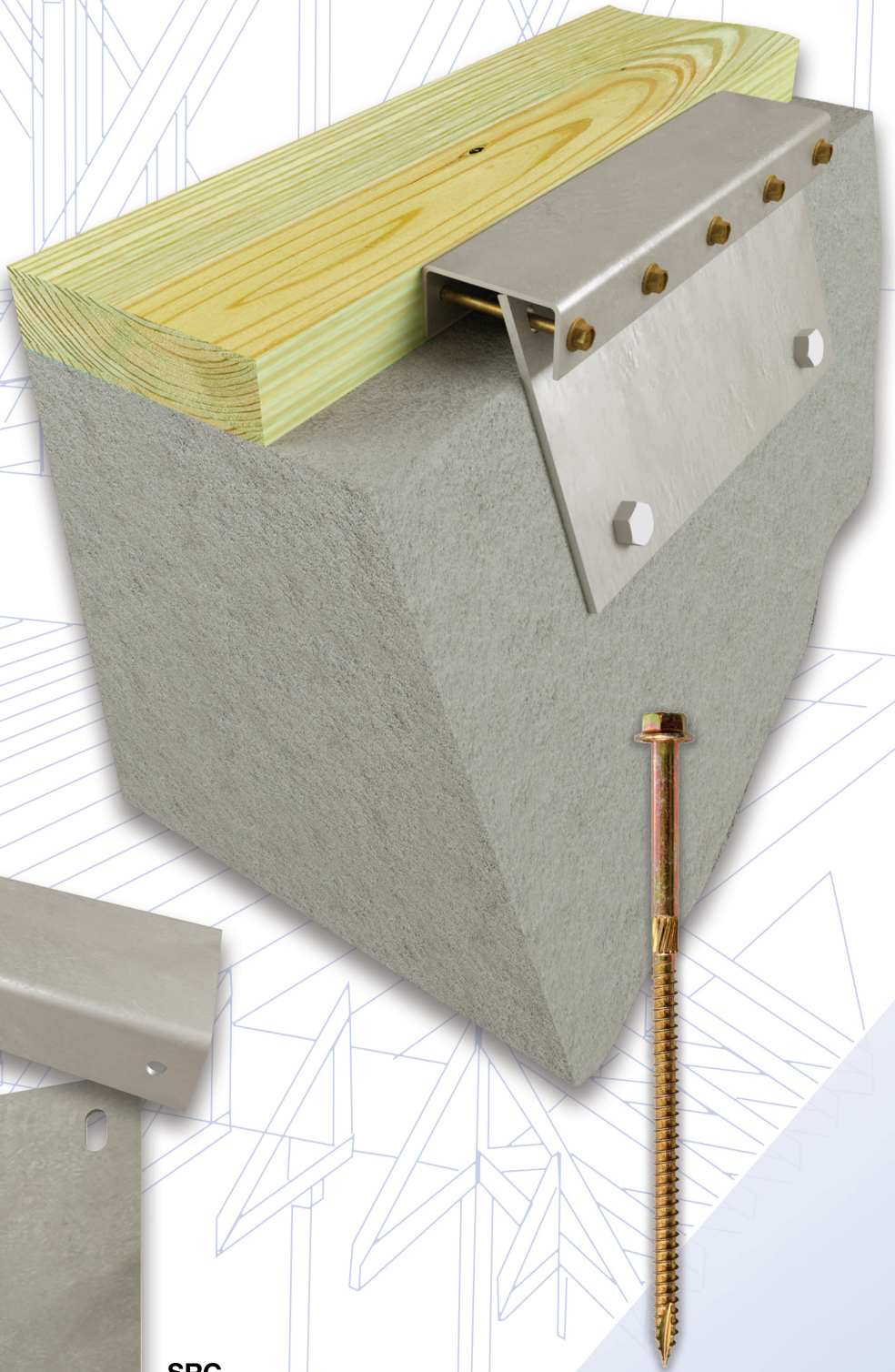
USP®

STRUCTURAL CONNECTORS

Retrofit Solutions for Single Family Residences



SRC
Sill Retrofit
Connector

USPconnectors.com
1-800-328-5934

MiTek®
Better Technology. Better Building.℠

USP CONNECTORS RETROFIT GUIDE

Use this Retrofit Guide to assist in the selection of USP connectors that work best to strengthen and reinforce existing structures. The purpose of this structural strengthening is to help reduce damage to the structure and provide additional safety to the building occupants during typical seismic events.

