Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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TRUFAST® SIP Fasteners for Use in Vented and Non-Vented Nailable Insulation Panels in Roofing Applications

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CSI Designations:

DIVISION: 04 00 00 - MASONRY	DIVISION: 05 00 00 - METALS	DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES
	Section: 05 05 23 - Metal Fastenings	Section: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Innovative Products Evaluated[1]

1.1 TRUFAST SIP Fasteners:

1.1.1 SIP TP

1.1.2 SIP LD

2 Product Description and Materials

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

2.2 *Fasteners*

2.2.1 SIP TP (Thread Point) Fasteners are size No. 14 fasteners with a pancake head and a T-30 drive. The point is a threaded drill point. The SIP TP Fastener is shown in **Figure 1**.

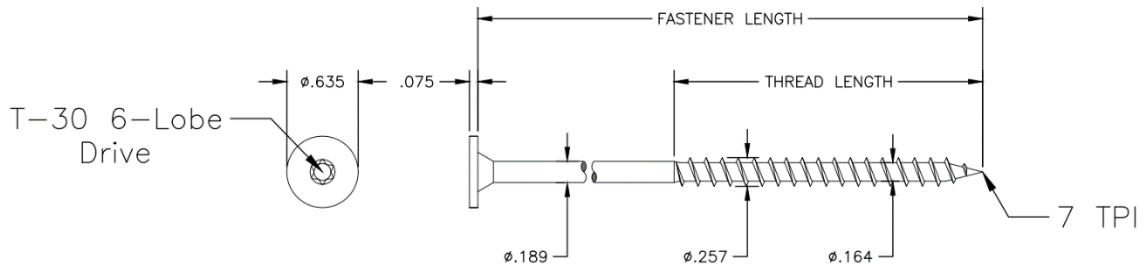

Figure 1. SIP TP Fastener

2.2.2 SIP LD (Light-Duty) Fasteners are size No. 14 fasteners with a pancake head and a T-30 drive. The point is a two-flute formed drill tip. The SIP LD Fastener is shown in **Figure 2**.

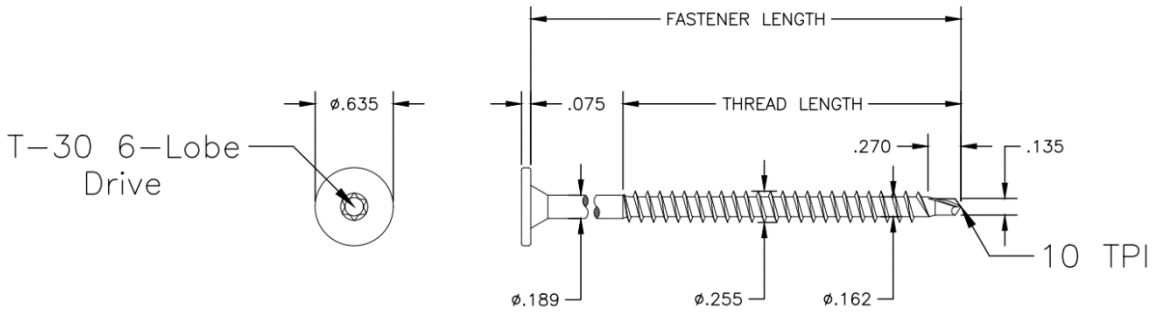

Figure 2. SIP LD Fastener

2.2.3 TRUFAST SIP Fasteners are covered with TRUFAST® Tru-Kote™ coating.

2.2.3.1 TRUFAST SIP Fasteners coated with TRUFAST Tru-Kote were tested and passed ASTM D6294 with less than fifteen percent (15%) red rust after 15 cycles, in accordance with FM 4470.

2.2.4 The fasteners evaluated in this report are set forth in **Table 1** and **Table 2**.

Table 1. SIP TP Fastener Specifications

Fastener Name	Fastener Part Number	Head (in)		Nominal Length[1] (in)	Thread Length[1] (in)	Shank Diameter[2] (in)	Thread Diameter (in)		Nominal Bending Yield,[3] F_{yb} (psi)	Allowable Fastener Strength (lb)		
		Diameter	Drive Type				Minor	Major		Tensile	Shear at Shank Diameter	Shear at Minor Diameter
SIP TP	SIPTP-2000	0.635	T-30	2.00	1.75	0.189	0.164	0.257	185,000	1,185	975	860
	SIPTP-2500			2.50								
	SIPTP-3000			3.00	2.00							
	SIPTP-3500			3.50								
	SIPTP-4000			4.00	2.75							
	SIPTP-4500			4.50								
	SIPTP-5000			5.00								
	SIPTP-5500			5.50								
	SIPTP-6000			6.00								
	SIPTP-6500			6.50								
	SIPTP-7000			7.00								
	SIPTP-7500			7.50								
	SIPTP-8000			8.00								
	SIPTP-8500			8.50								
	SIPTP-9000			9.00								
	SIPTP-10000			10.00								
	SIPTP-11000			11.00								
	SIPTP-12000			12.00								
	SIPTP-13000			13.00								
	SIPTP-14000			14.00								
	SIPTP-15000			15.00								
	SIPTP-16000			16.00								
	SIPTP-18000			18.00								

SI: 1 in. = 25.4 mm, 1 lb. = 4.45 N, 1 psi = 0.00689 MPa

1. Fastener length is measured from the underside of the head to the tip. Thread length includes tapered tip (see **Figure 1**).
2. Shank diameter based on manufactured thickness. Finished dimensions are larger due to the proprietary coatings added.
3. Nominal bending yield, F_{yb}, is measured along the threaded portion of the fastener. For the nominal bending yield of the fastener along the shank, take a ten percent (10%) reduction.

Table 2. SIP LD Fastener Specifications

Fastener Name	Fastener Part Number	Head (in)		Nominal Length[1] (in)	Thread Length[1] (in)	Point Length (in)	Shank Diameter[2] (in)	Thread Diameter (in)		Nominal Bending Yield,[3] F_{yb} (psi)	Allowable Fastener Strength (lb)		
		Diameter	Drive Type					Minor	Major		Tensile	Shear at Shank Diameter	Shear at Minor Diameter
SIP LD	SIPLD-2250	0.635	T-30	2.25	1.00	0.125	0.189	0.162	0.255	185,000	1,130	945	830
	SIPLD-3000			3.00	2.75	0.275							
	SIPLD-3250			3.25	1.50	0.125							
	SIPLD-3500			3.50	2.75	0.275							
	SIPLD-4000			4.00									
	SIPLD-4250			4.25	2.00	0.125							
	SIPLD-4500			4.50	2.75	0.275							
	SIPLD-5000			5.00									
	SIPLD-5250			5.25	2.50	0.125							
	SIPLD-5500			5.50	2.75	0.275							
	SIPLD-6000			6.00									
	SIPLD-6500			6.50									
	SIPLD-7000			7.00									
	SIPLD-7500			7.50									
	SIPLD-8000			8.00									
	SIPLD-8500			8.50									
	SIPLD-9000			9.00									
	SIPLD-9500			9.50									
	SIPLD-10000			10.00									
	SIPLD-11000			11.00									
	SIPLD-12000			12.00									
	SIPLD-13000			13.00									
	SIPLD-14000			14.00									
	SIPLD-15000			15.00									
	SIPLD-16000			16.00									
	SIPLD-18000			18.00									

