

# EWP INSTALLATION GUIDE

## Wood I-Joist Installation to Wood:

### *Sloped I-Joists*

Use sloped seat hangers and beveled web stiffeners whenever the slope exceeds the following: 1/2:12 for seat bearing lengths of 2 1/2" or less; 3/8:12 for bearing lengths between 2 1/2" and 3 1/2"; and 1/4:12 for bearing lengths in excess of 3 1/2".

### *Multiple I-Joist Plys*

Fasten together multiple plys of wood I-Joists, in accordance with the manufacturer's installation guidelines, such that the joists act as a single unit.

### *I-Joist Rotation*

It may be necessary to install straps, blocking, or sheathing to restrain torsional rotation of a supporting wood I-Joist when using top mount I-Joist hangers.

### *Fasteners*

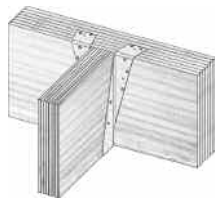
Install only the specified nails. The flanges of wood I-Joists may split if larger diameter nails or longer nails are installed. Do not install nails larger than 16d common wire nails (0.162" diameter) into the web stiffeners in the wood I-Joist.

### *Backer Blocks*

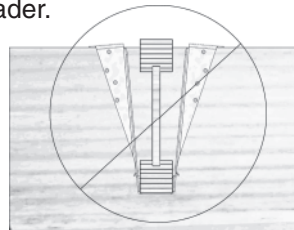
Pattern the nails used to install backer blocks or web stiffeners in wood I-Joists to avoid splitting the block. The nail pattern should be sufficiently spaced to avoid the same grain line, particularly with solid sawn backer blocks. Backer blocks must be installed on wood I-Joist acting as the header, or supporting member. Install in accordance with the I-Joist manufacturer's installation guidelines. The nails used to install hangers mounted to an I-Joist header must penetrate through the web and into the backer block on the opposite side.

## Top Flange Hangers

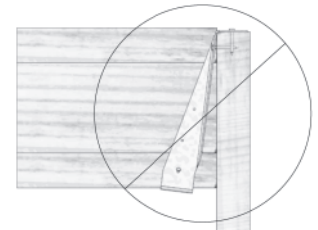
The thickness of the hanger metal and nail heads on top mount hangers must be evaluated for the effect on subsequent sheathing. Ensure the top mount hanger is installed so the flanges of the hanger are not *over-spread* which tends to elevate the supported I-Joist, causing uneven floor surfaces and squeaking. Similarly, ensure the hanger is installed plumb such that the face flanges of the hanger are mounted firmly against the wide-face surface of the header.



Flush framing

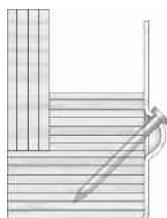


⚠ Hanger over-spread

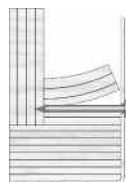


⚠ Hanger not plumb

## Correct Slant Nail Installation



Always secure wood I-Joist using 10d x 1 1/2" nail driven at a 45° angle and firmly seated.



## Common Nailing Errors

### ⚠ Wrong Angle

When a nail is driven into the bottom flange of the wood I-Joist parallel to the glue lines, separation of veneers can occur which substantially reduces the design loads of the connection.

### ⚠ Nail Too Long



When using nails longer than USP's recommended nails, bottom flange splitting may occur. Also, this can raise the wood I-Joist off the seat, resulting in uneven surfaces and squeaky floors, along with reduced allowable loads.



## Support Height & Lateral Stability

Hangers for joists **without web stiffeners** must support the I-Joist's top flange and provide lateral resistance with no more than 1/8" horizontal deflection.

Hangers for joists **with web stiffeners** must support a minimum of 60% of joist depth.



(Top flange support requirements can be verified in *EWP Top Mount Hangers* charts under the *Web Stiffener Req.* column of USP's *Full Line Catalog*.)

## Nailer Installations

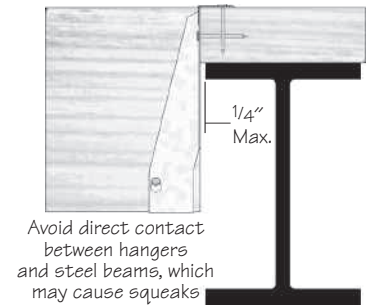
### Correct Hanger Attachment to Nailer

A nailer or sill plate is considered to be any wood member attached to a steel beam, concrete block wall, concrete stem wall, or other type of support which is unsuitable for nailing, and is used as a nailing surface for top mount hangers to hold beams or joists.