Some key things to remember when retrofitting your structure:

- Earthquake forces act in all directions including up and down.
- Some connection is better than no connection.
- Best connections are designed to put fasteners in shear rather than withdrawal.
- Ductility of the connection is as important as the strength and stiffness. Connections should retain strength after movement or shifting has occurred. (No “all or nothing” connections)
- Take a visual survey of your project to determine how much access you will have for installation of the connector. Each building and foundation type will have unique challenges and make one connector the solution for one project, but a difficult install on another project.
- Determine how much room you will have to use the tools that you have. For example some spaces will make swinging a hammer nearly impossible, so a pneumatic palm nailer will need to be used instead.
- Property owners of detached, single family wood frame dwellings, please refer to FEMA P-50 and P-50-1 for more information.

1 Sill Plate to Foundation

a. **SRC** — Sill Retrofit Connector for conditions when the distance from the sill plate edge to the inside surface of the foundation wall is between 1/2-in and 2-1/2-in.

b. **SRCP** — Sill Retrofit Connector Plate for conditions when the distance from the sill plate edge to the inside surface of the foundation wall is between 0-in and 1/2-in. Also allows sill plate to over hang foundation wall up to 1/2-in.

2 Sill Plate to Foundation

a. **Threaded Anchor Rod** — Installed with USP's CIA-GEL 7000-C. See local requirements for embedment depth.

3 Wall Studs to Top Plate

a. **SPT / RSPT** — Stud Plate Ties for connecting wall studs to top plates.

4 Rim Board to Top Plate / Sill Plate / Floor Joist

a. **MPA1** — Multi-Purpose Framing Angle to connect rim board directly to the top plate. Provides lateral resistance in all directions and uplift resistance.

5 Post Beam Connection

a. **PB / PBS** — Post Caps with 2-piece design for easy retrofit applications.

b. **PBES** — Post Cap with 2-piece design for easy retrofit applications. Design to be used at the end of the beam

6 Post to Foundation

a. **TDL5** — Concrete Angle to secure wood post to foundation. Use 1/2-in wedge bolt to connect TDL5 to concrete.

