

Guide for using mechanical fasteners to attach InSoFast EX 2.5 and InSoFast UX 2.0 continuous insulation panels to wood framing and steel framing substrates using various mechanical fastening systems.

Guideline Issuer:

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Subject

1. InSoFast EX 2.5 and InSoFast UX 2.0 Panel attachment.

Scope

InSoFast LLC, Guideline for attaching InSoFast to various exterior wall framing systems to comply with the following codes:

- 2009, 2012 International Building Code (IBC)
- 2009, 2012 International Residential Code (IRC)

InSoFast has compiled reports from fastener manufactures that have evaluated the following for their mechanical fastener properties for:

- Connection lateral shear strength and wind load/pressure resistance in accordance with AF&PA NDS -05 and ANSI S100-2007
- Fastener head pull through strength
- Fastener withdrawal and pull-out strength

2. Uses

- InSoFast EX 2.5 and InSoFast UX 2.0 (Panels) when used for an exterior continuous insulated rainscreen may be fastened to the framing system using a variety of mechanical fasteners

3. Description

- TRUFAST SIP TP or equal and is a # 14 thread point screw SIPTP-3000, SIPTP-3500, may be used to fasten through the InSoFast's stud into wood sheathing and/or framing. Install fastener using a maximum 2500 rpm screw gun until head is properly seated.
- ITW Buildex Part Number 2142500, Dec-King® Wood Screws - DEC-KING® 2PFH CLC 10 X 3-1/2" or equal gimlet drill point screw may be used to fasten through the InSoFast's stud into wood sheathing and/or framing. Install fastener using a maximum 2500 rpm screw gun until head is properly seated
- The TRUFAST SIP LD or equal fastener is a #14 drill-point SIPLD-3000 or SIPLD-3500 screw that may be used to fasten to wood framing and cold formed steel framing substrates. Install fastener using a maximum 2500 rpm screw gun until head is properly seated.

Design Considerations

- **InSoFast EX 2.5 and InSoFast UX 2.0** Guideline is for the direct attachment of the panels as a continuous insulation barrier for the exterior envelope of a building and is limited to the fasteners identified herein to resist the shear and wind loading resistance when used to secure the InSoFast panels to wood or steel framing systems.
- **Design Approvals:** Where required by code or design professionals attaching the InSoFast panels and the suggested fastening methods identified herein shall be prepared and engineered by a design professional licensed to do so.
- **Design Loads:** The design loads required by the local building code authorities shall not exceed the recommendations outlined in this guideline.
- **Allowable Loads:** The applied dead and negative wind loads should not exceed the tables outlined in this guideline for each of the different fastening systems for wood or steel framing methods. The required fastener spacing is determined by the different fastener manufacture's test reports for shear and wind loading and not by InSoFast, LLC.

Installation

- **General:** Installing the described panels should follow the guidelines recommendations and InSoFast's best practice installation guides. If a conflict between this guideline and the screw manufacturer's reports, the screw manufacturer's report should govern.
- **Weather Protection:** The connection assemblies described herein shall be protected from weather and contained within a weather-resistant exterior wall envelope complying with IBC Section 1403 or IRC Section R703. The design and specification of the weather-resistive covering, water-resistive barrier, flashing and drainage are not addressed herein and must be provided by the building designer.
- **Conditions of Use:** This guideline and the fasteners, as described, comply with the fasteners recommendations and the codes listed in Section 2.0, subject to the following conditions:
 - i. Installation complies with the manufacturer's installation instructions and the approved construction documents.
- **Guideline Information:** is based on the following manufacture's reports and documented test results :
 - i. [TRU110910-21 Evaluation Report 2013-02-27](#),
 - ii. [ITWBuildex DEC-KING® 2PFH CLC 10 X 3-1/2"](#)
 - i. [ITWBuildex Grid-Mate™ EIFS Screw GRID-MATE™ BUGLE HI-LO CLC 8 X 3"](#)

TRUFAST SIPTP
Gimlet Thread Point Fastener



[Product Specification Sheet \(PDF\)](#)

[NTA, Inc. Engineering Evaluation Report TRU110910-21 \(PDF\)](#)

Drive	Length		Part No.	Pkg. Qty	Pkg. Type	Wgt./Pkg
T-306-Lobe	3"	76.2 mm	SIPTP-3000	500	Bucket	14.1 lbs.
	3-1/2"	88.9 mm	SIPTP-3500	500	Bucket	16.1 lbs.

TRUFAST SIPLD
#2 Light-Duty Drill Point Fastener

For use in attaching panels to corrugated steel deck and wood applications
TRUFAST SIP LD Fasteners are approved for the attachment of continuous insulation.
Please see the link to the NTA, Inc. Engineering Evaluation Report TRU110910-21 below.