### Nailer Sized Correctly

Top flange of hanger is fully supported and recommended nails have full penetration into nailer, resulting in a carried member hanging safely at the proper height.

The nailer must be sized to fit the support width as shown and be of sufficient thickness to satisfy recommended top flange nailing requirements. A design professional must specify nailer attachment to steel beams.



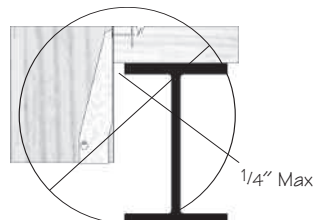
**Correct Attachment**

### Wrong Nailer Size Causes Component Failure



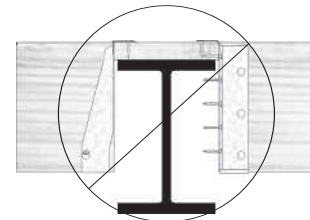
**Too Narrow**

Top flange not fully supported can cause nail breakout. Or, by fully supporting top flange, hanger is tilted back, causing lifting of carried member which results in uneven surfaces and squeaky floors.



**Too Wide**

Loading can cause cross grain breaking of nailer. The recommended nailer overhang is 1/4" maximum per side.



**Too Thin**

Top flange nailing cannot fully penetrate nailer, causing reduced allowable loads. Never use hangers which require multiple face nails since the allowable loads are dependent on all nail holes being used.

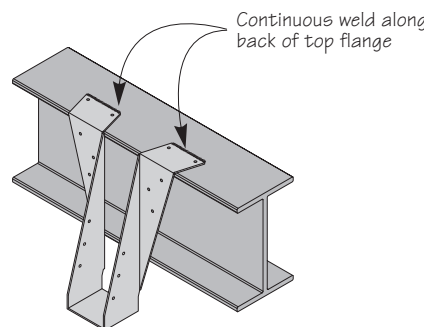
## Welded Top Flange

- Weld sizes and lengths shown on chart.
- Weld-on applications produce maximum allowable load listed. Uplift loads do not apply to this application.

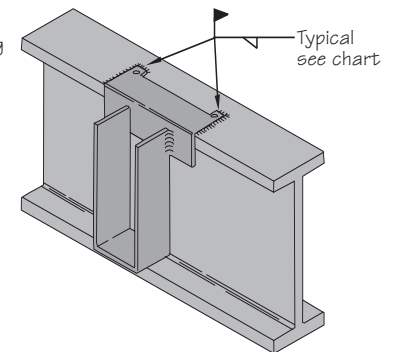
### Top Angle Weld Length chart

USP Welded Hanger Series	Weld Length
PH, PHI, SW	3"
BPH, PHM, SWH	4"
KLB, KHW, PHX, PHXU	6"
KB, KHB, LBH, KGB, KHGB, KHHB, KGLS, KGLST, KGLT, KHGLS, KHGLST	8"
HLBH, KHGLT	10"

Top Angle Steel Gauge	Weld Size
10 gauge or lighter	1/8"
7 gauge	3/16"
3 gauge	1/4"



**Typical Top Flange welded installation**



**Typical Top Angle welded installation**

Weld shall be distributed evenly.

**Customer Service:**  
Burnsville, MN  
Phone: 1-800-328-5934  
Fax: 1-507-364-8762

**Manufacturing:**  
Montgomery, MN • Livermore, CA  
Largo, FL • North Wilkesboro, NC  
Rancho Cucamonga, CA • Thornhill, Ontario

**Warehouses:**  
Houston, TX  
Lumberton, NJ

# NAILS – NA SERIES

## Installation:

• Allowable shear values assume nail embedment into the wood of the entire nail or 10 nail diameters (whichever is less). Otherwise, the nail must be embedded at least 6 nail diameters, with the load reduced using the following equation:

$$\text{Reduced Load} = \frac{\text{Published Load} \times \text{Actual Penetration}}{\text{Nail Diameter} \times 10}$$

• Load reductions may occur if nails are used other than those specified. See the chart *Optional Nails for Face Mount Hangers and Straight Straps* for load reduction factors regarding nail substitutions.

## How to use Optional Nails for Face Mount Hangers and Straight Straps load table:

The base value is the catalog listed nail in Douglas Fir-Larch and the adjustment factor is the multiplier for the applicable replacement nail and wood combination.