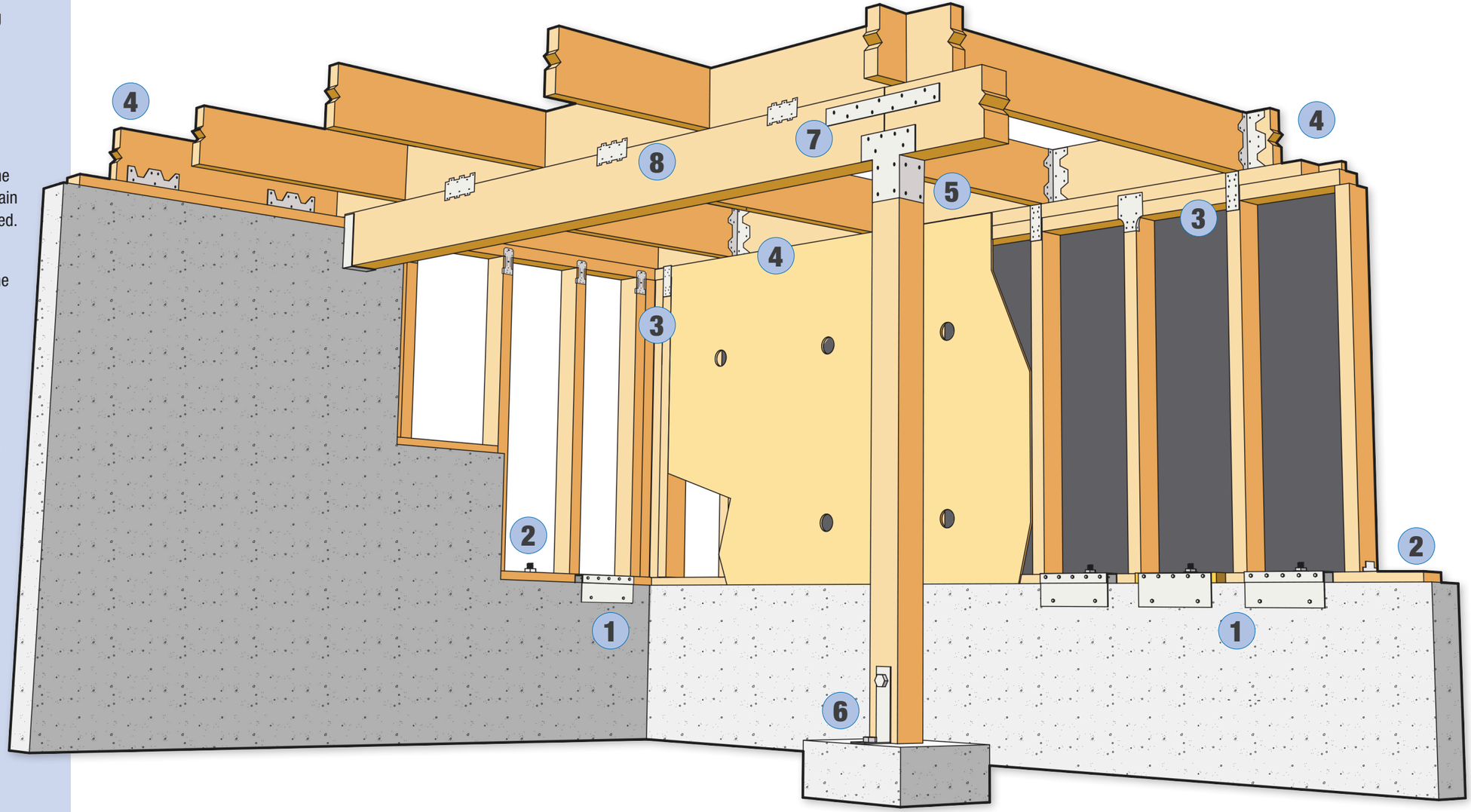
7 Continuity Tension Straps

a. **MSTC** — 3-in Wide strapping comes in a variety of lengths and installs with nails.

b. **CMST14** — 3-in Wide coiled strapping can be cut to a variety of lengths and installs with nails.

8 Member to Member in-Plane Shear

a. **MP4F** — Multi-Lateral Plate to transfer lateral force from one resisting element to another.



1 2 Sill Plate to Foundation

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SRC / SRCP Sill Retrofit Connectors

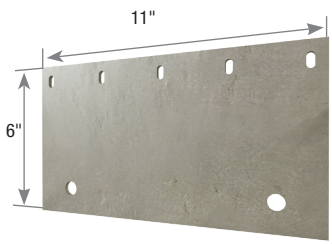
USP Stock No.	Ref. No.	Components	Steel Gauge	Dimensions (in) W	Dimensions (in) H	Maximum Spacing to Replace 1/2" or 5/8" Anchor Bolt	Fastener Schedule: Concrete[3,4] Qty	Fastener Schedule: Concrete[3,4] Dia.	Fastener Schedule: Sill Plate[2] Qty	Fastener Schedule: Sill Plate[2] WS Screw	Installation Type	DF/SP Allowable Load (Lbs.)[1] F1 160%	F2 160%	F3 160%
SRCP	FAP	--	10	11	6	6-ft	2	1/2	5	WS3	Figure 1	1570	360	--
											Figure 2	1570	--	360
											Figure 3 [5]	1570	360	360
SRC	UFP10-SDS3	Channel	12	11	1-1/4	6-ft	2	1/2	5	WS6	--	1450	--	--
		Plate	10	11	6									

1) Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
2) WS3 wood screws are 1/4" x 3" and are included with each SRCP connector,
WS6 wood screws are 1/4" x 6" and are included with each SRC connector.
3) Use 1/2" diameter Powers Power-Stud® anchors with minimum 3" embedment or equivalent.
4) Minimum concrete strength f'c = 2500 psi.
5) The shim must be fastened to the sill by means other than the WS3 wood screws.

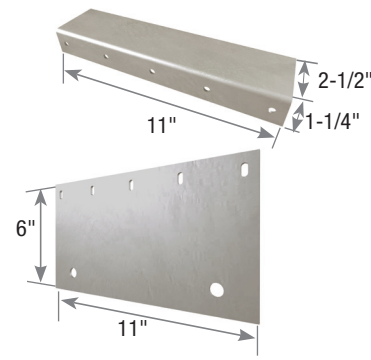
THR Threaded Anchor Rod

USP Stock No.	Ref. No.	Bolt Dia.	L (in)
THR5812-HDG	RFB#5X12HDG	5/8	12

THR

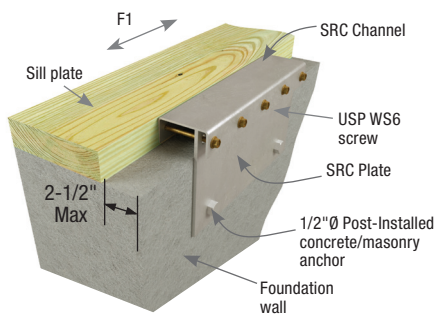


SRCP

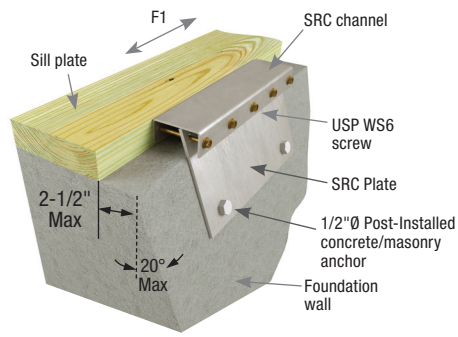


SRC components

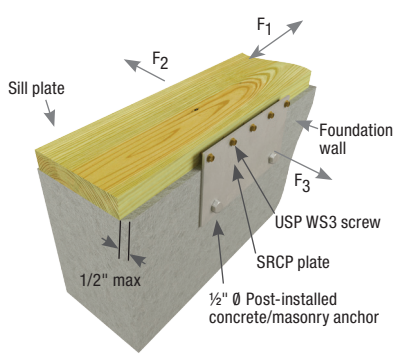
Typical THR installation



Typical SRC installation on rectangular foundation

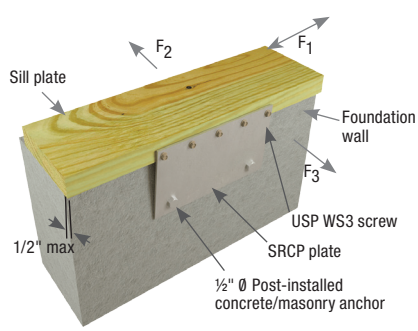


Typical SRC installation on trapezoidal foundation



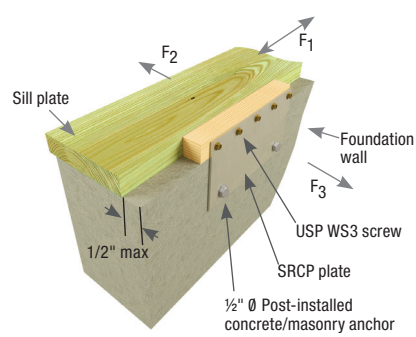
Typical SRCP installation without shim, 1/2" max setback

