	12			
			12	12			
			16	16			
			24	24			
Simpson Strong-Drive® SDWS22	1.25	24	4	12	220/170	220/170	220/170
			6	12			
			8	12			
			12	12			
			16	16			
			24	24	220/170	220/170	200/155

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

1. Wind speeds are based on an enclosed building with a mean roof height of 30' design, Zone 4, and an effective area of 10 ft^2.
2. Minimum specific gravity of OSB or plywood is 0.50.

5.6 *Fastener Attachments to Wood to Support Cladding Weight*

5.6.1 Fasteners are required to attach EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, and EnergyShield® products sheathing to the wall framing to carry the cladding weight.

5.6.1.1 For EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, and EnergyShield® products the following tables give the allowable cladding loads:

5.6.1.1.1 Any thickness added by backing on any of the EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products or EnergyShield® products may be assumed to be part of the foam thickness of the product when using these tables.

5.6.1.1.2 See Table 3 through Table 8 for allowable cladding loads for various fastener types and sheathing thicknesses for wood stud framing.

5.6.2 Minimum penetration into wood wall framing is 1 1/4" as specified in IRC Table R703.15.1, unless specifically noted in this TER.

5.6.3 For attaching to wood studs, fasteners with equal or greater design properties shall be permitted:

5.6.3.1 8d nail (0.131" x 2.5"): 0.281" head diameter

5.6.3.2 12d nail (0.148" x 3.25"): 0.312" head diameter

5.6.3.3 Simpson Strong-Drive® SDWS22: 0.22" shank diameter, 0.435" head diameter

5.6.3.4 FastenMaster® HeadLOK®: 0.191" shank diameter, 0.625" head diameter

5.6.3.5 TRUFAST® SIPTP: 0.189" shank diameter, 0.635" head diameter

Table 3. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16" and 1/2" OSB with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Specifications	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	1/2	24	20	12	8	8	6
	3/4	24	16	8	8	6	4
12d (0.148" x 3.25")	1/2	24	24	16	12	8	8
	1	24	16	8	8	6	4
	1 1/8	24	12	8	8	6	4
	1 1/2	20	8	8	6	4	4
TRUFAST® SIPTP	1/2	24	24	24	24	20	16
	1	24	24	20	16	12	8
	1 1/8	24	24	20	12	12	8
	1 1/2	24	20	16	12	8	8
	2	24	16	12	8	8	6
	2 1/2	24	12	8	8	6	4
	3	20	12	8	6	4	4
	3 1/2	16	8	6	6	4	4
	4	16	8	6	4	4	-
	4 1/2	12	8	6	4	-	-

Table 3. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing $^{7}/_{16}$" and $^{1}/_{2}$" OSB with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Specifications	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
FastenMaster® HeadLOK®	$^{1}/_{2}$	24	24	24	24	20	16
	1	24	24	24	16	16	12
	$1^{1}/_{8}$	24	24	20	16	12	12
	$1^{1}/_{2}$	24	24	16	12	12	8
	2	24	20	12	8	8	8
	$2^{1}/_{2}$	24	16	12	8	6	6
	3	24	12	8	8	6	4
	$3^{1}/_{2}$	20	12	8	6	4	4
	4	16	8	8	6	4	4
	$4^{1}/_{2}$	16	8	6	4	4	-
Simpson Strong-Drive® SDWS22	$^{1}/_{2}$	24	24	24	24	24	24
	1	24	24	24	24	20	16
	$1^{1}/_{8}$	24	24	24	20	16	12
	$1^{1}/_{2}$	24	24	24	16	12	12
	2	24	24	16	12	12	8
	$2^{1}/_{2}$	24	20	16	12	8	8
	3	24	16	12	8	8	6
	$3^{1}/_{2}$	24	16	12	8	6	6
	4	24	12	8	8	6	4

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is $1^{1}/_{4}$".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials other than the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 4. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing $^{7}/_{16}$" and $^{1}/_{2}$" OSB with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	$^{1}/_{2}$	24	12	8	6	4	4
	$^{3}/_{4}$	12	8	6	4	-	-
12d (0.148" x 3.25")	$^{1}/_{2}$	24	16	8	8	6	6
	1	16	8	6	4	4	-
	$1^{1}/_{8}$	16	8	6	4	4	-
	$1^{1}/_{2}$	12	6	4	4	-	-
TRUFAST® SIPTP	$^{1}/_{2}$	24	24	20	16	12	8
	1	24	20	12	8	8	6
	$1^{1}/_{8}$	24	16	12	8	8	6
	$1^{1}/_{2}$	24	12	8	8	6	4
	2	20	12	8	6	4	4
	$2^{1}/_{2}$	16	8	6	4	4	-
	3	12	8	6	4	-	-
	$3^{1}/_{2}$	12	6	4	4	-	-
	4	8	6	4	-	-	-
	$4^{1}/_{2}$	8	4	4	-	-	-
FastenMaster® HeadLOK®	$^{1}/_{2}$	24	24	24	16	12	12
	1	24	24	16	12	8	8
	$1^{1}/_{8}$	24	20	12	12	8	8
	$1^{1}/_{2}$	24	16	12	8	8	6
	2	24	12	8	6	6	4
	$2^{1}/_{2}$	20	8	8	6	4	4
	3	16	8	6	4	4	-
	$3^{1}/_{2}$	12	8	6	4	-	-
	4	12	6	4	4	-	-
	$4^{1}/_{2}$	8	6	4	-	-	-
Simpson Strong-Drive® SDWS22	$^{1}/_{2}$	24	24	24	20	16	16
	1	24	24	20	16	12	8
	$1^{1}/_{8}$	24	24	20	12	12	8
	$1^{1}/_{2}$	24	20	16	12	8	8
	2	24	16	12	8	8	6
	$2^{1}/_{2}$	24	12	8	8	6	4
	3	20	12	8	6	4	4