[Product Specification Sheet \(PDF\)](#)

[NTA, Inc. Engineering Evaluation Report TRU110910-21 \(PDF\)](#)

Drive	Length		Part No.	Pkg. Qty	Pkg. Type	Wgt./Pkg
T-306-Lobe	3"	76.2 mm	SIPLD-3000	500	Carton	14.1 lbs.
	3-1/2"	88.9 mm	SIPLD-3500	500	Carton	16.1 lbs.

ITW Buildex 2142500 and 21425000, Dec-King® Wood Screws 2PFH CLC 10 X 3-1/2"


[DEC-KING EXTERIOR WOOD SCREWS Product Report No. 02723](#)

Description	Part#		Pullout Values (Average pounds ultimate) Embedment 2" x 4" Stud Grade S.Y. Pine		
	Phillips drive	Square drive	1/2"	3/4"	1"
8 X 3"	2181500	2141500	186	290	502
10 x 3-1/2"	21425000	2182500	241 lbs	386 lbs	522 lbs

ITW Buildex Grid-Mate™ Exterior Insulated Finish System Screws

[Grid-Mate™ EIFS Screws - GRID-MATE™ BUGLE HI-LO CLC 8 X 3"](#)

GRID-MATE™ BUGLE HI-LO for Wood/Light Metal		Pullout Values (Average pounds ultimate)		
Steel Applications		Sheet Metal Gauge		
Fastener	Screw Dimension	24	22	20
Wood/Light Metal (Hi-Lo®) 2314500	8 x 3"	178 lbs	244 lbs	277 lbs
GRID-MATE™ S (12) Steel Framing 18-14 Gauge		Pullout Values (Average pounds ultimate)		
Steel Applications		Sheet Metal Gauge		
Fastener	Screw Dimension	18	16	14
Steel (S-12) 2320500	8 x 3"	471 lbs	679 lbs	847 lbs

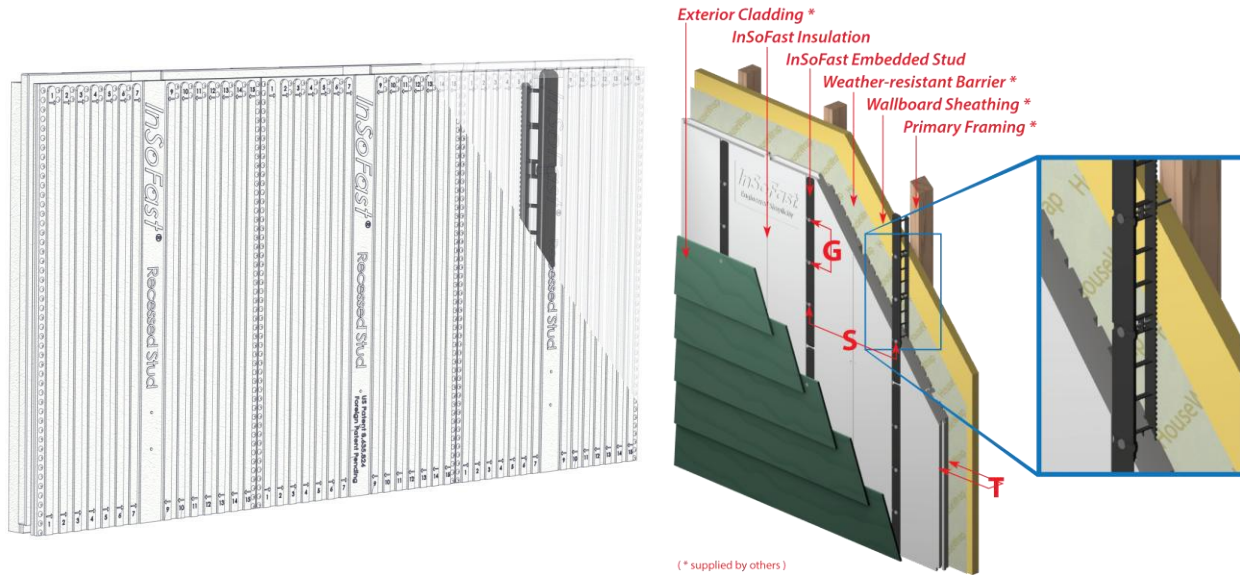


Table 2a: Recommended Fastener Spacing for SIT TP, SIP LD, DEC-KING EXTERIOR WOOD SCREWS

Horizontal Spacing, S (in. oc)	InSoFast Panel Thickness, T (in.)	Shear Strength, V (lbf/fastener)	Vertical Fastener Spacing, G (in. oc)			
			Maximum Insulation Assembly Weight to be Supported (psf)			
16"	Product Code		10	15	20	30
	ISF 2.0"	29.6	24"	16"	12"	8"
	ISF EX 2.5"	29.6*				

