Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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

Trade Secret Report Holder:

Atlas Roofing Corporation

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 16 00 - Sheathing

Section: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 20 00 - Thermal Protection

Section: 07 21 00 - Thermal Insulation

Section: 07 27 00 - Air Barriers

1 Innovative Products Evaluated[1]

1.1 Atlas EnergyShield and ThermalStar Products:

1.1.1 ThermalStar Products:[2]

1.1.1.1 ThermalStar Nailbase

1.1.1.2 ThermalStar Structural Wall Insulation (SWI)

1.1.1.3 ThermalStar Laminated Wall Insulation (LWI)

1.1.1.4 ThermalStar Wall Insulation Board

1.1.1.5 ThermalStar Tongue & Groove (T&G) Insulation

1.1.2 EnergyShield Products:

1.1.2.1 EnergyShield

1.1.2.2 EnergyShield CGF

1.1.2.3 EnergyShield XR

1.1.2.4 EnergyShield Pro

1.1.2.5 EnergyShield CGF Pro

2 Product Description and Materials

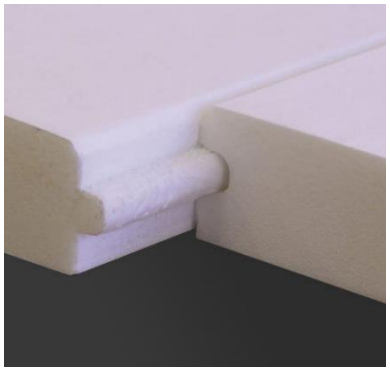
2.1 The innovative products evaluated in this report are shown in **Figure 1** and **Figure 2**, and are described in **Table 1**.

ThermalStar Nailbase

ThermalStar SWI Insulation Boards

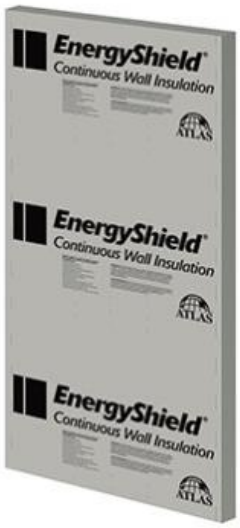
ThermalStar LWI Insulation Boards

ThermalStar Insulation Boards



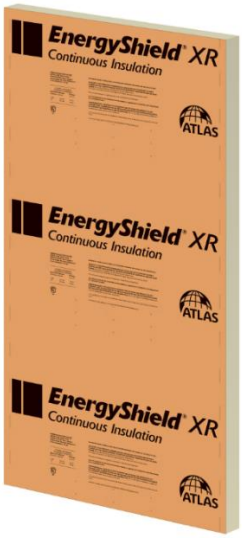
ThermalStar T&G Insulation Boards

Figure 1. ThermalStar EPS Wall Insulation Products

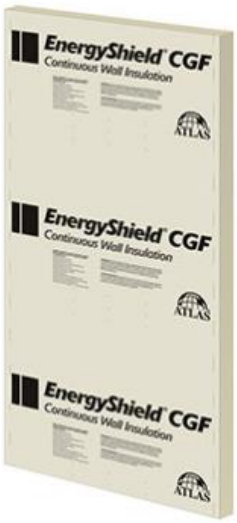


EnergyShield Insulation Board

EnergyShield Pro Insulation Board



EnergyShield XR Insulation Board



EnergyShield CGF Insulation Board

EnergyShield CGF Pro Insulation Board

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 Thickness (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 (in)	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 Thickness (in)	ThermalStar Structural Wall Insulation (SWI): • $^{1}/_{2}$" • $1^{1}/_{8}$" 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 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 (in)	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" x 96", 16" x 96", or 24" x 96"
Available Thickness (in)	EnergyShield and 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	

2.2 As needed, review material properties for design in **Section 6** and the regulatory evaluation in **Section 8**.

3 Definitions[3]

3.1 New Materials[4] are defined as building materials, equipment, appliances, systems, or methods of construction, not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[5] The design strength and permissible stresses shall be established by tests[6] and/or engineering analysis.[7]