Table 4. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16" and 1/2" OSB with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
Simpson Strong-Drive® SDWS22	3 1/2	16	8	8	6	4	4
	4	16	8	6	4	4	-
	4 1/2	12	8	6	4	4	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is 1 1/4".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 5. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	1/2	24	16	12	8	8	6
	3/4	24	12	8	8	6	4
12d (0.148" x 3.25")	1/2	24	20	12	12	8	8
	1	24	12	8	8	6	4
	1 1/8	20	12	8	6	6	4
	1 1/2	16	8	6	4	4	4
TRUFAST® SIPTP	1/2	24	24	24	20	16	12
	1	24	24	20	12	12	8
	1 1/8	24	24	16	12	8	8
	1 1/2	24	20	12	8	8	8
	2	24	16	12	8	6	6
	2 1/2	20	12	8	6	6	4
	3	20	12	8	6	4	4
	3 1/2	16	8	6	4	4	4
	4	12	8	6	4	4	-
	4 1/2	12	8	4	4	-	-

Table 5. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
FastenMaster® HeadLOK®	1/2	24	24	24	24	20	16
	1	24	24	24	16	12	12
	1 1/8	24	24	20	16	12	8
	1 1/2	24	24	16	12	8	8
	2	24	20	12	8	8	6
	2 1/2	24	16	8	8	6	6
	3	20	12	8	6	6	4
	3 1/2	20	12	8	6	4	4
	4	16	8	6	6	4	4
	4 1/2	12	8	6	4	4	-
Simpson Strong-Drive® SDWS22	1/2	24	24	24	24	24	20
	1	24	24	24	20	16	16
	1 1/8	24	24	24	20	16	12
	1 1/2	24	24	20	16	12	12
	2	24	24	16	12	8	8
	2 1/2	24	20	12	8	8	8
	3	24	16	12	8	8	6
	3 1/2	24	16	12	8	6	6
	4	24	12	8	8	6	4
	4 1/2	20	12	8	6	6	4

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is 1 1/4".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 6. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	1/2	20	12	8	6	4	4
	3/4	12	8	4	4	-	-
12d (0.148" x 3.25")	1/2	24	12	8	8	6	4
	1	16	8	6	4	4	-
	1 1/8	12	8	6	4	4	-
	1 1/2	12	6	4	-	-	-
TRUFAST® SIPTP	1/2	24	24	16	12	12	8
	1	24	16	12	8	8	6
	1 1/8	24	16	12	8	6	6
	1 1/2	24	12	8	6	6	4
	2	16	8	8	6	4	4
	2 1/2	12	8	6	4	4	-
	3	12	8	4	4	-	-
	3 1/2	8	6	4	-	-	-
	4	8	6	4	-	-	-
	4 1/2	8	4	-	-	-	-
FastenMaster® HeadLOK®	1/2	24	24	20	16	12	12
	1	24	20	16	12	8	8
	1 1/8	24	20	12	8	8	6
	1 1/2	24	16	12	8	6	6
	2	20	12	8	6	6	4
	2 1/2	16	8	6	6	4	4
	3	12	8	6	4	4	-
	3 1/2	12	8	4	4	-	-
	4	8	6	4	4	-	-
	4 1/2	8	6	4	-	-	-
Simpson Strong-Drive® SDWS22	1/2	24	24	24	20	16	12
	1	24	24	20	12	12	8
	1 1/8	24	24	16	12	8	8
	1 1/2	24	20	12	8	8	8
	2	24	16	12	8	6	6
	2 1/2	20	12	8	6	6	4
	3	20	12	8	6	4	4
	3 1/2	16	8	8	6	4	4

Table 6. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
Simpson Strong-Drive® SDWS22	4	16	8	6	4	4	-
	4 1/2	12	8	6	4	4	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is 1 1/4".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 7. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" OSB, 3/4" OSB or 3/4" Plywood with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	1/2	24	20	16	12	8	8
	3/4	24	16	12	8	8	6
12d (0.148" x 3.25")	1/2	24	24	16	12	12	8
	1	24	16	12	8	8	6
	1 1/8	24	16	12	8	6	6
	1 1/2	20	12	8	6	6	4
TRUFAST® SIPTP	1/2	24	24	24	24	20	16
	1	24	24	20	16	12	12
	1 1/8	24	24	20	16	12	8
	1 1/2	24	24	16	12	8	8
	2	24	16	12	8	8	6
	2 1/2	24	16	8	8	6	6
	3	20	12	8	6	6	4
	3 1/2	16	12	8	6	4	4
	4	16	8	6	6	4	4
	4 1/2	12	8	6	4	4	-
FastenMaster® HeadLOK®	1/2	24	24	24	24	20	16