*InSoFast Stud is recessed 1/2" deep into the EX 2.5 panel

Table 2b: Allowable Wind Pressure and Maximum Wind Speed For SIP TP or SIP LD Fastener into Wood Framing Based on Fastener Spacing and Wind Exposure 1,2,3

Horizontal Spacing, S (in. oc)	Vertical Spacing, G (in. oc)	Allowable Wind Pressure, P (psf)	Wind Exposure 1,2,3 Maximum Wind Speed (mph) Based on Wind Exposure 6,8,9					
			ASCE 7 – 05 IRC, 2006/2009 IBC			ASCE 7 – 10 2012 IBC		
16"	24	53.8	140	120	110	180	155	140
	16	80.6	175	145	135	220	190	175
	12	108	200	170	155	255	220	200
	8	161	245	210	195	315	270	250
	6	215	285	240	225	365	310	285
	4	350	350	295	275	450	380	355

Table Notes:

- InSoFast's embedded stud shall use a fastener that has a sufficient length and be installed so that the fastener penetrates into the wood framing stud at a minimum of 1.5-inches. Use of sheathing over the framing shall be determined by the building designer.
- Tabulated vertical fastener spacing, g, does not consider the following: 1) the water resistive barrier, flashing, and weather-resistive exterior covering. These items must be considered independently in accordance with accepted practice. The more restrictive fastener spacing based on this report and these considerations shall apply.
- InSoFast UX 2.0 and InSoFast EX 2.5 expanded polystyrene (EPS) conforming to ASTM C578
- Determined in accordance with the *National Design Specification for Wood Construction* (2005 Edition).
- Determined from fastener head pull-through testing in accordance with ASTM D1037. The allowable withdrawal strength and pull-through strength were taken as the average ultimate load divided by a factor of safety of 5.0 and a load duration factor of 1.6 (allowable pull through strength = 179 lbf, allowable withdrawal strength = 200 lbf).
- Three-second-gust wind speed; based on a building height of 30-feet, Zone 5, Importance Factor, $I_w=1.0$ and Topographic Factor, $K_{zt}=1.0$, Internal Pressure Coefficient, $GCP_i=+/-0.18$ in accordance with ASCE 7, 2005 edition, Section 6.4.2.2 (Component and Cladding); ASCE 7, 2010 edition, Section 30.4.2 and IRC Section R301.2.1. Pressure Equalization Factor, $PEF=1.0$.
- Insulation Assembly Weight shall include all materials supported including, but not limited to, furring, sheathing, continuous insulation, water-resistive barrier, flashing and weather-resistive exterior covering.
- Furring or sheathing type and thickness shall be selected based on the cladding manufacturer's installation instructions.
- Interpolation between table values is permitted.

Table: Recommended Fastener Spacing SIP LD, GRID-MATE™ S (12) Steel Framing 18-14 Gauge

Horizontal Spacing, S (in. oc)	InSoFast Panel Thickness, T (in.)	Shear Strength, V (lbf/fastener)	Vertical Fastener Spacing, G (in. oc)			
			Maximum Insulation Assembly Weight to be Supported (psf)			
16"	Product Code		10	15	20	30
	ISF 2.0"	10.5	8"	6"	4"	2"
	ISF EX 2.5"	10.5*				

*InSoFast Stud is recessed 1/2" deep into the EX 2.5 panel

Table 2b: Allowable Wind Pressure and Maximum Wind Speed For SIP TP or SIP LD Fastener into Wood Framing Based on Fastener Spacing and Wind Exposure 1,2,3

Horizontal Spacing, S (in. oc)	Steel Design Thickness (in)	Vertical Spacing G (in. oc)	Allowable Wind Pressure P (psf)	Wind Exposure 1,2,3 Maximum Wind Speed (mph) Based on Wind Exposure 6,8,9					
				ASCE 7 – 05 IRC, 2006/2009 IBC			ASCE 7 – 10 2012 IBC		
				8	6	4	8	6	4
16"	0.0346" (20 ga)	8	130	230	195	180	295	250	230
		6	173	265	225	205	340	285	265
		4	259	325	275	250	420	355	325
	0.0451 (18 ga.)	8	161	245	210	195	315	270	250
		6	215	285	240	225	365	310	285
		4	323	350	295	275	450	380	355

Table Notes:

- InSoFast's embedded stud shall use a fastener that has a sufficient length and be installed so that the fastener penetrates into the wood framing stud at a minimum of 1.5-inches. Use of sheathing over the framing shall be determined by the building designer.
- Tabulated vertical fastener spacing, *g*, does not consider the following: 1) the water resistive barrier, flashing, and weather-resistive exterior covering. These items must be considered independently in accordance with accepted practice. The more restrictive fastener spacing based on this report and these considerations shall apply.
- InSoFast UX 2.0 and InSoFast EX 2.5 expanded polystyrene (EPS) conforming to ASTM C578
- Determined in accordance with the *National Design Specification for Wood Construction* (2005 Edition).
- Determined from fastener head pull-through testing in accordance with ASTM D1037. The allowable withdrawal strength and pull-through strength were taken as the average ultimate load divided by a factor of safety of 5.0 and a load duration factor of 1.6 (allowable pull through strength = 179 lbf, allowable withdrawal strength = 200 lbf).
- Three-second-gust wind speed; based on a building height of 30-feet, Zone 5, Importance Factor, *I_w*=1.0 and Topographic Factor, *K_zt*=1.0, Internal Pressure Coefficient, *G_{Cpi}*=+/-0.18 in accordance with ASCE 7, 2005 edition, Section 6.4.2.2 (Component and Cladding); ASCE 7, 2010 edition, Section 30.4.2 and IRC Section R301.2.1. Pressure Equalization Factor, *PEF*=1.0.
- Insulation Assembly Weight shall include all materials supported including, but not limited to, furring, sheathing, continuous insulation, water-resistive barrier, flashing and weather-resistive exterior covering.
- Furring or sheathing type and thickness shall be selected based on the cladding manufacturer's installation instructions.
- Interpolation between table values is permitted.

Definitions:

- a. **Cladding** is the exterior skin of a building which is intended to control the infiltration of weather elements and for aesthetic purposes. The cladding consists of not less than a weather-resistive covering, a water-resistive barrier, drainage plane, and flashing.
- b. **Sheathing** is a continuous layer of boards or other wood or fiber materials secured to the structural members of a wall to strengthen the structure and serve as a substrate for an external weatherproof cladding.
- c. **InSoFast UX 2.0 and InSoFast EX 2.5** is insulation that is pre-assembled with a co-polymer polypropylene open web insulated stud that is injected molded with high pressure steam fused expanded polystyrene. InSoFast is molded with two, 3 dimensional drainage planes, for the wall assemblies' moisture control.
- d. **Continuous Insulation (c.i.)** is defined as insulation that is continuous across all structural members without thermal bridges. It is installed on the interior, exterior, or is integral to any opaque surface of the building envelope.

Design Example:**Given**

Design Wind Speed/Exposure 100 mph, Exposure B
Seismic Design Category SDC B
Occupancy Category II
Foam Sheathing 2.5-inches, Type VIII EPS (1.25 pcf)
Cladding Material Fiber cement lap siding
Cladding Weight 3 psf (from manufacturer's literature)
Wood Framing 2x4 SPF framing at 16-inches on-center

Solution**Determine Fastener Type:**

Step 1: Based on the substrate (wood framing) Table 2a and Table 2b apply. *Check limits of use.*

Step 2: Verify that the Seismic Design Category and Occupancy Category conform to the limits in Section 5.5. The specified Seismic Design Category and Occupancy Category are within the limits.

Step 3: Verify that the wind design criteria conform to Table 2, footnote 6.

Step 4: Verify substrate and **InSoFast UX 2.0 or InSoFast EX 2.5** materials are suitability. Table 2, footnote 1 provides the minimum material requirements. Note 1 specifically recognizes the materials specified; however, for other materials minimum requirements are provided, for example, the framing must have a minimum specific gravity $G = 0.42$.

Determine Fastener Spacing:

Step 5: Consult the siding manufacturer data for siding weight (3 psf), add 1.25 psf for **InSoFast UX 2.0 or InSoFast EX 2.5**. The total supported assembly weight equals 4.25 psf.

Step 6: To verify the connection shear strength, using Table 2a with the stud spacing (16" oc) and assembly weight (4.25 psf). Where design values don't match the table values exactly, the values should be rounded up to the next greater value. In this example, the assembly weight is rounded up to 5 psf. From Table 2a, the recommended spacing for 16" oc studs, with **InSoFast UX 2.0 or InSoFast EX 2.5** the weight of 5 psf is 24" oc.

Step 7: To verify the negative wind strength, using Table 2b with the stud spacing (16" oc), Wind Speed (100 mph), and Wind Exposure (Category B). Where design values don't match the table values exactly, the values should be rounded up to the next greater value. In this example, the next greatest wind speed in Table 2b is 140 mph and the corresponding fastener spacing is 24" oc.

Step 8: The recommended fastener spacing shall be taken as the smaller spacing determined in Step 6 and Step 7. In this example, both checks required a spacing of 24" oc.

Specify Fastener:

Step 9: Determine the fastener length by summing the material thicknesses and adding the minimum required penetration into the substrate, which is provide in Table 2, footnote 1. In this example, the minimum fastener length is 3.5" (**InSoFast UX 2.0 and InSoFast EX 2.5** + 1.5" penetration). Contact InSoFast LLC., the fastener length must be rounded up to the next available size.