3.2 Duly authenticated reports[8] and research reports[9] are test reports and related engineering evaluations that are written by an approved agency[10] and/or an approved source.[11]

3.2.1 These reports utilize intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secretes under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[12]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is accredited and listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[13]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[14] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[15] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[16] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[17]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[18] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[19] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[20]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[21]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[22]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[23]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[24] and Part 3280[25] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.2.3 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.3 *Standards*

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

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

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

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

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

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

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

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

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

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

4.3.11 *AWC TR12: General Dowel Equations for Calculating Lateral Connection Values with Appendix A*

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

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

5 Listed[26]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), an approved agency (i.e., CBI and DrJ), and/or and approved source (i.e., DrJ), or other organization(s) concerned with product evaluation (i.e., DrJ), that maintains periodic inspection (i.e., CBI) 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.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General*

6.1.1 The Atlas EnergyShield and ThermalStar Products in this report are evaluated for the following applications:

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

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

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

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

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

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

6.2 *Thermal Insulation*

6.2.1 Atlas EnergyShield and ThermalStar Products are intended to be used as exterior continuous insulation under any type of permitted cladding.

6.3 *Air Barrier*

6.3.1 Atlas EnergyShield and ThermalStar 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 with all seams, including the top and bottom edges, treated in accordance with the manufacturer installation instructions and this report.

6.3.2 The air permeance of an air barrier material is defined in IRC Section N1101.10.5, IECC Section R303.1.5, and IECC Section C402.6.2.3.1[27] 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.

6.3.3 *Thermal Star:*

6.3.3.1 ThermalStar SWI and ThermalStar LWI at a minimum thickness of $^1/_2$" meet these criteria.

6.3.4 *EnergyShield:*

6.3.4.1 EnergyShield CGF and EnergyShield CGF Pro at a minimum thickness of 1.1" meet these criteria.

6.3.4.2 EnergyShield at a minimum thickness of $^3/_4$" meet these criteria.

6.3.4.3 Additional information can be found in Report Number 2202-01.

6.4 *Surface Burning Characteristics*

6.4.1 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.

6.4.2 Additional information regarding ThermalStar SWI can be found in Report Number 1905-02.

6.4.3 Fire performance for EnergyShield products is evaluated in Report Number 1306-03.

6.5 *Wing Pressure Resistance*

6.5.1 Atlas EnergyShield and ThermalStar 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		Maximum Wall Stud Spacing (in)	Maximum 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.

6.6 *Fastener Attachments to Wood to Support Cladding Weight*

6.6.1 Fasteners are required to attach Atlas EnergyShield and ThermalStar Products to the wall framing to carry the cladding weight.

6.6.1.1 For Atlas EnergyShield and ThermalStar Products, the following tables give the allowable cladding loads:

6.6.1.1.1 Any thickness added by backing on any of the Atlas EnergyShield and ThermalStar Products may be assumed to be part of the foam thickness of the product when using these tables.

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

6.6.2 Minimum penetration into wood wall framing is $1^1/_4$" as specified in IRC Table R703.15.1, unless specifically noted in this report.

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

6.6.3.1 8d nail (0.131" x 2.5"): 0.281" head diameter

6.6.3.2 12d nail (0.148" x 3.25"): 0.312" head diameter

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

6.6.3.4 FastenMaster HeadLOK: 0.191" shank diameter, 0.625" head diameter

6.6.3.5 TRUFAST SIPTP: 0.189" shank diameter, 0.635" head diameter

Table 3. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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)	Maximum 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	-	-
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	-

Table 3. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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 2 x 4 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 Atlas EnergyShield and ThermalStar Products Utilizing $^{7}/_{16}$" and $^{1}/_{2}$" OSB with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-

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

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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
	$3^{1}/_{2}$	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 2 x 4 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 Atlas EnergyShield and ThermalStar Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 16" o.c.[1,3,4,5,6]

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-
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	-

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

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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 2 x 4 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 Atlas EnergyShield and ThermalStar Products Utilizing 1/2" or 5/8" Plywood with Vertical Wood Studs Spaced 24" o.c.[1,3,4,5,6]

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-

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

Fastener Type and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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
	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 2 x 4 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 Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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
	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

Table 7. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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 2 x 4 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 Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-

Table 8. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
		Specified Cladding Weight[2] (psf)					
		5	10	15	20	25	30
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
	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/m2

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 2 x 4 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.