Table 7. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" OSB, 3/4" OSB or 3/4" Plywood with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
FastenMaster® HeadLOK®	1	24	24	24	20	16	12
	1 1/8	24	24	24	16	12	12
	1 1/2	24	24	20	12	12	8
	2	24	20	16	12	8	8
	2 1/2	24	16	12	8	8	6
	3	24	16	8	8	6	6
	3 1/2	20	12	8	6	6	4
	4	20	12	8	6	4	4
	4 1/2	16	8	8	6	4	4
Simpson Strong-Drive® SDWS22	1/2	24	24	24	24	24	20
	1	24	24	24	24	20	16
	1 1/8	24	24	24	20	16	16
	1 1/2	24	24	24	16	12	12
	2	24	24	20	12	12	8
	2 1/2	24	20	16	12	8	8
	3	24	20	12	8	8	6
	3 1/2	24	16	12	8	8	6
	4	24	16	8	8	6	6
	4 1/2	20	12	8	8	6	4

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is 1 1/4".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 8. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" OSB, 3/4" OSB or 3/4" Plywood with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
8d (0.131" x 2.5")	1/2	24	12	8	8	6	4
	3/4	16	8	6	4	4	4
12d (0.148" x 3.25")	1/2	24	16	12	8	8	6
	1	20	12	8	6	4	4
	1 1/8	16	8	8	6	4	4
	1 1/2	12	8	6	4	4	-
TRUFAST® SIPTP	1/2	24	24	20	16	12	8
	1	24	20	12	8	8	8
	1 1/8	24	16	12	8	8	6
	1 1/2	24	16	8	8	6	6
	2	20	12	8	6	6	4
	2 1/2	16	8	6	6	4	4
	3	12	8	6	4	4	-
	3 1/2	12	8	4	4	-	-
	4	8	6	4	4	-	-
	4 1/2	8	6	4	-	-	-
FastenMaster® HeadLOK®	1/2	24	24	20	16	12	12
	1	24	24	16	12	8	8
	1 1/8	24	20	16	12	8	8
	1 1/2	24	16	12	8	8	6
	2	24	12	8	8	6	4
	2 1/2	20	12	8	6	4	4
	3	16	8	6	6	4	4
	3 1/2	12	8	6	4	4	-
	4	12	8	4	4	-	-
	4 1/2	8	6	4	4	-	-
Simpson Strong-Drive® SDWS22	1/2	24	24	24	20	16	12
	1	24	24	20	16	12	8
	1 1/8	24	24	20	12	12	8
	1 1/2	24	20	16	12	8	8
	2	24	16	12	8	8	6

Table 8. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" OSB, 3/4" OSB or 3/4" Plywood with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
Simpson Strong-Drive® SDWS22	2 1/2	24	12	8	8	6	6
	3	20	12	8	6	6	4
	3 1/2	20	12	8	6	4	4
	4	16	8	6	6	4	4
	4 1/2	12	8	6	4	4	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is 1 1/4".
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Wood studs shall be a minimum of 2x4 and have a minimum specific gravity of 0.42.
5. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
6. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

5.7 *Fastener Attachments to Cold-formed Steel Studs (CFS) to Support Cladding Weight*

5.7.1 Fasteners are required to attach EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products and EnergyShield® products sheathing to the wall framing to carry the cladding weight.

5.7.1.1 For EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products and EnergyShield® products the following tables give the allowable cladding loads:

5.7.1.1.1 Any thickness added by backing on any of the EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products or EnergyShield® products may be assumed to be part of the foam thickness of the product when using these tables.

5.7.1.1.2 See Table 9 through Table 14 for allowable cladding loads for various fastener types and sheathing thicknesses for light-frame cold-formed steel construction.

5.7.2 Minimum allowable penetration into steel wall framing is the steel thickness plus three threads, plus the tip as specified in IRC Table R703.16.1.

5.7.3 For attaching to cold-formed steel studs, fasteners with equal or greater design properties shall be permitted:

5.7.3.1 #8 screw: 0.164" shank diameter, 0.312" head diameter

5.7.3.2 #10 screw: 0.190" shank diameter, 0.363" head diameter

5.7.3.3 #12 screw: 0.216" shank diameter, 0.414" head diameter

5.7.3.4 TRUFAST® SIPLD: 0.189" shank diameter, 0.635" head diameter

5.7.3.5 TRUFAST® SIPHD: 0.189" shank diameter, 0.635" head diameter

5.7.3.6 FastenMaster® HeadLOK®: 0.191" shank diameter, 0.625" head diameter

5.7.3.7 SFS intec Dekfast™: 0.191" shank diameter, 0.625" head diameter

Table 9. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	8	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#10 Screw	1/2	12	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	12	6	4	-	-	-
		3/4	12	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
	SFS intec Dekfast™	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-

Table 9. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	SFS intec Dekfast™	3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	8	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#10 Screw	1/2	12	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	12	6	4	-	-	-
		3/4	12	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
	SFS intec Dekfast™	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-

Table 9. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	SFS intec Dekfast™	2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
16-gauge Structural (53 mil)	#8 Screw	1/2	8	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#10 Screw	1/2	12	6	4	-	-	-
		3/4	8	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	12	6	4	-	-	-
		3/4	12	6	4	-	-	-
		1	8	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-

Table 9. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil)	SFS intec Dekfast™	1/2	20	12	8	6	4	4
		1	20	8	8	6	4	4
		1 1/2	16	8	6	4	4	-
		2	12	8	4	4	-	-
		2 1/2	8	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure. ThermalStar® Nailbase is installed with the OSB to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 10. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	6	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	-	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#12 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-