Figure 1



Typical SRCP installation without shim, 1/2" max overhang

Figure 2



Typical SRCP installation with shim, 1-1/2" max setback

Figure 3

3 Wall Studs to Top Plate

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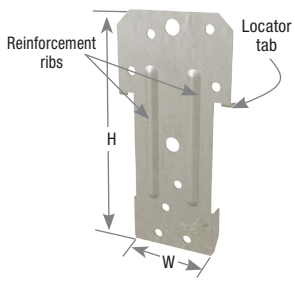
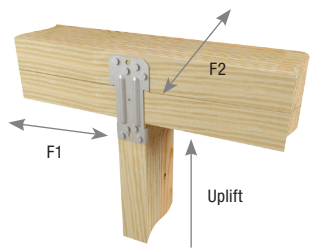
RSPT / SPT Stud Plate Ties

Stud Size	USP Stock No.[2]	Ref. No.	Steel Gauge	Dimensions (in)			Fastener Schedule[3]				DF/SP Allowable Loads (Lbs.)		
							Stud		Plate		Uplift[1]	F1	F2
				W	H	L	Qty	Type	Qty	Type	160%	160%	160%
2x	RSPT4	RSP4	20	1-1/2	4-1/8	--	4	8d x 1-1/2	4	8d x 1-1/2	470	230	300
	RSPT6	SSP	18	1-1/2	5-7/16	--	4	10d x 1-1/2	4	10d x 1-1/2	700	--	--
	SPT22	SP1	20	1-9/16	4-3/8	3-1/2	4	10d	4	10d	685	560	260
	SPT24	SP2	20	1-9/16	5-5/8	3-1/2	6	10d	6	10d	1030	560	260
(2) 2x	RSPT6-2	DSP	18	2-3/4	5-7/16	--	8	10d x 1-1/2	6	10d x 1-1/2	955	--	--
4x	SPT44	--	20	3-9/16	6-3/4	6-1/2	6	16d	6	16d	1305	680	255

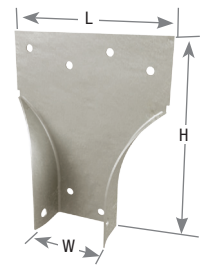
1) Uplift loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
2) SPT22, SPT24, and SPT44: the two nails fastened to the wide face of the stud must be driven 30° from the perpendicular on the horizontal plane.
3) **NAILS:** 8d x 1-1/2" nails are 0.131" dia. x 1-1/2" long, 10d x 1-1/2" nails are 0.148" dia. x 1-1/2" long, 10d nails are 0.148" dia. x 3" long, 16d nails are 0.162" dia. x 3-1/2" long.