SI: 1 in. = 25.4 mm, 1 lb. = 4.45 N, 1 psi = 0.00689 MPa

1. Fastener length is measured from the underside of the head to the tip. Thread length includes tapered tip (see **Figure 2**).
2. Shank diameter based on manufactured thickness. Finished dimensions are larger due to the proprietary coatings added.
3. Nominal bending yield, F_{yb}, is measured along the threaded portion of the fastener. For the nominal bending yield of the fastener along the shank, take a ten percent (10%) reduction.

2.3 *Vented and Non-Vented Nailable Insulation Panels*

2.3.1 Vented nailable insulation panels are a composite of single layer of Oriented Strand Board (OSB) or plywood material, vent spacer, and a rigid insulation board(s). Vented nailable insulation panels have an air space formed by blocking between the wood facer and foam insulation.

2.3.2 Non-Vented nailable insulation panels are a composite of a single layer of OSB or plywood material and a rigid insulation board(s).

2.3.3 *Rigid Insulation Board:*

2.3.3.1 Expanded Polystyrene (EPS) shall be ASTM C578 Type 1, at a minimum.

2.3.3.2 Polyisocyanurate (polyiso) insulation shall be ASTM C1289, Type II Class 1 Grade 2 minimum or Type II Class 2 Grade 2 minimum.

2.3.3.3 EPS and polyiso products with greater density and compressive strength than the types listed above are also allowed.

2.3.4 *Vent Spacers:*

2.3.4.1 Vent spacers shall be constructed of either EPS or wood blocking per manufacturer specifications.

2.3.5 *Nailable Surface:*

2.3.5.1 Facing material shall be a minimum of:

2.3.5.1.1 $^{7}/_{16}$" thick OSB with a specific gravity of at least 0.50 and comply with DOC PS 2

2.3.5.1.2 $^{19}/_{32}$" thick plywood with a specific gravity of at least 0.50 and comply with DOC PS 1

2.4 *Field Fabricated Nailable Insulation Panels*

2.4.1 Nailable insulation panels may also consist of OSB or plywood over layer(s) of foam insulation, with or without a vent space.

2.4.2 Where Fire-Retardant Treated (FRT) plywood is used as a nail base, the appropriate reduction factors shall be taken per the FRT manufacturer.

2.5 *Substrate Materials*

2.5.1 *Wood Roof Deck:*

2.5.1.1 Wood roof decks must meet the requirements of the nailable insulation panel manufacturer or one of the following, whichever is most restrictive:

2.5.1.1.1 Solid sawn wood (plank or tongue-and-groove) shall be a minimum 1" thick and have a specific gravity of at least 0.42.

2.5.1.1.2 Plywood shall be a minimum $^{1}/_{2}$" thick with a specific gravity of at least 0.39 and comply with DOC PS 1.

2.5.1.1.3 OSB shall be a minimum $^{7}/_{16}$" thick with a specific gravity of at least 0.50 and comply with DOC PS 2.

2.5.2 *Steel Roof Deck:*

2.5.2.1 Steel must comply with one of the material standards provided in Section A3.1 of AISI S100.

2.5.2.1.1 The steel deck shall be a minimum 22-gauge and have a minimum tensile strength of 45 ksi (i.e., ASTM A653 Gr. 33, ASTM A1063 Gr. 33, etc.).

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

3 Definitions[2]

3.1 New Materials[3] 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.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

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 secrets under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

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.[12]

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[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] 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[15] 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.[16]

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.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] 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.[19]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[20]

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.[21]

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.[22]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[23] and Part 3280[24] 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®*

4.3 *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 *ASCE 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.3.4 *ASTM A370: Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

4.3.5 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*

4.3.6 *ASTM D6294: Standard Test Method for Corrosion Resistance of Ferrous Metal Fastener Assemblies Used in Roofing and Waterproofing*

4.3.7 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

4.3.8 *DOC PS 1: Structural Plywood*

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

4.3.10 *FM 4470: Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction*

5 Listed[25]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (e.g., CBI), an approved agency (e.g., CBI and DrJ), and/or and approved source (e.g., DrJ), or other organization(s) concerned with product evaluation (e.g., DrJ), that maintains periodic inspection (e.g., 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 TRUFAST SIP Fasteners are self-tapping fasteners used for attaching vented and non-vented nailable insulation panels to approved roof decks.

6.2 Unless otherwise noted, adjustment of the design stresses for load duration shall be in accordance with the applicable code.

6.3 *Connections in Wood Roof Deck*

6.3.1 TRUFAST SIP Fasteners are approved for attaching vented nailable insulation panels in roof assemblies with a maximum 2" vent space plus a maximum of 8.5" of foam insulation, (for a total of 10.5" space between nailable insulation panels face and roof deck) to wood decking or a non-vented nailable insulation panel with a total of 10.5" space between the nailable insulation panel face and roof deck.

6.3.1.1 The total foam insulation thickness may be comprised of multiple layers of foam or a single piece of foam.

6.3.2 Design of TRUFAST SIP Fasteners is governed by the applicable code and the provisions for dowel-type fasteners in the NDS.

6.3.3 The required number of fasteners per nailable insulation panels is selected by choosing the largest value for the applicable wind speed and snow/seismic load from **Section 6.3.7**, **Section 6.3.8**, **Section 6.3.9**, and **Section 6.3.10**, respectively.

6.3.4 For calculations involving snow loads, the tabulated fastener requirements for TRUFAST SIP Fasteners in **Section 6.3.10** are based on fastener properties from testing. The allowable lateral design values for the various roof-decking materials, with a load duration factor of 1.0, are as follows:

6.3.4.1 36 pounds for $^{7}/_{16}$" OSB

6.3.4.2 62 pounds for $^{1}/_{2}$" plywood, $^{19}/_{32}$" plywood, and 1" thick SPF (Spruce-Pine-Fir)

6.3.5 Nailable insulation panels shall be attached through the foam insulation to the roof deck or wood framing (if approved by the nailable insulation panel manufacturer) spaced a maximum of 24" on-center per the nailable insulation panel manufacturer specifications and installation instructions.