Table 10. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	SFS intec Dekfast™	3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	6	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	-	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#12 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-

Table 10. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	SFS intec Dekfast™	2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
16-gauge Structural (53 mil)	#8 Screw	1/2	6	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	-	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	-	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#12 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-

Table 10. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 1/2" or 5/8" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil)	SFS intec Dekfast™	1/2	12	8	6	4	-	-
		1	12	6	4	4	-	-
		1 1/2	8	6	4	-	-	-
		2	8	4	-	-	-	-
		2 1/2	6	4	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 11. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	12	8	4	4	-	-
		3/4	12	6	4	4	-	-
		1	12	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	#10 Screw	1/2	16	8	6	4	-	-
		3/4	12	8	4	4	-	-
		1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-
	#12 Screw	1/2	16	8	6	4	4	-
		3/4	12	8	6	4	-	-
		1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-

Table 11. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	FastenMaster® HeadLOK®	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	SFS intec Dekfast™	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	12	8	4	4	-	-
		3/4	12	6	4	4	-	-
		1	12	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	#10 Screw	1/2	16	8	6	4	-	-
		3/4	12	8	4	4	-	-
		1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-
	#12 Screw	1/2	16	8	6	4	4	-
		3/4	12	8	6	4	-	-

Table 11. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	#12 Screw	1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	FastenMaster® HeadLOK®	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	SFS intec Dekfast™	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
16-gauge Structural (53 mil)	#8 Screw	1/2	12	8	4	4	-	-
		3/4	12	6	4	4	-	-
		1	12	6	4	-	-	-
		1 1/2	8	4	4	-	-	-
	#10 Screw	1/2	16	8	6	4	-	-
		3/4	12	8	4	4	-	-
		1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-

Table 11. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil)	#12 Screw	1/2	16	8	6	4	4	-
		3/4	12	8	6	4	-	-
		1	12	8	4	4	-	-
		1 1/2	12	6	4	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	FastenMaster® HeadLOK®	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-
	SFS intec Dekfast™	1/2	24	16	8	8	6	6
		1	24	12	8	6	6	4
		1 1/2	20	12	8	6	4	4
		2	16	8	6	4	4	-
		2 1/2	12	8	6	4	-	-
		3	8	6	4	-	-	-
		3 1/2	8	4	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 12. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#10 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	16	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-

Table 12. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	SFS intec Dekfast™	2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#10 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	16	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-

Table 12. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	SFS intec Dekfast™	2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
16-gauge Structural (53 mil)	#8 Screw	1/2	8	4	-	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	6	-	-	-	-	-
	#10 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	-	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	#12 Screw	1/2	8	6	4	-	-	-
		3/4	8	4	4	-	-	-
		1	8	4	-	-	-	-
		1 1/2	8	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	20	8	6	4	4	4
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	16	8	6	4	4	4
		1	16	8	6	4	4	-

Table 12. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 7/16", 1/2" OSB or 3/4" Plywood with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil)	SFS intec Dekfast™	1 1/2	12	8	4	4	-	-
		2	12	6	4	-	-	-
		2 1/2	8	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-

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

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 13. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	16	8	6	6	4	4
		3/4	16	8	6	4	4	-
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
	#10 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4
		1	16	8	6	4	4	4
		1 1/2	16	8	6	4	4	-
	#12 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4
		1	16	8	6	6	4	4
		1 1/2	16	8	6	4	4	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	16	12	8	8	6
		1	24	16	8	8	6	6

Table 13. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	TRUFAST® SIPLD or TRUFAST® SIPHD	1 1/2	20	12	8	6	6	4
		2	16	8	8	6	4	4
		2 1/2	12	8	6	4	4	-
		3	12	6	4	4	-	-
		3 1/2	8	4	-	-	-	-
	FastenMaster® HeadLOK®	1/2	24	16	12	8	8	6
		1	24	16	8	8	6	6
		1 1/2	20	12	8	6	6	4
		2	16	8	8	6	4	4
		2 1/2	16	8	6	4	4	-
		3	12	6	4	4	-	-
		3 1/2	8	4	-	-	-	-
	SFS intec Dekfast™	1/2	24	16	12	8	8	6
		1	24	16	8	8	6	6
		1 1/2	20	12	8	6	6	4
		2	16	8	8	6	4	4
		2 1/2	16	8	6	4	4	-
		3	12	6	4	4	-	-
		3 1/2	8	4	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	16	8	6	6	4	4
		3/4	16	8	6	4	4	-
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
	#10 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4
		1	16	8	6	4	4	4
		1 1/2	16	8	6	4	4	-
	#12 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4
		1	16	8	6	6	4	4
		1 1/2	16	8	6	4	4	-

Table 13. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	20	16	12	8	8
		1	24	20	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	6	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-
	FastenMaster® HeadLOK®	1/2	24	20	16	12	8	8
		1	24	20	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	8	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-
	SFS intec Dekfast™	1/2	24	20	12	12	8	8
		1	24	16	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	6	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-
16-gauge Structural (53 mil)	#8 Screw	1/2	16	8	6	6	4	4
		3/4	16	8	6	4	4	-
		1	16	8	6	4	4	-
		1 1/2	12	8	4	4	-	-
	#10 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4
		1	16	8	6	4	4	4
		1 1/2	16	8	6	4	4	-
	#12 Screw	1/2	20	12	8	6	4	4
		3/4	20	8	8	6	4	4