6.7 *Fastener Attachments to Cold-Formed Steel Studs (CFS) to Support Cladding Weight*

6.7.1 Fasteners are required to attach Atlas EnergyShield and ThermalStar Products sheathing to the wall framing to carry the cladding weight.

6.7.1.1 For Atlas EnergyShield and ThermalStar Products the following tables give the allowable cladding loads:

6.7.1.1.1 Any thickness added by backing on any of the Atlas EnergyShield and ThermalStar Products may be assumed to be part of the foam thickness of the product when using these tables.

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

6.7.2 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.

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

6.7.3.1 #8 screw: 0.164" shank diameter, 0.312" head diameter

6.7.3.2 #10 screw: 0.190" shank diameter, 0.363" head diameter

6.7.3.3 #12 screw: 0.216" shank diameter, 0.414" head diameter

6.7.3.4 TRUFAST SIPLD: 0.189" shank diameter, 0.635" head diameter

6.7.3.5 TRUFAST SIPHD: 0.189" shank diameter, 0.635" head diameter

6.7.3.6 FastenMaster HeadLOK: 0.191" shank diameter, 0.625" head diameter

6.7.3.7 SFS intec Dekfast: 0.191" shank diameter, 0.625" head diameter

Table 9. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-	-	-

Table 9. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	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	-	-	-
		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	-	-	-

Table 9. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	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	-	-	-
		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	-	-	-	-

Table 9. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil) continued	#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	-	-	-
		3	8	4	-	-	-	-
		3 1/2	6	-	-	-	-	-

Table 9. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30

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. 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 Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-	-	-

Table 10. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	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	-	-	-	-
		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	-	-	-	-	-

Table 10. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	#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	-	-	-	-
		3	6	-	-	-	-	-
		3 1/2	4	-	-	-	-	-

Table 10. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
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 Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil) continued	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/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 11. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-

Table 11. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	#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	-	-	-	-

Table 11. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
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	-	-
		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	-	-	-	-

Table 11. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	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	-	-	-
	#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	-	-	-	-

Table 11. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil) continued	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/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 12. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-	-	-

Table 12. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	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	-	-	-
		$2^{1}/_{2}$	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	-	-	-	-	-

Table 12. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	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	-	-	-
		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	-	-	-	-

Table 12. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil) continued	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	-	-	-
		2 1/2	8	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.

Table 13. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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
		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	-	-	-	-

Table 13. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	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	-
	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	-	-	-

Table 13. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	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
		1	16	8	6	6	4	4
		1 1/2	16	8	6	4	4	-

Table 13. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (53 mil) continued	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 Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum 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	-	-	-	-	-	-

Table 14. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
20-gauge Structural (33 mil) continued	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	-	-	-	-
		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	-	-	-	-	-

Table 14. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
18-gauge Structural (43 mil) continued	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
		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	-	-	-	-

Table 14. Maximum Fastener Spacing for Atlas EnergyShield and ThermalStar 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 and Minimum Size	Nominal Thickness of Foam Insulation Board (in)	Maximum Fastener Spacing (in)					
			Specified Cladding Weight[2] (psf)					
			5	10	15	20	25	30
16-gauge Structural (63 mil) continued	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
		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.

6.8 *Fastener Attachments to Concrete Substrate for Atlas EnergyShield and ThermalStar Products to Support Cladding Weight*

6.8.1 Fasteners are required to attach the Atlas EnergyShield and ThermalStar Products to the substrate to carry the cladding weight listed in the tables below.