6.3.6 Fastener thread shall penetrate a minimum of 1" into sawn lumber decks (plank or tongue-and-groove). Fastener shall penetrate OSB and plywood decks and extend a minimum of $^{3}/_{4}$" beyond the underside of the board. Fastener length shall be specified so threads contact the full thickness of the OSB or plywood. Where FRT plywood nailable insulation panels are used, the tabulated allowable minimum number of fasteners shall be divided by the FRT manufacturer strength reduction factor for screw connections.

6.3.6.1 For example, where $^{1}/_{2}$" FRT plywood is used and the FRT manufacture specifies a strength design factor of 0.90 for wood screws.

6.3.6.1.1 **Table 3** requires 20 fasteners to resist a 120 mph wind load on Roof Zone 3 of a 3:12 roof pitch sheathed with standard $^{1}/_{2}$" plywood. If $^{1}/_{2}$" FRT plywood is used in place of $^{1}/_{2}$" standard plywood, the required number of fasteners is 20 ÷ 0.90 = 22.2. Therefore, 23 fasteners are required.

6.3.7 *ASCE 7–10 Wind Loading:*

6.3.7.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, hip and monoslope roofs per ASCE 7-10 are provided in **Table 3**.

Table 3. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-10 Wind Loads

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
$^{7}/_{16}$" OSB[1]												
Roof Zone 1	15	15	16	15	20	16	24	20	28	24	36	28
Roof Zone 2	15	15	20	15	24	16	32	24	40	28	48	32
Roof Zone 3	20	15	28	15	40	16	52	24	64	28	80	32
$^{1}/_{2}$" Plywood[2]												
Roof Zone 1	15	15	15	15	16	15	16	16	24	16	28	20
Roof Zone 2	15	15	16	15	20	15	24	16	28	20	36	24
Roof Zone 3	16	15	20	15	28	15	36	16	48	20	56	24
$^{19}/_{32}$" Plywood[3] or SPF[4]												
Roof Zone 1	15	15	15	15	15	15	15	15	16	15	20	16
Roof Zone 2	15	15	15	15	16	15	20	15	24	16	28	20
Roof Zone 3	15	15	16	15	20	15	28	15	36	16	44	20

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-10 wind components and cladding part 1 low-rise rise ($h \leq 60$ ft).
6. Tabulated values apply to hip, gable, and monoslope roofs only for wind exposure B or C.
7. Tabulated values assume $K_z = 1.13$, $K_{zt} = 1.0$, and $K_d = 0.85$. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-10 Chapter 30 for roof zone locations.
9. Tabulated values are based on a load duration factor $C_D = 1.6$. No further increases are permitted.

6.3.8 *ASCE 7–16 Wind Loading:*

6.3.8.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, monoslope and hip roofs per ASCE 7-16 are provided in **Table 4** through **Table 9**.

Table 4. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]						
Wind Speed (mph):	**100**	**120**	**140**	**160**	**180**	**200**
Roof Angle:	**θ ≤ 7°**					
$^{7}/_{16}$" OSB[1]						
Roof Zone 1'	15	15	15	16	20	24
Roof Zone 1	15	20	24	32	40	48
Roof Zone 2	16	24	32	40	52	64
Roof Zone 3	24	32	44	56	72	88
$^{1}/_{2}$" Plywood[2]						
Roof Zone 1'	15	15	15	15	16	20
Roof Zone 1	15	15	16	24	28	36
Roof Zone 2	15	16	24	32	36	48
Roof Zone 3	16	24	32	40	52	64
$^{19}/_{32}$" Plywood[3] **or SPF**[4]						
Roof Zone 1'	15	15	15	15	15	16
Roof Zone 1	15	15	15	16	20	24
Roof Zone 2	15	15	16	24	28	36
Roof Zone 3	15	20	24	32	40	48

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85 and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30, Figure 30.3-2A for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 5. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	16	15	15	20	16	20	28	20	24
Roof Zone 2e	16	15	15	20	16	20	28	20	24
Roof Zone 2n	20	20	16	32	24	20	40	36	28
Roof Zone 2r	20	20	15	32	24	20	40	36	24
Roof Zone 3e	20	20	24	32	24	32	40	36	44
Roof Zone 3r	24	24	16	36	36	20	48	48	28
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	15	15	15	16	15	16	20	16	20
Roof Zone 2e	15	15	15	16	15	16	20	16	20
Roof Zone 2n	16	15	15	24	20	16	32	24	20
Roof Zone 2r	16	15	15	24	20	16	32	24	20
Roof Zone 3e	16	15	16	24	20	24	32	24	32
Roof Zone 3r	20	20	15	28	28	16	36	36	20
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	15	15	15	15	15	15	16	15	16
Roof Zone 2e	15	15	15	15	15	15	16	15	16
Roof Zone 2n	15	15	15	16	16	15	24	20	16
Roof Zone 2r	15	15	15	16	16	15	24	20	16
Roof Zone 3e	15	15	15	16	16	20	24	20	24
Roof Zone 3r	16	16	15	20	20	15	28	28	16

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30 Figures 30.3-2B, 30.3-2C, and 30.3-2D for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 6. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	36	28	32	44	36	40	56	40	48
Roof Zone 2e	36	28	32	44	36	40	56	40	48
Roof Zone 2n	52	44	36	68	56	44	80	68	56
Roof Zone 2r	52	44	32	68	56	40	80	68	48
Roof Zone 3e	52	44	56	68	56	72	80	68	88
Roof Zone 3r	64	64	36	80	80	44	96	96	56
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	28	20	24	32	24	28	40	32	36
Roof Zone 2e	28	20	24	32	24	28	40	32	36
Roof Zone 2n	40	32	28	48	40	32	60	48	40
Roof Zone 2r	40	32	24	48	40	28	60	48	36
Roof Zone 3e	40	32	40	48	40	52	60	48	64
Roof Zone 3r	48	48	28	56	56	32	72	72	40
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	20	16	20	24	20	24	28	24	28
Roof Zone 2e	20	16	20	24	20	24	28	24	28
Roof Zone 2n	28	24	20	36	32	24	44	36	28
Roof Zone 2r	28	24	20	36	32	24	44	36	28
Roof Zone 3e	28	24	32	36	32	40	44	36	48
Roof Zone 3r	36	36	20	44	44	24	52	52	28