Table 13. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 16" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil)	#12 Screw	1	16	8	6	6	4	4
		1 1/2	16	8	6	4	4	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	24	20	16	12	8	8
		1	24	20	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	6	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-
	FastenMaster® HeadLOK®	1/2	24	20	16	12	8	8
		1	24	20	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	8	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-
	SFS intec Dekfast™	1/2	24	20	12	12	8	8
		1	24	16	12	8	8	6
		1 1/2	24	16	12	8	6	6
		2	24	12	8	6	6	4
		2 1/2	20	8	8	6	4	4
		3	12	8	6	4	4	-
		3 1/2	8	6	4	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

Table 14. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	#8 Screw	1/2	6	4	4	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	4	-	-	-	-
	#12 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	4	-	-	-
		1 1/2	6	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	6	4	4	4
		1	8	6	6	4	4	4
		1 1/2	8	6	4	4	-	-
		2	8	4	4	-	-	-
		2 1/2	6	4	-	-	-	-
		3	4	-	-	-	-	-
		3 1/2	-	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	6	4	4	4
		1	8	6	6	4	4	4
		1 1/2	8	6	4	4	-	-
		2	8	4	4	-	-	-
		2 1/2	6	4	-	-	-	-
		3	4	-	-	-	-	-
		3 1/2	-	-	-	-	-	-
	SFS intec Dekfast™	1/2	12	8	6	4	4	4
		1	8	6	6	4	4	4
		1 1/2	8	6	4	4	-	-
		2	8	4	4	-	-	-
		2 1/2	6	4	-	-	-	-

Table 14. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil)	SFS intec Dekfast™	3	4	-	-	-	-	-
		3 1/2	-	-	-	-	-	-
18-gauge Structural (43 mil)	#8 Screw	1/2	6	4	4	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	4	-	-	-	-
	#12 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	4	-	-	-
		1 1/2	6	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4
		2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4
		2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	SFS intec Dekfast™	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4

Table 14. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil)	SFS intec Dekfast™	2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
16-gauge Structural (63 mil)	#8 Screw	1/2	6	4	4	-	-	-
		3/4	6	4	-	-	-	-
		1	6	4	-	-	-	-
		1 1/2	4	-	-	-	-	-
	#10 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	-	-	-	-
		1 1/2	6	4	-	-	-	-
	#12 Screw	1/2	8	4	4	-	-	-
		3/4	6	4	4	-	-	-
		1	6	4	4	-	-	-
		1 1/2	6	4	-	-	-	-
	TRUFAST® SIPLD or TRUFAST® SIPHD	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4
		2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-
	FastenMaster® HeadLOK®	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4
		2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-

Table 14. Maximum Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Utilizing 5/8" or 3/4" OSB with Vertical Cold-Form Steel Studs Spaced 24" o.c.[1,3,4,5]

Framing Member	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Max. Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (63 mil)	SFS intec Dekfast™	1/2	12	8	8	6	4	4
		1	12	8	6	4	4	4
		1 1/2	8	8	6	4	4	4
		2	8	6	4	4	-	-
		2 1/2	6	4	4	-	-	-
		3	6	4	-	-	-	-
		3 1/2	4	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Minimum fastener penetration into stud is the steel thickness plus three threads and the tip of the fastener.
2. The weight of foam insulation and sheathing is included in the fastener spacing calculations. The specified cladding weight shall include all other supported materials besides the foam insulation and sheathing.
3. Foam insulation is installed directly to the studs with the OSB or plywood to the exterior of the structure.
4. Nail and screw values determined using NDS Yield Limit Equations and TR-12 for evaluating the foam as a gap.
5. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths. Minimum bending yield strength for nails with a diameter up to 0.148", 0.162", and 0.225" shall be 90,000 psi, 90,000 psi, and 80,000 psi respectively. Proprietary fastener properties are per published data or testing.

5.8 *Fastener Attachments to Concrete Substrate for ThermalStar® and EnergyShield® Products to Support Cladding Weight*

5.8.1 Fasteners are required to attach the EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, or EnergyShield® products to the substrate to carry the cladding weight listed in the tables below.

5.8.2 The cladding weight shall include the weight of the EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, or EnergyShield® products as well as any additional cladding attached to the sheathing.

5.8.3 Any thickness added by backing on any of the EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® products, or EnergyShield® products may be assumed to be part of the foam thickness of the product when using these tables.

5.8.4 The tables below only consider the gravity (dead) loads corresponding to the tabulated cladding weights.

5.8.4.1 See Table 15 through Table 17 for allowable cladding loads for various fastener types and sheathing thicknesses for connection to minimum 2,500 psi concrete (at 28 days).