- Adjustment factors may vary with some custom hangers or steel thicker than 10 gauge. Contact USP for exceptions.
- Roofing nails shall not be substituted for any nail size or type.



## Optional Nails Example:

JL210 listed load is 1595 lbs. @ 100% for 10d common nails.

### If substituting:

8d common nails with DF-L or LVL: 1595 lbs. x 0.83 = 1323 lbs.  
8d common nails with SP: 1595 lbs. x .90 = 1435 lbs.  
8d common nails with S-P-F: 1595 lbs. x .72 = 1148 lbs.

No further reductions are required.

## Optional Nails for Face Mount Hangers and Straight Straps

Catalog Nail	Replacement Fastener <sup>1</sup>	Allowable Load Adjustment Factor			
		DF-L	SP	S-P-F	LVL
16d common	8d common	0.70	0.75	0.60	0.70
16d common	10d Box	0.67	0.72	0.58	0.67
16d common	10d common	0.83	0.91	0.72	0.83
16d common	12d common	0.83	0.91	0.72	0.83
16d common	10d x 1-1/2	0.81	0.88	0.70	0.81
16d common	10d Sinker	0.59	0.64	0.51	0.59
16d common	16d Box	0.74	0.80	0.64	0.74
16d common	16d Sinker	0.83	0.91	0.72	0.83
16d common	16d x 2-1/2	1.00	1.00	0.86	1.00
16d common	No. 8 x 1-1/2 Wood Screw	0.60	0.66	0.52	0.60
10d common	8d Box	0.63	0.68	0.54	0.63
10d common	10d Sinker	0.70	0.77	0.61	0.70
10d common	8d common	0.83	0.90	0.72	0.83
10d common	10d Box	0.80	0.87	0.70	0.80
10d common	8d x 1-1/4	0.64	0.69	0.55	0.64
10d common	No. 8 x 1-1/2 Wood Screw	0.72	0.79	0.63	0.72
10d common	10d x 1-1/2	0.97	1.00	0.84	0.97
10d common	16d Sinker	1.00	1.00	0.86	1.00
10d common	No. 8 x 1-1/2 Wood Screw	0.72	0.79	0.63	0.72
12d common	10d x 1-1/2	0.97	1.00	0.84	0.97
12d common	16d Sinker	1.00	1.00	0.86	1.00
12d common	No. 8 x 1-1/2 Wood Screw	0.72	0.79	0.63	0.72
8d common	8d Box	0.75	0.81	0.65	0.75
8d common	8d x 1-1/4	0.76	0.83	0.66	0.76
8d common	No. 8 x 1-1/2 Wood Screw	0.86	0.95	0.75	0.86
8d x 1-1/2	8d x 1-1/4	0.76	0.83	0.66	0.76
8d x 1-1/2	No. 8 x 1-1/2 Wood Screw	0.86	0.95	0.75	0.86
10d x 1-1/2	8d x 1-1/2	0.86	0.93	0.74	0.86
10d x 1-1/2	No. 8 x 1-1/2 Wood Screw	0.74	0.81	0.64	0.74

1) No. 8 x 1-1/2 Wood Screw has a shank diameter of 0.164" and shall conform to ANSI/ASME Standard B18.6.1-1981.

## Nail Specification Table

USP Stock No.	Ref. No.	Description	Finish <sup>4</sup>	Nail Diameter	Length	Withdrawal Load <sup>7</sup>	Nails Per Lb.	Allowable Shear per Nail (Lbs.) <sup>1,2,3,5</sup>								
								Steel Gauge								
								3	7	10	12	14	16	18	20	22
NA11	N8HDG	8d x 1-1/2	HDG	0.131	1-1/2	48	152	---	---	---	---	---	96	95	94	94
NA11SS	SSN8	8d x 1-1/2	SS	0.131	1-1/2	48	143	---	---	---	---	---	96	95	94	94
NA9D	N10HDG	10d x 1-1/2	HDG	0.148	1-1/2	54	100	---	---	126	118	114	112	112	112	111
NA16D	N16	16d x 2-1/2	HDG	0.162	2-1/2	99	66	192	177	158	147	140	138	136	136	---
NA16D-RS	---	16d Ring Shank	Bright	0.148	3-1/2	140	47	181	164	147	---	---	---	---	---	---
NA21	---	20d x 1-3/4	HDG	0.192	1-3/4	81	65	211	184	168	159	152	---	---	---	---
NA20D	---	20d x 2-1/2	HDG	0.192	2-1/2	117	41	231	202	184	174	167	---	---	---	---
NA250	N54A	1/4 x 2-1/2	HDG	0.250	2-1/2	152	27	275	241	225	216	---	---	---	---	---
NA25	---	1/4 x 3	HDG	0.250	3	183	22	275	241	225	216	---	---	---	---	---
8d Common	---	8d Common	Bright	0.131	2-1/2	80	126	---	---	---	---	98	96	95	94	94
10d Common	---	10d Common	Bright	0.148	3	108	70	---	154	136	125	118	115	114	113	112
16d Sinker	---	16d Sinker	Bright	0.148	3-1/4	117	60	160	154	136	125	118	115	114	113	---
16d Common	---	16d Common	Bright	0.162	3-1/2	138	48	192	177	158	147	140	138	136	136	---
20d Common	---	20d Common	Bright	0.192	4	187	29	231	202	184	174	167	---	---	---	---