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30 Figures 30.3-2B, 30.3-2C, and 30.3-2D for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 7. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Monoslope Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Angle:	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**
$^{7}/_{16}$" OSB[1]												
Roof Zone 1	15	15	15	16	16	20	20	24	24	28	32	36
Roof Zone 2	15	15	16	16	20	24	24	28	28	36	36	44
Roof Zone 2'	15	-	16	-	24	-	28	-	36	-	44	-
Roof Zone 3	15	20	20	28	24	40	32	52	40	64	48	80
Roof Zone 3'	20	-	28	-	36	-	44	-	56	-	72	-
$^{1}/_{2}$" Plywood[2]												
Roof Zone 1	15	15	15	15	15	16	16	16	20	24	24	28
Roof Zone 2	15	15	15	15	16	16	16	20	24	28	28	32
Roof Zone 2'	15	-	15	-	16	-	20	-	28	-	32	-
Roof Zone 3	15	16	16	20	20	28	24	36	28	48	36	56
Roof Zone 3'	16	-	20	-	28	-	32	-	44	-	52	-
$^{19}/_{32}$" Plywood[3] or SPF[4]												
Roof Zone 1	15	15	15	15	15	15	15	15	16	16	16	20
Roof Zone 2	15	15	15	15	15	15	15	16	16	20	20	24
Roof Zone 2'	15	-	15	-	15	-	16	-	20	-	24	-
Roof Zone 3	15	15	15	16	16	20	20	28	24	36	28	44
Roof Zone 3'	15	-	16	-	20	-	24	-	32	-	40	-

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to monoslope roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30 Figure 30.3-5A and Figure 30.3-5B for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 8. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads - Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]												
Wind Speed (mph):	**100**				**120**				**140**			
Roof Angle:	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]												
Roof Zone 1	15	15	15	15	20	16	16	16	24	20	20	20
Roof Zone 2e	20	15	16	20	28	20	20	28	36	24	28	40
Roof Zone 2r	16	16	16	20	24	24	20	28	32	32	28	36
Roof Zone 3	20	15	16	24	28	20	20	36	36	24	28	48
$^{1}/_{2}$" Plywood[2]												
Roof Zone 1	15	15	15	15	16	15	15	15	20	16	16	16
Roof Zone 2e	16	15	15	16	20	16	16	20	28	20	20	28
Roof Zone 2r	15	15	15	16	20	20	16	20	24	24	20	28
Roof Zone 3	16	15	15	20	20	16	16	28	28	20	20	36
$^{19}/_{32}$" Plywood[3] or SPF[4]												
Roof Zone 1	15	15	15	15	15	15	15	15	16	15	15	15
Roof Zone 2e	15	15	15	15	16	15	15	16	20	16	16	20
Roof Zone 2r	15	15	15	15	16	16	15	16	20	20	16	20
Roof Zone 3	15	15	15	16	16	15	15	20	20	16	16	28

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to hip roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30 Figure 30.3-2H for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 9. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads - Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]												
Wind Speed (mph):	**160**				**180**				**200**			
Roof Angle:	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]												
Roof Zone 1	32	24	24	28	40	28	32	36	48	36	40	40
Roof Zone 2e	44	32	36	48	56	40	44	60	72	48	56	76
Roof Zone 2r	44	44	36	48	52	52	44	60	64	64	56	72
Roof Zone 3	44	32	36	64	56	40	44	80	72	48	56	96
$^{1}/_{2}$" Plywood[2]												
Roof Zone 1	24	16	20	20	28	24	24	24	36	28	28	32
Roof Zone 2e	32	24	28	36	44	28	32	44	52	36	40	56
Roof Zone 2r	32	32	28	36	40	40	32	44	48	48	40	52
Roof Zone 3	32	24	28	48	44	28	32	56	52	36	40	72
$^{19}/_{32}$" Plywood[3] or SPF[4]												
Roof Zone 1	20	15	16	16	24	16	16	20	28	20	20	24
Roof Zone 2e	24	20	20	28	32	24	24	32	40	28	28	40
Roof Zone 2r	24	24	20	28	28	28	24	32	36	36	28	40
Roof Zone 3	24	20	20	36	32	24	24	44	40	28	28	52

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to hip roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-16 Chapter 30 Figure 30.3-2H for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

6.3.9 *ASCE 7–22 Wind Loading:*

6.3.9.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, monoslope and hip roofs per ASCE 7-22 are provided in **Table 10** through **Table 15**.

Table 10. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]						
Wind Speed (mph):	**100**	**120**	**140**	**160**	**180**	**200**
Roof Angle:	**θ ≤ 7°**					
$^{7}/_{16}$" OSB[1]						
Roof Zone 1'	15	15	15	16	20	24
Roof Zone 1	15	20	24	32	40	48
Roof Zone 2	16	24	32	40	52	64
Roof Zone 3	24	32	44	56	68	84
$^{1}/_{2}$" Plywood[2]						
Roof Zone 1'	15	15	15	15	16	20
Roof Zone 1	15	15	16	24	28	36
Roof Zone 2	15	16	24	32	36	44
Roof Zone 3	16	24	32	40	52	64
$^{19}/_{32}$" Plywood[3] **or SPF**[4]						
Roof Zone 1'	15	15	15	15	15	16
Roof Zone 1	15	15	15	16	20	24
Roof Zone 2	15	15	16	24	28	32
Roof Zone 3	15	16	24	32	36	48

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figure 30.3-2A for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 11. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	16	15	15	20	16	20	28	20	24
Roof Zone 2	20	20	16	28	24	20	36	36	28
Roof Zone 3	24	20	20	36	32	24	48	40	36
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	15	15	15	16	15	16	20	16	20
Roof Zone 2	16	15	15	20	20	16	28	24	20
Roof Zone 3	20	16	15	28	24	20	36	28	24
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	15	15	15	15	15	15	16	15	16
Roof Zone 2	15	15	15	16	16	15	20	20	16
Roof Zone 3	16	15	15	20	16	16	28	24	20

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figure 30.3-2C for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 12. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads - Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	36	28	32	44	32	40	56	40	48
Roof Zone 2	48	44	36	60	56	44	72	68	56
Roof Zone 3	64	52	44	80	64	56	96	80	68
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	28	20	24	32	24	28	40	32	36
Roof Zone 2	36	32	28	44	40	32	52	48	40
Roof Zone 3	44	40	32	56	48	40	72	60	48
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	20	16	16	24	20	24	28	24	28
Roof Zone 2	24	24	20	32	32	24	40	36	28
Roof Zone 3	32	28	24	44	36	32	52	44	36