5.8.5 For attaching to concrete substrate, fasteners with equal or greater design properties shall be permitted:

5.8.5.1 ITW Buildex Tapcon® Hex: 3/16" nominal diameter

5.8.5.2 Hilti KH-EZ C: 1/4" nominal diameter

5.8.5.3 Simpson Strong-Tie® Titen HD®: 1/4" nominal diameter

Table 15. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 16" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
Concrete (f_c' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex[1]	1/2	24	24	24	16	12	12
		3/4	24	24	24	16	12	12
		1	24	24	20	16	12	8
		1 1/2	24	24	20	12	12	8
		2	24	24	16	12	8	8
		2 1/2	24	20	12	8	8	6
		3	24	16	8	8	6	4
		3 1/2	24	12	8	6	4	4
		4	16	8	4	4	-	-
		4 1/2	8	4	-	-	-	-
Concrete (f_c' = 2,500 psi)	1/4" Hilti KH-EZ C[2]	1/2	24	24	24	20	16	12
		3/4	24	24	24	20	16	12
		1	24	24	24	16	12	12
		1 1/2	24	24	20	16	12	8
		2	24	24	20	12	12	8
		2 1/2	24	24	16	12	8	8
		3	24	20	12	8	8	6
		3 1/2	24	20	12	8	8	6
		4	24	16	8	8	6	4
		4 1/2	24	12	8	6	4	4
	1/4" Simpson Strong-Tie® Titen HD®[3]	1/2	24	24	16	12	8	8
		3/4	24	24	16	12	8	8
		1	24	24	16	12	8	8
		1 1/2	24	20	12	8	8	6
		2	24	20	12	8	8	6
		2 1/2	24	16	12	8	6	6
		3	24	16	8	8	6	4
		3 1/2	24	12	8	6	4	4
		4	20	8	6	4	4	-
		4 1/2	16	8	4	4	-	-

Table 15. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 16" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m2								
1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".								
2. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".								
3. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".								
4. The cladding weight shall include the weight of the foam insulation, and sheathing as well as any additional cladding attached to the sheathing.								

Table 16. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 24" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
Concrete (f_c' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex[1]	1/2	24	24	16	12	8	8
		3/4	24	24	16	12	8	8
		1	24	20	12	8	8	6
		1 1/2	24	20	12	8	8	6
		2	24	16	8	8	6	4
		2 1/2	24	12	8	6	4	4
		3	20	8	6	4	4	-
		3 1/2	16	8	4	4	-	-
		4	8	4	-	-	-	-
		4 1/2	4	-	-	-	-	-
	¼" Hilti KH-EZ C[2]	1/2	24	24	16	12	8	8
		3/4	24	24	16	12	8	8
		1	24	24	16	12	8	8
		1 1/2	24	20	12	8	8	6
		2	24	20	12	8	8	6
		2 1/2	24	16	12	8	6	6
		3	24	12	8	6	6	4
		3 1/2	24	12	8	6	4	4
		4	20	8	6	4	4	-
		4 1/2	16	8	4	4	-	-
Concrete (f_c' = 2,500 psi)	¼" Simpson Strong-Tie® Titen HD®[3]	1/2	24	16	12	8	6	6
		3/4	24	16	12	8	6	6

Table 16. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 24" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
Concrete (f_c' = 2,500 psi)	1/4" Simpson Strong-Tie® Titen HD®[3]	1	24	16	8	8	6	4
		1 1/2	24	12	8	6	6	4
		2	24	12	8	6	4	4
		2 1/2	24	12	8	6	4	4
		3	20	8	6	4	4	-
		3 1/2	16	8	6	4	-	-
		4	12	6	4	-	-	-
		4 1/2	8	4	-	-	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m2

1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".
2. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".
3. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".
4. The cladding weight shall include the weight of the foam insulation, and sheathing as well as any additional cladding attached to the sheathing.

Table 17. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 48" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
Concrete (f_c' = 2,500 psi)	3/16" ITW Buildex Tapcon® Hex[1]	1/2	24	12	8	6	4	4
		3/4	24	12	8	6	4	4
		1	20	8	6	4	4	-
		1 1/2	20	8	6	4	4	-
		2	16	8	4	4	-	-
		2 1/2	12	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	8	4	-	-	-	-
		4	4	-	-	-	-	-
		4 1/2	-	-	-	-	-	-
	1/4" Hilti KH-EZ C[2]	1/2	24	12	8	6	4	4
		3/4	24	12	8	6	4	4
		1	24	12	8	6	4	4
		1 1/2	20	8	6	4	4	-

Table 17. Maximum Vertical Fastener Spacing for EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products, and EnergyShield® Products Attached to Concrete (Horizontally Spaced at 48" o.c.)

Substrate Material	Screw Fastener Type & Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Vertical Fastener Spacing (in)					
			Specified Cladding Weight[4] (psf)					
			5	10	15	20	25	30
Concrete (f_c' = 2,500 psi)	¼" Hilti KH-EZ C[2]	2	20	8	6	4	4	-
		2 1/2	16	8	6	4	-	-
		3	12	6	4	-	-	-
		3 1/2	12	6	4	-	-	-
		4	8	4	-	-	-	-
		4 1/2	8	4	-	-	-	-
	¼" Simpson Strong-Tie® Titen HD®[3]	1/2	16	8	6	4	-	-
		3/4	16	8	6	4	-	-
		1	16	8	4	4	-	-
		1 1/2	12	6	4	-	-	-
		2	12	6	4	-	-	-
		2 1/2	12	6	4	-	-	-
		3	8	4	-	-	-	-
		3 1/2	8	4	-	-	-	-
		4	6	-	-	-	-	-
		4 1/2	4	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psf = 47.88 N/m2

1. Minimum nominal embedment depth of 2" and minimum edge distance of 2".
2. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".
3. Minimum nominal embedment depth of 1 5/8" and minimum edge distance of 1 1/2".
4. The cladding weight shall include the weight of the foam insulation, and sheathing as well as any additional cladding attached to the sheathing.

5.9 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

6 Installation

6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER, and the applicable building code.

6.2 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.