1) Loads are calculated according to specifications of Part II of the National Design Specifications for Wood Construction (NDS®), 2005 Edition.

2) Loads apply to Douglas Fir-Larch (G=0.50) and Southern Pine (G=0.55). For Spruce-Pine-Fir (G=0.42) multiply above values by 0.86, for other wood types refer to NDS® or consult USP.

3) Shear values assumes full penetration of at least 10 nail diameters.

4) HDG = Hot-Dip Galvanized; SS = Stainless Steel; Bright = No Finish.

5) For steel with Fu=45,000 psi, and gage minimum bare metal thickness.

6) Fastener values may be increased for duration of load.

7) Withdrawal loads assume full penetration.

## Minimum Fastener Penetration

Nail Penny	Wire Gauge	Shank Diameter (inches)	Minimum Penetration for Full Shear Load (inches)	Minimum Penetration for Reduced Shear Load <sup>2</sup> (inches)
6d	11-1/2 ga.	.113	1.13	0.68
8d	10-1/4 ga.	.131	1.31	0.79
10d/16d Sinker	9 ga.	.148	1.48	0.89
12d	9 ga.	.148	1.48	0.89
16d	8 ga.	.162	1.62	0.97
20d	6 ga.	.192	1.92	1.15

1) Less than the specified nail penetration shall be multiplied by the applicable adjustment factor.

2) For penetration less than this distance, the nail has no value.

3) Penetrations are derived according to the 2001 NDS®.



## Reduced Fastener Penetration Example:

HD210 – listed load is 1680 lbs. @ 100% for 16d common nails.

### Reduced HD210 capacity if using 2x DF-L or SP header:

1680 lbs. x 1.5 = 1555 lbs. @ 100%  
1.62

# GENERAL NOTES

## PRODUCT NOTES

- 1) USP's Full Line Product Catalog reflects the most current information regarding USP product line. However, product revisions and new product additions occur on an ongoing basis. USP Structural Connectors® reserves the right to change specifications, designs, and models at any time without notice and liability for such changes. USP's Full Line Product catalog may not be reproduced in whole or in part without the prior written approval of USP Structural Connectors®.
- 2) USP's Full Line Product Catalog reflects design changes and design load adjustments to some USP products. The information presented in this publication replaces all information published in previous documents, and is valid until December 31, 2007.
- 3) USP's Full Line Product Catalog was designed as a general reference for the USP Product Line. Various specialized publications have been developed for design professionals, truss manufacturers, contractors, retail dealers, and building material wholesalers. Product load values may vary from one publication to another due to recent product testing, changes in regulatory criteria, or code evaluation updates. The most current product information is available on USP's Web Site.
- 4) The type and quantity of fasteners used to install USP products is critical to connector performance. To achieve the allowable loads presented in USP's Full Line Product Catalog, all specified fasteners must be used and proper installation procedures observed. Verify that the dimensions of supporting members are sufficient to receive specified fasteners. Any product modifications void the warranty unless prior written permission of USP Structural Connectors® is obtained.
- 5) Some connector models are listed more than once to indicate installation and/or fastener options.
- 6) New products or updated product information are designated in red.
- 7) Throughout USP's Full Line Product Catalog, dimensions are expressed in inches and loads in pounds unless specifically noted otherwise.
- 8) Some USP products show both bolt and nail fastening schedules. In those cases, specific loads for each has been identified. Bolt and nail values cannot be combined unless noted otherwise.
- 9) Load values for 8d, 10d, 16d, and 20d designations in the fastener schedules throughout this catalog refer to common wire nails unless noted otherwise. Nails shall conform to a recognized national standard, such as ASTM F1667, as prescribed by the model building codes.
- 10) Fastener installation may cause wood to split and reduce a fastener's ability to carry a load. **If wood splitting occurs, consider pre-drilling holes not exceeding 75% of the nail diameter (per the National Design Specification).**
- 11) Bolts specified in this catalog are through-bolts and must conform to requirements for ASTM A 307 Grade A, or ASME SAE Grade 2, or better unless noted otherwise.
- 12) Anchor Bolts conform to ASTM F 1554.
- 13) USP connectors listed in USP's Full Line Product Catalog are manufactured for specific sizes of standard lumber, plated trusses, or composite lumber. **For applications involving unusual supporting conditions environments, contact USP. Wood shrinkage or expansion, caused by lack of moisture or excessive moisture, may adversely affect connector installation. Evaluate potential shrinking or expanding to ensure proper connector installation and performance.**
- 14) The load values listed in USP's Full Line Product Catalog are based on installation to wood with a moisture content of less than 19%, and used in dry service conditions. Load reductions, in accordance with the code, shall be taken where wood moisture content greater than 19% at the time of installation or where used in wet service conditions.
- 15) Unless otherwise noted, USP products may not be bent or cut in the field to facilitate installation. **Field alterations may weaken steel and cause connector failure at lower than published allowable loads.**