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to gable roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figures 30.3-2C and Figure 30.3-2D for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 13. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Monoslope Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Angle:	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**
$^{7}/_{16}$" OSB[1]												
Roof Zone 1	15	15	15	16	16	20	20	24	24	28	32	36
Roof Zone 2	15	15	16	16	20	24	24	28	28	36	36	44
Roof Zone 2'	15	-	16	-	24	-	28	-	36	-	44	-
Roof Zone 3	15	20	20	28	24	40	32	52	40	64	48	80
Roof Zone 3'	20	-	28	-	36	-	44	-	56	-	72	-
$^{1}/_{2}$" Plywood[2]												
Roof Zone 1	15	15	15	15	15	16	16	16	20	24	24	28
Roof Zone 2	15	15	15	15	16	16	16	20	24	28	28	32
Roof Zone 2'	15	-	15	-	16	-	20	-	28	-	32	-
Roof Zone 3	15	16	16	20	20	28	24	36	28	48	36	56
Roof Zone 3'	16	-	20	-	28	-	32	-	44	-	52	-
$^{19}/_{32}$" Plywood[3] or SPF[4]												
Roof Zone 1	15	15	15	15	15	15	15	15	16	16	16	20
Roof Zone 2	15	15	15	15	15	15	15	16	16	20	20	24
Roof Zone 2'	15	-	15	-	15	-	16	-	20	-	24	-
Roof Zone 3	15	15	15	16	16	20	20	28	24	36	28	44
Roof Zone 3'	15	-	16	-	20	-	24	-	32	-	40	-

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to monoslope roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figures 30.3-5A and Figure 30.3-5B for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 14. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads - Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	15	15	15	20	16	16	24	20	20
Roof Zone 2	16	16	16	24	20	20	32	28	28
Roof Zone 3	20	16	16	28	20	24	36	28	32
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	15	15	15	16	15	15	20	16	16
Roof Zone 2	15	15	15	20	16	16	24	20	20
Roof Zone 3	16	15	15	20	16	20	28	20	24
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	15	15	15	15	15	15	16	15	15
Roof Zone 2	15	15	15	15	15	15	20	16	16
Roof Zone 3	15	15	15	16	15	15	20	16	20

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to hip roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figures 30.3-2E, 30.3-2F and 30.3-2G for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

Table 15. Connection to Wood Roof Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads - Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[5,6,7,8,9]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
$^{7}/_{16}$" OSB[1]									
Roof Zone 1	32	24	28	40	32	32	48	40	40
Roof Zone 2	44	36	36	52	44	44	64	56	56
Roof Zone 3	44	36	44	56	44	52	72	56	64
$^{1}/_{2}$" Plywood[2]									
Roof Zone 1	24	20	20	28	24	24	36	28	32
Roof Zone 2	32	28	28	40	32	32	48	40	40
Roof Zone 3	32	28	32	44	32	40	52	40	48
$^{19}/_{32}$" Plywood[3] or SPF[4]									
Roof Zone 1	16	16	16	24	16	20	28	20	24
Roof Zone 2	24	20	20	28	24	24	36	28	28
Roof Zone 3	24	20	24	32	24	28	40	28	36

SI: 1 mph = 1.61 km/h

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum $^{19}/_{32}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
4. Minimum 1" thick SPF (specific gravity 0.42).
5. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
6. Tabulated values apply to hip roofs only for wind exposure B or C.
7. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
8. See ASCE 7-22 Chapter 30 Figures 30.3-2E, 30.3-2F and 30.3-2G for roof zone locations.
9. Tabulated values are based on a load duration factor C_D = 1.6. No further increases are permitted.

6.3.10 *Snow and Seismic Loading:*

6.3.10.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist snow and seismic loads are provided in **Table 16** through **Table 19**.

6.3.10.2 The tables in this section may be used with ASCE 7-10, ASCE 7-16, or ASCE 7-22.

Table 16. Connection to Wood Deck:
Fastener Requirements to Resist Snow Loads up to 60 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[4,5,6,7]								
Snow Load (psf):	**30**		**40**		**50**		**60**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
$^{7}/_{16}$" OSB[1]								
Roof Zone – All	15	16	15	20	20	24	20	28
S_{DS} Max	1.154	1.121	0.811	1.375	1.161	1.591	0.873	1.779
$^{1}/_{2}$" Plywood[2] or SPF[3]								
Roof Zone – All	15	15	15	15	15	16	15	16
S_{DS} Max	2.819	3.015	2.314	2.411	1.898	2.178	1.550	1.711

SI: 1 psf = 0.0479 kN/m2

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum 1" thick SPF (specific gravity 0.42).
4. Tabulated snow load is a design snow load.
5. 10 psf dead load is assumed to act concurrently with snow load.
6. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).
7. Tabulated values are based on a load duration factor C_D = 1.15 for the snow load case and 1.6 for the seismic load case. No further increases are permitted.

Table 17. Connection to Wood Deck:
Fastener Requirements to Resist Snow Loads up to 100 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[4,5,6,7]								
Snow Load (psf):	**70**		**80**		**90**		**100**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
$^{7}/_{16}$" OSB[1]								
Roof Zone – All	24	28	24	32	28	36	32	40
S_{DS} Max	1.058	1.367	0.817	1.546	0.982	1.704	1.126	1.846
$^{1}/_{2}$" Plywood[2] or SPF[3]								
Roof Zone – All	15	20	15	20	16	20	16	24
S_{DS} Max	1.255	2.295	1.001	1.877	0.940	1.505	0.737	2.008

SI: 1 psf = 0.0479 kN/m^2

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum 1" thick SPF (specific gravity 0.42).
4. Tabulated snow load is a design snow load.
5. 10 psf dead load is assumed to act concurrently with snow load.
6. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).
7. Tabulated values are based on a load duration factor C_D = 1.15 for the snow load case and 1.6 for the seismic load case. No further increases are permitted.

Table 18. Connection to Wood Deck:
Fastener Requirements to Resist Snow Loads up to 140 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[4,5,6,7]								
Snow Load (psf):	**110**		**120**		**130**		**140**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
$^{7}/_{16}$" OSB[1]								
Roof Zone – All	32	44	32	48	32	48	36	52
S_{DS} Max	0.923	1.974	0.743	2.089	0.581	1.776	0.717	1.890
$^{1}/_{2}$" Plywood[2] or SPF[3]								
Roof Zone – All	16	24	20	28	20	28	20	32
S_{DS} Max	0.556	1.667	0.934	2.113	0.762	1.799	0.607	2.201

SI: 1 psf = 0.0479 kN/m2

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum 1" thick SPF (specific gravity 0.42).
4. Tabulated snow load is a design snow load.
5. 10 psf dead load is assumed to act concurrently with snow load.
6. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).
7. Tabulated values are based on a load duration factor C_D = 1.15 for the snow load case and 1.6 for the seismic load case. No further increases are permitted.