6.3 *Installation Procedure*

6.3.1 *Orientation:*

6.3.1.1 EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products shall be installed vertically with framing that has a nominal thickness of not less than 2" ($1^1/_2$" actual; 38.1 mm) and spaced a maximum of 24" (610 mm) o.c.

6.3.1.2 EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products shall be installed vertically over concrete.

6.3.2 *Attachment:*

6.3.2.1 Fasteners shall be installed with a minimum edge distance of $^3/_8$" (9.5 mm), unless noted otherwise.

6.3.2.2 Bending yield strength of commodity fasteners shall be as shown in NDS, Table 12N, footnote 2. Bending yield of proprietary fasteners are as published by the fastener manufacturer.

6.3.2.3 Fasteners shall be installed with the maximum on-center spacing as indicated in Table 3 through Table 17.

6.3.2.4 See footnotes of Table 15 through Table 17 for more installation information into concrete substrates.

7 Substantiating Data

7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

7.1.1 Connection load and spacing calculations by DrJ Engineering, LLC in accordance with NDS and accepted engineering practices.

7.1.2 Physical and mechanical properties for specified fasteners in Section 5 from approved sources.

7.1.3 Physical properties of EnergyShield® Ply, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products from approved sources.

7.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e., ANAB accredited agencies), approved sources (i.e., RDPs), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.

7.3 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

7.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies, and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.

7.5 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[10]

7.6 Where additional condition of use and/or code compliance information is required, please search for EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products on the DrJ Certification website.

8 Findings

8.1 As delineated in Section 3, EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products have performance characteristics that were tested and/or meet applicable standards and are suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products shall be approved for the following applications:

8.2.1 Use as a nail base for support of cladding materials when installed in accordance with the manufacturer installation instructions and this TER.

8.2.2 Thermal resistance for use as insulating sheathing in accordance with IECC Section R402.1 and IRC Section N1102.1.

8.2.3 Foam plastic insulation performance in accordance with IRC Section R316.

8.2.4 Performance for use as an air barrier in accordance with IECC Section C402.

8.2.5 Wind pressure resistance in accordance with IBC Section 1609.1.1 and IRC Section R301.2.1.

8.3 Unless exempt by state statute, when EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

8.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Atlas Roofing Corporation.

8.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[11] are similar) in pertinent part 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. 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.

[10] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

[11] 2018 IFC Section 104.9

8.6 **Approved**:[12] Building codes require that the building official shall accept duly authenticated reports[13] or research reports[14] from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.

8.6.1 Acceptance of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).

8.6.2 Acceptance of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.

8.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved, as denial without written reason deprives a protected right to free and fair competition in the marketplace.

8.7 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.

8.8 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members and Signatories to meet the Purpose of the MLA – "*certified once, accepted everywhere*." IAF specifically says, "*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope*."[15]

9 Conditions of Use

9.1 Material properties shall not fall outside the boundaries defined in Section 3.

9.2 As defined in Section 3, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

9.3 EnergyShield® Ply, ThermalStar® Nailbase, and WSP over ThermalStar® & EnergyShield® products may be used as a nail base for cladding.

9.3.1 Fastener size and spacing for attaching EnergyShield® Ply, ThermalStar® Nailbase, and WSP over ThermalStar® & EnergyShield® products to the wall framing shall be in accordance with Table 3 through Table 17.

9.3.2 Cladding attachments shall be in accordance with the cladding manufacturer installation instructions or an approved engineered design.

9.4 As listed herein, EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products shall not be used:

9.4.1 To serve as the primary bracing system to resist lateral loads.

9.4.2 To resist horizontal loads from concrete and masonry walls.

[12] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[13] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

[14] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[15] https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise

9.5 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

9.5.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an approved source, shall be approved when signed and sealed.

9.5.2 This TER and the installation instructions shall be submitted at the time of permit application.

9.5.3 These innovative products have an internal quality control program and a third-party quality assurance program.

9.5.4 At a minimum, these innovative products shall be installed per Section 6 of this TER.

9.5.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.

9.5.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.

9.5.7 The application of these innovative products in the context of this TER is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

9.6 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11*", all of IBC Section 104, and IBC Section 105.4.

9.7 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 (i.e., owner or RDP).

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.

10 Identification

10.1 The innovative products listed in Section 1 are identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at www.atlasrwi.com and www.atlasmoldedproducts.com.

11 Review Schedule

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

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

12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

12.1 EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products are included in this TER published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance Innovation,

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and

1.1.3 Benefit consumers through lower prices, better quality, and greater choice.

1.2 **Adopted Legislation**: The following local, state, and federal regulations affirmatively authorize EnergyShield® Ply Pro, ThermalStar® Nailbase, ThermalStar® Products and EnergyShield® Products to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to "protect economic freedom and opportunity by promoting free and fair competition in the marketplace."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation, and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[16] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years[17] and/or a $5,000,000 fine or 3 times the value of[18] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[19] that are not specifically provided for in any building code, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[20]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence, provided in writing, that specific legislation has been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[21]

[16] http://www.drjengineering.org/AppendixC and https://www.drjcertification.org/cornell-2016-protection-trade-secrets.

[17] https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

[18] https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

[19] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

[20] IBC 2021, Section 1706.1 Conformance to Standards

[21] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

1.3 **Approved**[22] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards, which apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[23] The Superintendent of Building roster of approved testing agencies is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a CBI Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[24]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed[25] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[26] (i.e., ANAB, International Accreditation Forum (IAF), etc.).