6.8.2 The cladding weight shall include the weight of the Atlas EnergyShield and ThermalStar Products as well as any additional cladding attached to the sheathing.

6.8.3 Any thickness added by backing on any of the Atlas EnergyShield and ThermalStar Products may be assumed to be part of the foam thickness of the product when using these tables.

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

6.8.4.1 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).

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

6.8.5.1 ITW Buildex Tapcon® Hex: $^{3}/_{16}$" nominal diameter

6.8.5.2 Hilti KH-EZ C: $^{1}/_{4}$" nominal diameter

6.8.5.3 Simpson Strong-Tie® Titen HD®: $^{1}/_{4}$" nominal diameter

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

Substrate Material	Screw Fastener Type and 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	-	-	-	-

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

Substrate Material	Screw Fastener Type and 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" 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	-	-

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 Atlas EnergyShield and ThermalStar Products Attached to Concrete (Horizontally Spaced at 24" o.c.)

Substrate Material	Screw Fastener Type and 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	-	-

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

Substrate Material	Screw Fastener Type and 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]	1/2	24	16	12	8	6	6
		3/4	24	16	12	8	6	6
		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 Atlas EnergyShield and ThermalStar Products Attached to Concrete (Horizontally Spaced at 48" o.c.)

Substrate Material	Screw Fastener Type and 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 (fc' = 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	-
		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	-	-	-	-

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

Substrate Material	Screw Fastener Type and 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 (fc' = 2,500 psi)	1/4" 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.

6.9 Where it is anticipated that loads will be applied to a single fastener simultaneously in more than one direction, additional evaluation is required to account for the combined effect of these loads using accepted engineering practice.

6.10 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.

7 Certified Performance[28]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[29]

7.2 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.[30]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Atlas EnergyShield and ThermalStar Products comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Atlas EnergyShield and ThermalStar Products were evaluated to determine the following:

8.1.1.1 Thermal resistance for use as insulating sheathing in accordance with IRC Section N1102.1, IRC Section N1102.2, IECC Section C402, and IECC Section R402.

8.1.1.2 Foam plastic insulation performance in accordance with IBC Section 2603 and IRC Section R303.[31]

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

8.1.1.4 Connection to light-frame cold-formed steel framing to support cladding weight in accordance with IBC Section 1604.2 and IRC Section R301.1.3.

8.1.1.5 Connection to concrete substrate to support cladding weight in accordance with IBC Section 1901.3 and IRC Section R301.1.3.

8.1.1.6 Performance for use as an air barrier in accordance with IRC Section N1101.10.5, IECC Section R303.1.5, and IECC Section C402.6.2.3.1.[32]

8.1.1.7 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with IRC Section R301.2.1 and IBC Section 1609.1.1.

8.2 Design of cladding being fastened to Atlas EnergyShield and ThermalStar Products is outside the scope of this report.

8.3 Seismic design is outside the scope of this report.

8.4 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[33] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[34] respectively.

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

8.6 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

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

9.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

9.3 *Installation Procedure*

9.3.1 *Orientation:*

9.3.1.1 Atlas EnergyShield and ThermalStar 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.

9.3.1.2 Atlas EnergyShield and ThermalStar Products shall be installed vertically over concrete.

9.3.2 *Attachment:*

9.3.2.1 Fasteners shall be installed with a minimum edge distance of $^{3}/_{8}$" (9.5 mm), unless noted otherwise.

9.3.2.2 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.

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

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

10 Substantiating Data

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

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

10.1.2 Physical and mechanical properties for specified fasteners in **Section 6** from approved sources.

10.1.3 Physical properties of Atlas EnergyShield and ThermalStar Products from approved sources

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.4 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, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 *Testing and Engineering Analysis*

10.5.1 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.[35]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Atlas EnergyShield and ThermalStar Products on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, Atlas EnergyShield and ThermalStar Products have performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Atlas EnergyShield and ThermalStar Products shall be approved for the following applications:

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

11.2.2 Thermal resistance for use as insulating sheathing in accordance with IECC Section R402.1 and IRC Section N1102.1, and IECC Section C402.1.