Table 19. Connection to Wood Deck:
Fastener Requirements to Resist Snow Loads up to 200 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[4,5,6,7]								
Snow Load (psf):	**150**		**160**		**180**		**200**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
$^{7}/_{16}$" OSB[1]								
Roof Zone – All	36	56	40	60	44	64	48	72
S_{DS} Max	0.571	1.994	0.695	2.090	0.677	1.920	0.662	2.091
$^{1}/_{2}$" Plywood[2] or SPF[3]								
Roof Zone – All	24	32	24	36	28	40	28	44
S_{DS} Max	0.929	1.909	0.780	2.274	0.925	2.336	0.674	2.390

SI: 1 psf = 0.0479 kN/m^2

1. Minimum $^{7}/_{16}$" OSB with a specific gravity of at least 0.50 that complies with DOC PS 2.
2. Minimum $^{1}/_{2}$" plywood with a specific gravity of at least 0.39 that complies with DOC PS 1.
3. Minimum 1" thick SPF (specific gravity 0.42).
4. Tabulated snow load is a design snow load.
5. 10 psf dead load is assumed to act concurrently with snow load.
6. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).
7. Tabulated values are based on a load duration factor C_D = 1.15 for the snow load case and 1.6 for the seismic load case. No further increases are permitted.

6.4 *Connections in Steel Roof Deck*

6.4.1 SIP LD fasteners are approved for attaching nailable insulation panels with a maximum 2" vent space plus a maximum of 12" of foam insulation to steel decking (total of 14" space between nailable insulation panel face and roof deck) or a non-vented nailable insulation panel with a total of 14" space between the nailable insulation panel face and roof deck.

6.4.1.1 The total foam insulation thickness may be comprised of multiple layers of foam or a single piece of foam.

6.4.2 The required number of fasteners per nailable insulation panel is selected by choosing the largest value for the applicable wind speed and snow load from **Section 6.4.5**, **Section 6.4.6**, or **Section 6.4.7** and **Section 6.4.8**, respectively.

6.4.3 For calculations involving snow load, the tabulated fastener requirements in **Section 6.4.8** are based on fastener properties from testing. The allowable lateral design value for SIP LD fasteners in minimum 22-gauge steel decking (F_u = 45 ksi, min) is 42 pounds.

6.4.4 Fastener length shall provide a minimum of $^3/_4$" penetration through steel deck.

6.4.5 *ASCE 7-10 Wind Loading:*

6.4.5.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, hip and monoslope roofs per ASCE 7-10 are provided in **Table 20**.

Table 20. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-10 Wind Loads

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
Roof Zone 1	15	15	15	15	15	15	20	15	25	20	30	20
Roof Zone 2	15	15	15	15	20	15	25	20	30	20	40	25
Roof Zone 3	15	15	25	15	30	15	40	20	50	20	60	25

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-10 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to hip, gable and monoslope roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, and K_d = 0.85. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-10 Chapter 30 for roof zone locations.

6.4.6 *ASCE 7–16 Wind Loading:*

6.4.6.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, monoslope and hip roofs per ASCE 7-16 are provided in **Table 21** through **Table 26**.

Table 21. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]						
Wind Speed (mph):	**100**	**120**	**140**	**160**	**180**	**200**
Roof Angle:	**θ ≤ 7°**					
Roof Zone 1'	15	15	15	15	15	20
Roof Zone 1	15	15	20	25	30	35
Roof Zone 2	15	20	25	30	40	50
Roof Zone 3	20	25	35	45	55	65

SI: 1 mph = 1.61 km/h
1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

Table 22. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**
Roof Zone 1	15	15	15	15	15	15	20	15	20
Roof Zone 2e	15	15	15	15	15	15	20	15	20
Roof Zone 2n	15	15	15	25	20	15	30	25	20
Roof Zone 2r	15	15	15	25	20	15	30	25	20
Roof Zone 3e	15	15	20	25	20	25	30	25	35
Roof Zone 3r	20	20	15	30	30	15	40	40	20

SI: 1 mph = 1.61 km/h
1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

Table 23. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**
Roof Zone 1	30	20	25	35	25	30	40	30	40
Roof Zone 2e	30	20	25	35	25	30	40	30	40
Roof Zone 2n	40	35	30	50	45	35	60	50	40
Roof Zone 2r	40	35	25	50	45	30	60	50	40
Roof Zone 3e	40	35	45	50	45	55	60	50	65
Roof Zone 3r	50	50	30	60	60	35	75	75	40

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

Table 24. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Monoslope Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Angle:	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**
Roof Zone 1	15	15	15	15	15	15	15	20	20	25	25	30
Roof Zone 2	15	15	15	15	15	20	20	25	25	30	30	35
Roof Zone 2'	15	-	15	-	20	-	25	-	30	-	35	-
Roof Zone 3	15	15	15	25	20	30	25	40	30	50	40	60
Roof Zone 3'	15	-	20	-	30	-	35	-	45	-	55	-

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to monoslope roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

Table 25. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]												
Wind Speed (mph):	**100**				**120**				**140**			
Roof Angle:	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
Roof Zone 1	15	15	15	15	15	15	15	15	20	15	15	15
Roof Zone 2e	15	15	15	15	20	15	15	25	30	20	20	30
Roof Zone 2r	15	15	15	15	20	20	15	20	25	25	20	30
Roof Zone 3	15	15	15	20	20	15	15	30	30	20	20	40

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to hip roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

Table 26. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-16 Wind Loads – Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]												
Wind Speed (mph):	**160**				**180**				**200**			
Roof Angle:	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°, h/B ≥0.8**	**7° < θ ≤ 20°, h/B ≤0.5**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
Roof Zone 1	25	20	20	20	30	25	25	25	40	30	30	30
Roof Zone 2e	35	25	30	40	45	30	35	50	55	40	40	60
Roof Zone 2r	35	35	30	35	40	40	35	45	50	50	40	55
Roof Zone 3	35	25	30	50	45	30	35	60	55	40	40	75

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-16 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to hip roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-16 Chapter 30 for roof zone locations.

6.4.7 *ASCE 7–22 Wind Loading:*

6.4.7.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist wind loads on gable, monoslope, and hip roofs per ASCE 7-22 are provided in **Table 27** through **Table 32**.

Table 27. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]						
Wind Speed (mph):	**100**	**120**	**140**	**160**	**180**	**200**
Roof Angle:	**θ ≤ 7°**					
Roof Zone 1'	15	15	15	15	15	20
Roof Zone 1	15	15	20	25	30	35
Roof Zone 2	15	20	25	30	40	50
Roof Zone 3	20	25	35	45	55	65

SI: 1 mph = 1.61 km/h
1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

Table 28. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**
Roof Zone 1	15	15	15	15	15	15	20	15	20
Roof Zone 2	15	15	15	20	20	15	30	25	20
Roof Zone 3	20	15	15	30	25	20	40	30	25

SI: 1 mph = 1.61 km/h
1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

Table 29. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Gable Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤27°**	**27° < θ ≤ 45°**
Roof Zone 1	30	20	25	35	25	30	40	30	40
Roof Zone 2	35	35	30	45	45	35	55	50	40
Roof Zone 3	50	40	35	60	50	45	75	60	50

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to gable roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