## DESIGN NOTES

- 1) Allowable loads for more than one direction for a single connection cannot be added together. A design load which can be divided into components in the directions given must be evaluated as follows:  
**Design shear/allowable shear + design tension/allowable tension  $\leq 1.0$**
- 2) The allowable loads shown in USP's Full Line Product Catalog are based on Allowable Stress Design methodology. AF&PA has published a brochure for calculating soft conversions called Guideline to LRFD for Pre-engineered Metal Connectors for Wood Construction. Consult USP for assistance in determining appropriate LRFD values for the products shown in this catalog.
- 3) Connector ratings may exceed the tensile strength or other aspects of the wood members involved in the connection. A qualified designer should verify wood member capacities when specifying connectors.
- 4) Verify that the size of the supporting member can accommodate the connector's specified fasteners.
- 5) Some illustrations in USP's Full Line Product Catalog may not reflect additional mechanical reinforcements which may be required to reduce cross grain tension or wood member bending under loading. The design professional is responsible for determining if additional mechanical reinforcement is required.
- 6) USP recommends the hanger height be 60% of the joist height for stability.

## INSTALLATION NOTES

- 1) Use proper safety equipment during connector installations. Always wear gloves when handling connectors.
- 2) All field welding should be done in accordance with AWS Codes. **Caution: Welding galvanized steel may produce harmful fumes and should only be performed in well-ventilated environments.**
- 3) The type and quantity of fasteners used to install USP products is critical to connector performance. To achieve the allowable loads shown in USP's Full Line Product Catalog, install with the fasteners specified for that particular product. Some products allow for alternate nail installations. Refer to the "Optional Nails for Face Mount Hangers and Straight Straps" chart on page 21 of this catalog for load adjustments when using alternate nailing. All specified fasteners must be properly installed prior to applying load of any kind to the connection.
- 4) Drill bolt holes a minimum of 1/32" and a maximum of 1/16" larger than the diameter of the bolt to be installed (per the 2005 NDS®, Section 11.1.2.).
- 5) Washers should always be used under the head or nut of a bolt when not in contact with the connector unless noted otherwise.
- 6) It is permissible to use nail guns to install connectors as long as the specified nails are installed through prepunched nail holes and all specified nail holes are filled. USP recommends the use of nail guns featuring hole-locating mechanisms. Please note that many nail guns use fasteners smaller than the common nail size and load reductions will result. Contact USP or visit our Web Site for additional information. **Caution: Always follow nail gun manufacturer's safety guidelines.**
- 7) Joists installed in hangers should bear fully on the connector seat and shall be cut to fit against the header with a gap no greater than 1/8" between the joist end and header face.
- 8) Multiple-ply members must be fastened securely together to act as one member.
- 9) Top mount hangers shall be installed with the face of the hanger tight to the face of the header
- 10) Top mount hangers installed in floor systems may produce unevenness. This may vary by the thickness of the hanger top flange steel and the nail heads. **If a problem is anticipated, the effects can be mitigated by dapping the beam or cutting the subfloor at hanger locations. The use of face mount hangers will eliminate this problem.**