11.2.3 Foam plastic insulation performance in accordance with IBC Section 2603 and IRC Section R303.[36]

11.2.4 Performance for use as an air barrier in accordance with IRC Section N1101.10.5, IECC Section R303.1.5, and IECC Section C402.6.2.3.1.[37]

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

11.3 Unless exempt by state statute, when Atlas EnergyShield and ThermalStar 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.

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

11.5 IBC Section 104.2.3[38] (IRC Section R104.2.2[39] and IFC Section 104.2.3[40] are similar) in pertinent part state:

> **104.2.3 Alternative Materials, Design and Methods of Construction and Equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative is not specifically prohibited by this code and has been approved.

11.6 **Approved:**[41] Building regulations require that the building official shall accept duly authenticated reports.[42]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 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. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Arrangement (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[43]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, 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.

12.3 As listed herein, Atlas EnergyShield and ThermalStar Products shall be used:

12.3.1 As a nail base for cladding.

12.3.1.1 Fastener size and spacing for attaching Atlas EnergyShield and ThermalStar Products to the wall framing shall be in accordance with **Table 3** through **Table 17**.

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

12.4 As listed herein, Atlas EnergyShield and ThermalStar Products shall not be used:

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

12.4.2 To resist horizontal loads from concrete and masonry walls.

12.5 Atlas EnergyShield and ThermalStar Products shall be separated from the interior of the building with an approved thermal barrier in accordance with IBC Section 2603.4 or IRC Section R303.4,[44] where applicable.

12.5.1 For more information regarding properties of EnergyShield products, see Report Number 2209-01, Report Number 2202-01 and Report Number 1306-03.

12.5.2 For more information regarding properties of ThermalStar products, see Report Number 1905-02.

12.6 In areas where the probably of termite infestation is labeled “very heavy”, Atlas EnergyShield and ThermalStar Products boards are installed on buildings or structures of wood-framed construction, the installation shall follow the provisions of IBC Section 2603.8 and IRC Section R305.4,[45] where applicable.

12.7 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:

12.7.1 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.

12.7.2 This report and the installation instructions shall be submitted at the time of permit application.

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

12.7.4 At a minimum, these innovative products shall be installed per **Section 9**.

12.7.5 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.7.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.7.7 The application of these innovative products in the context of this report 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.

12.8 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *“the building official shall make, or cause to be made, the necessary tests and investigations; or 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 104.2.3”*, all of IBC Section 104, and IBC Section 105.3.

12.9 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.10 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 Atlas EnergyShield and ThermalStar Products, as listed in **Section 1.1**, are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at www.atlasmoldedproducts.com or www.atlasrwi.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit www.drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

Notes

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

2 Made in all of the manufacturing locations except Anthony, Texas.

3 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

4 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

5 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

6 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

7 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.2.3.

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

11 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

12 https://www.law.cornell.edu/uscode/text/18/1832 (b) 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. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

13 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

14 https://www.cbitest.com/accreditation/

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

17 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

18 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

19 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

20 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

21 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

23 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

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

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

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

27 2021 IECC Section C402.5.1.3 and 2018 IECC Section C402.5.1.2.1

28 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

29 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[30] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[31] 2021 IRC Section R316.3

[32] 2021 IECC Section C402.5.1.3 and 2018 IECC Section C402.5.1.2.1

[33] 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.

[34] https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

[35] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[36] 2021 IRC Section R316.3

[37] 2021 IECC Section C402.5.1.3 and 2018 IECC Section C402.5.1.2.1

[38] 2021 IBC Section 104.11

[39] 2021 IRC Section R104.11

[40] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[41] 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 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[42] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

[43] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[44] 2021 IRC Section R316.4

[45] IRC Section R318.4