Table 30. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Monoslope Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4,5]												
Wind Speed (mph):	**100**		**120**		**140**		**160**		**180**		**200**	
Roof Angle:	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**	**3° < θ ≤ 10°**	**10° < θ ≤ 30°**
Roof Zone 1	15	15	15	15	15	15	15	20	20	25	25	30
Roof Zone 2	15	15	15	15	15	20	20	25	25	30	30	35
Roof Zone 2'	15	-	15	-	20	-	25	-	30	-	35	-
Roof Zone 3	15	15	15	25	20	30	25	40	30	50	40	60
Roof Zone 3'	15	-	20	-	30	-	35	-	45	-	55	-

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to monoslope roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

Table 31. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]									
Wind Speed (mph):	**100**			**120**			**140**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
Roof Zone 1	15	15	15	15	15	15	20	15	15
Roof Zone 2	15	15	15	20	15	15	25	20	20
Roof Zone 3	15	15	15	20	15	20	30	20	25

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to hip roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

Table 32. Connection to Steel Deck:
Fastener Requirements to Resist ASCE 7-22 Wind Loads – Hip Roofs

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]									
Wind Speed (mph):	**160**			**180**			**200**		
Roof Angle:	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**	**7° < θ ≤ 20°**	**20° < θ ≤ 27°**	**27° < θ ≤ 45°**
Roof Zone 1	25	20	20	30	25	25	40	30	30
Roof Zone 2	35	30	30	40	35	35	50	40	40
Roof Zone 3	35	30	35	45	35	40	55	40	50

SI: 1 mph = 1.61 km/h

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Table based on ASCE 7-22 wind components and cladding part 1 low-rise rise (h ≤ 60 ft).
3. Tabulated values apply to hip roofs only for wind exposure B or C.
4. Tabulated values assume K_z = 1.13, K_{zt} = 1.0, K_d = 0.85, and K_e = 1.0. Tabulated values may be adjusted to account for site-specific conditions.
5. See ASCE 7-22 Chapter 30 for roof zone locations.

6.4.8 *Snow and Seismic Loading:*

6.4.8.1 The required number of fasteners per 4' x 8' nailable insulation panel to resist snow loads are provided in **Table 33** through **Table 36**.

6.4.8.2 The tables in this section may be used with ASCE 7-10, ASCE 7-16, or ASCE 7-22.

Table 33. Connection to Steel Deck:
Fastener Requirements to Resist Snow Loads up to 60 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]								
Snow Load (psf):	**30**		**40**		**50**		**60**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
Roof Zone – All	15	20	20	25	25	25	25	30
S_{DS} Max	0.510	0.815	0.729	1.022	0.910	0.604	0.642	0.797

SI: 1 psf = 0.0479 kN/m^2

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Tabulated snow load is a design snow load.
3. 10 psf dead load is assumed to act concurrently with snow load.
4. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).

Table 34. Connection to Steel Deck:
Fastener Requirements to Resist Snow Loads up to 100 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]								
Snow Load (psf):	**70**		**80**		**90**		**100**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
Roof Zone – All	30	35	30	35	35	40	35	45
S_{DS} Max	0.802	0.966	0.579	0.626	0.722	0.786	0.532	0.928

SI: 1 psf = 0.0479 kN/m^2

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Tabulated snow load is a design snow load.
3. 10 psf dead load is assumed to act concurrently with snow load.
4. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).

Table 35. Connection to Steel Deck:
Fastener Requirements to Resist Snow Loads up to 140 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]								
Snow Load (psf):	**110**		**120**		**130**		**140**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
Roof Zone – All	40	45	45	50	45	50	50	55
S_{DS} Max	0.661	0.642	0.776	0.777	0.612	0.524	0.718	0.653

SI: 1 psf = 0.0479 kN/m^2

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Tabulated snow load is a design snow load.
3. 10 psf dead load is assumed to act concurrently with snow load.
4. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).

Table 36. Connection to Steel Deck:
Fastener Requirements to Resist Snow Loads up to 200 psf

Minimum Number of Fasteners per 4' x 8' Nailable Insulation Panel[1,2,3,4]								
Snow Load (psf):	**150**		**160**		**180**		**200**	
Roof Pitch:	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**	**3:12 to 6:12**	**7:12 to 12:12**
Roof Zone – All	50	60	55	60	60	65	65	75
S_{DS} Max	0.573	0.771	0.671	0.549	0.632	0.460	0.598	0.668

SI: 1 psf = 0.0479 kN/m^2

1. Steel decking shall be minimum 22-gauge and have a minimum ultimate tensile strength of 45 ksi.
2. Tabulated snow load is a design snow load.
3. 10 psf dead load is assumed to act concurrently with snow load.
4. S_{DS} Max per ASCE 7 Section 13.5.3 for W_p assuming 10 psf dead load plus 0.2 snow load (sloped roof).

6.5 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

7 Certified Performance[26]

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.[27]

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.[28]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 TRUFAST SIP Fasteners comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 TRUFAST SIP Fasteners were evaluated for use in attaching vented and non-vented nailable insulation panels to approved substrates.

8.1.1.1 TRUFAST SIP Fasteners were evaluated to resist uplift due to wind loads and shear loads due to dead and live loads.

8.1.2 The scope of this report includes attachment of vented and non-vented nailable insulation panels to wood and steel roof decks.

8.1.2.1 For installation on wood roof decks, the scope of this report is limited to vented nailable insulation panels with a maximum 2" vent space plus a maximum of 8$^1/_2$" of foam insulation (total thickness 10$^1/_2$") or a non-vented nailable insulation panel with a total thickness of 10$^1/_2$".

8.1.2.2 For installation on steel roof decks, the scope of this report is limited to vented nailable insulation panels with a maximum 2" vent space plus a maximum of 12" of foam insulation (total thickness 14"), or a non-vented nailable insulation panel with a total thickness of 14".

8.1.3 The scope of this report includes connections of nailable insulation panels as described in **Section 2.3** and **Section 2.4**, and connections to roof decks as described in **Section 2.5**.

8.1.4 For evaluation of TRUFAST SIP Fasteners properties see Report Number 1909-04.

8.1.5 Use of fasteners in locations exposed to saltwater and saltwater spray are outside the scope of this report.

8.2 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[29] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[30] respectively.

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

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 TRUFAST SIP Fasteners shall be installed with the appropriate rotating powered driver per the manufacturer instructions.

9.4 TRUFAST SIP Fasteners shall not be struck with a hammer during installation.

9.5 TRUFAST SIP Fasteners shall be evenly spaced in equal rows along the nailable insulation panel and spaced 24" on center maximum. Depending on the deck framing spacing, additional fasteners from the minimum required, per the tables in this report, may be required to achieve equal rows across the entire panel. In all cases, the installation shall comply with the nailable insulation manufacturer specifications and installation recommendations.