[22] See Section 8 for the distilled building code definition of **Approved**

[23] Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

[24] https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

[25] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

[26] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

1.6 **Approved by Florida**: Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods; 1) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 3) A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code; 4) A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code; 5) A statewide product approval issued by the Florida Building Commission. The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.8 **Approved by New Jersey**: Pursuant to Building Code 2018 of New Jersey in IBC Section 1707.1 General,[27] it states: “In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)”.[28] Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) Approvals**: Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations. 1. A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. 2. Reports of engineering findings issued by nationally recognized evaluation service programs, such as, but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item 2 given that the listed entities are no longer in existence and/or do not provide “reports of engineering findings”.

[27] https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

[28] https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[29] and Part 3280,[30] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) "All construction methods shall be in conformance with accepted engineering practices"; 2) "The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur."; and 3) "The design stresses of all materials shall conform to accepted engineering practice."

1.10 **Approval by US, Local, and State Jurisdictions in General**: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[31]

1.10.2 For innovative alternative products, materials, designs, services and/or methods of construction, in the absence of approved rules or other approved standards…the building official shall accept duly authenticated reports (i.e., listing and/or research report) from approved agencies with respect to the quality and manner of use of new materials or assemblies.[32] A building official approved agency is deemed to be approved via certification from an accreditation body that is listed by the International Accreditation Forum[33] or equivalent.

1.10.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[34] An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,

1.11.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.

[29] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

[30] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[31] IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

[32] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

[33] Please see the ANAB directory for building official approved agencies.

[34] IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

1.11.4 **Approved**: The purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA, and subsequently acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

Appendix B. Atlas Molded Products Plant Locations

Plant ID: **EMVVA**
UL PSN: 627453
445 Industrial Park Drive
Ridgeway, VA 24148
(800) 277-0967
Dean Knight - Process Engineer
dknight@atlasroofing.com

Plant ID: **EKMAZ**
UL PSN: 536448
4555 N Olympic Way
Kingman, AZ 86401
(928) 681-2800
Bob Bach - Plant Mgr
bbach@atlasroofing.com

Plant ID: **EFDWI**
UL PSN: 553426
90 Trowbridge Drive
Fond du Lac, WI 54936
(920) 924-4050
Roger Orlando - Plant Mgr
rorlando@atlasroofing.com

Plant ID: **EGAGA**
UL PSN: 556179
2731 White Sulfur Road
Gainesville, GA 30501
(770) 536-7900
Christopher Miller - Plant Mgr
c.miller@atlasroofing.com

Plant ID: **EKCBL**
UL PSN: 588837
1400 North 3rd Street
Kansas City, KS 6610J
(913) 321 4114
Bob Ladewig - Plant Mgr
rladewig@atlasroofing.com

Plant ID: **EMUUT**
UL PSN: 1176073
111 West Fireclay Avenue
Murray, UT 84107
(801) 265-3465
Jes Lundberg - Plant Mgr
jlundberg@atlasroofing.com

Plant ID: **EDNCO**
UL PSN: 755002
5250 North Sherman Street
Denver, CO 80216
(303) 297-3844
Daniom Teele - Plant Mgr
dtecle@atlasroofing.com

Plant ID: **EWAIA**
UL PSN: 556469
809 East 15th Street
Washington, IA 52353
(319) 653-6216
Daryl Russ - Plant Mgr
druss@atlasroofing.com

Plant ID: **ERNNV**
UL PSN: 553338
13695 Mt. Anderson St.
Reno, NV 89506
(775) 343-3400
David Jackson - Plant Mgr
djackson@atlasroofing.com

Plant ID: **EGRMI**
UL PSN: 535776
8240 Byron Center Ave SW Byron Center, MI 49315
(616) 878-1568
Ted Grant - Tech Director
tgrant@atlasroofing.com

Plant ID: **EPVMO**
UL PSN: 544072
911 Industrial Drive
Perryville, MO 63775
(800) 888-2332
Brad Holifield - Prod. Mgr
bholifield@atlasroofing.com

Plant ID: **ELACA**
UL PSN: 560059
Privada Misiones 1108
Tijuana, Mexico CP22500
(664) 973-1603
Rafael Hernandez, Process Egr
rhernandez@atlasroofing.com

Plant ID: **EFTMO**
UL PSN: 537096
701 Sargent Drive
Fredericktown, MO 63645
(573) 783-4200
April Fort - Plant Mgr
afort@atlasroofing.com

Plant ID: **EARTX**
UL PSN: 548054, 2522726
3220 Ave F
Arlington, TX 76011
(817) 654-4688
Joe Adamowicz - Plant Mgr
jadamowicz@atlasroofing.com

Appendix C. Atlas RWI Polyiso Manufacturing Locations

Camp Hill (CH)
817 Spangler Rd
Camp Hill, PA 17011

East Moline (EM)
3110 Morton Dr
East Moline, IL 61244

LaGrange (LG)
1303 Orchard Hill Rd
LaGrange, GA 30240

Diboll (DB)
101 W Borden Dr
Diboll, TX 75491

Phoenix (PX)
40 S 45th St
Phoenix, AZ 85043

Denver (DN)
11020 Leroy Dr
Northglenn, CO 80233

Toronto (TO)
55 Akron Rd
Etobicoke, ON M8W 1T3
Canada

Vancouver (VA)
971 Derwent Way
Delta, BC V3M 5R4
Canada