9.6 TRUFAST SIP Fasteners shall not be installed closer than $^{5}/_{8}$" from any perimeter edge (edge distance) of the nailable surface of the vented or non-vented nailable insulation panel, subject to the panel manufacturer instructions, whichever is more restrictive.

9.7 *Installation into Wood Substrates*

9.7.1 Fastener thread shall penetrate a minimum of 1" (including the tip) into solid sawn lumber decking with a specific gravity of at least 0.42 (plank or tongue and groove).

9.7.2 Fastener thread shall fully penetrate the thickness of OSB or plywood decking and extend beyond the underside by a minimum of $^{3}/_{4}$".

9.7.3 Lead holes are not required.

9.7.4 The underside of the fastener head shall be installed flush to the surface of the nailable insulation panel. Fasteners shall not be overdriven or underdriven.

9.7.5 Minimum requirements for attaching to wood joists/rafters shall be in accordance with **Table 37**. The nailable insulation panel manufacturer must approve this application. The requirements in **Table 37** do not apply to continuous wood decking.

Table 37. SIP TP and SIP LD Minimum Fastener Spacing Requirements in Wood Joists and Rafters

Figure 3 Label[3]	Connection Geometry[1,2]	SIP TP and SIP LD (in)
A	Edge Distance – Load in any direction	5/8
B	End Distance – Load parallel to grain, towards end	3 7/8
	End Distance – Load parallel to grain, away from end	2 5/8
	End Distance – Load perpendicular to grain	2 5/8
C	Spacing between Fasteners in a Row – Parallel to grain	3 7/8
D	Spacing between Fasteners in a Row – Perpendicular to grain	2 5/8
E	Spacing between Rows of Fasteners – In-line	1 1/4
F	Spacing between Rows of Fasteners – Staggered	5/8

SI: 1 in. = 25.4 mm

1. Edge distances, end distances, and spacing of fasteners shall be sufficient to prevent splitting of the wood or as shown in this table, whichever is the more restrictive.
2. Values for "*Spacing between Rows of Fasteners-Staggered*" apply where the fasteners in adjacent rows are offset by one-half of the "*Spacing between Fasteners in a Row*".
3. See **Figure 3** for spacing requirement labels.

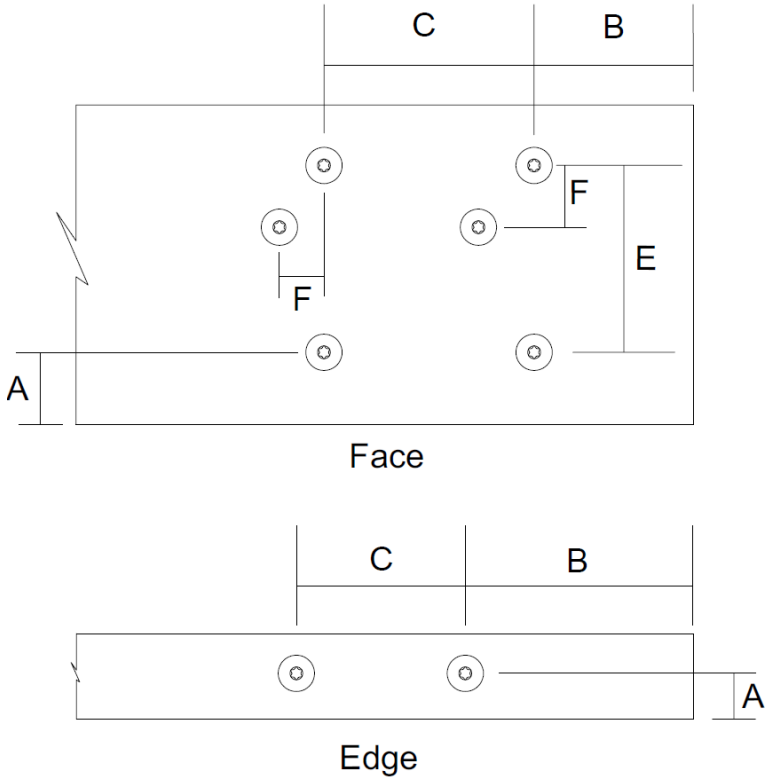

Figure 3. Example of Fastener Spacing in Wood

9.8 *Installation into Steel Substrates*

9.8.1 Install using a maximum 2,000-rpm screw gun.

9.8.2 Minimum requirements for fastener spacing, edge distance, and end distance shall be in accordance with **Table 38**.

9.8.3 The fastener shall penetrate a minimum of $^{3}/_{4}$" through the steel deck.

Table 38. SIP LD Minimum Fastener Spacing Requirements in Steel

Connection Geometry	SIP LD (in)
Spacing Between Fastener	$^{5}/_{8}$
Edge Distance	$^{3}/_{8}$
End Distance	$^{5}/_{8}$
SI: 1 in. = 25.4 mm	

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 Fastener bending yield testing in accordance with ASTM F1575

10.1.2 Steel tensile strength in accordance with ASTM A370

10.1.3 Lateral shear strength in accordance with ASTM D1761

10.1.4 Withdrawal and head-pull-through data from Report Number 1909-04

10.1.5 Connection spacing calculations by DrJ Engineering, LLC in accordance with ASCE 7 and accepted engineering practices

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.[31]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for TRUFAST SIP Fasteners on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, TRUFAST SIP Fasteners 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, TRUFAST SIP Fasteners shall be approved for the following applications:

11.2.1 For use in attaching vented or non-vented nailable insulation panels to approved decks to resist uplift due to wind loads and shear loads due to dead, snow, and seismic loads.

11.3 Unless exempt by state statute, when TRUFAST SIP Fasteners 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 Altenloh, Brinck & Co. U.S., Inc.

11.5 IBC Section 104.2.3[32] (IRC Section R104.2.2[33] and IFC Section 104.2.3[34] 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:**[35] Building regulations require that the building official shall accept duly authenticated reports.[36]

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.[37]

12 Conditions of Use

12.1 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.

12.2 As listed herein, TRUFAST SIP Fasteners shall be installed:

12.2.1 In dry lumber with a moisture content less than or equal to nineteen percent (19%)

12.2.2 In minimum 22-gauge steel substrates with a minimum ultimate tensile strength of 45 ksi

12.3 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this report.

12.4 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:

12.4.1 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.

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

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

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

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

12.4.6 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.

12.4.7 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.

12.5 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.

12.6 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).

12.7 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 TRUFAST SIP Fasteners, 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.trufast.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 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.

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

4 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

5 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

6 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

7 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.

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

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

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

11 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.

12 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/

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

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

15 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

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

17 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

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

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

20 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.

21 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

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

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

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

25 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

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

27 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

28 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

[29] 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.

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

[31] 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

[32] 2021 IBC Section 104.11

[33] 2021 IRC Section R104.11

[34] 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

[35] 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.

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

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