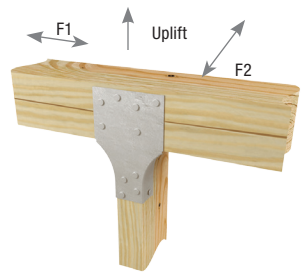
RSPT4



Typical RSPT4 double plate installation



SPT22



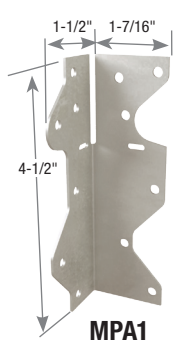
Typical SPT24 installation

4 Rim Board to Top Plate / Sill Plate / Floor Joist

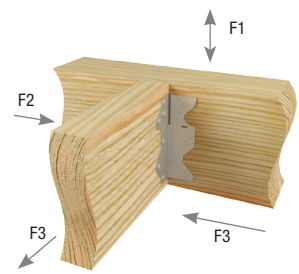
MPA1 Multi-Purpose Framing Angle

USP Stock No.	Ref. No.	Steel Gauge	Installation Type[2]	Fastener Schedule[4]				Direction of Load[2]	DF/SP Allowable Loads (Lbs.)[1,3]			
				Header or Stud		Joist or Plate						
				Qty	Type	Qty	Type		100%	115%	125%	160%
MPA1	A35	18	Figure 1	6	8d x 1-1/2	6	8d x 1-1/2	F1	570	655	680	680
				6	8d x 1-1/2	6	8d x 1-1/2	F2	570	655	715	795
				6	8d x 1-1/2	6	8d x 1-1/2	F3	280	320	350	445
			Figure 2	6	8d x 1-1/2	3	8d x 1-1/2	A1	285	330	355	415
				6	8d x 1-1/2	3	8d x 1-1/2	B1	285	330	350	350
				6	8d x 1-1/2	3	8d x 1-1/2	C1	285	330	355	355
			Figure 3	6	8d x 1-1/2	6	8d x 1-1/2	A2	505	505	505	505
				6	8d x 1-1/2	6	8d x 1-1/2	B2	280	280	280	280
				6	8d x 1-1/2	6	8d x 1-1/2	C2	375	375	375	375

1) Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
2) Refer to drawings for installation type and definition of the various load directions.
3) Loads are shown per angle. When using a single anchor, joist must be constrained from rotation.
4) **NAILS:** 8d x 1-1/2" nails are 0.131" dia. x 1-1/2" long.

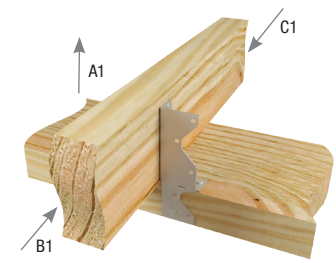


MPA1



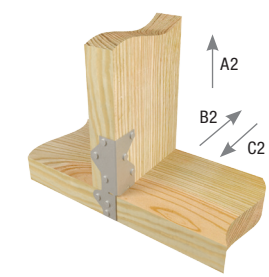
Typical MPA1 joist / header installation

Figure 1



Typical MPA1 rafter / plate installation

Figure 2



Typical MPA1 stud / plate installation

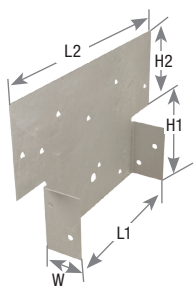
Figure 3

5 Post Beam Connection

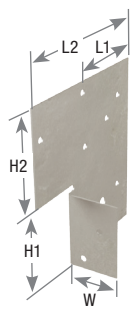
PB / PBES / PBS Post Caps

Post Size	USP Stock No.	Ref. No.	Steel Gauge	Dimensions (in)					Fastener Schedule[2,3]				DF/SP Allowable Loads (Lbs.)[1,2]		
									Post		Beam		Uplift	F1	F2
				W	H1	H2	L1	L2	Qty	Type	Qty	Type	160%	160%	160%
4 x 4	PB44-6TZ	LPC4Z	18	1-1/2	2-1/8	1-1/2	--	3-5/8	8	16d HDG	8	16d HDG	640	1000	400
	PBES44	ACE4, LCE4	18	1-1/2	2-3/8	2-3/4	3-1/4	4-3/4	8	16d	8	16d	1755	1015	630
	PBS44	AC4	18	1-7/16	2-5/16	2-13/16	3-9/16	6-1/2	12	16d	12	16d	2630	1730	1195
4 x 4 Rough	PBS44R	AC4R	18	1-1/2	2-5/16	2-3/16	4	7	8	16d	8	16d	1755	1015	630
6 x 6	PB66-6TZ	LPC6Z	18	1-1/2	2-1/2	3	--	5-9/16	8	16d HDG	8	16d HDG	640	1000	400
	PBES66	ACE6	18	1-1/2	2-3/8	2-1/8	5-1/2	7	8	16d	8	16d	1755	1275	1010
	PBS66	AC6	18	1-1/4	2-5/16	2-7/8	5-1/2	8	14	16d	12	16d	2280	1850	1310
6 x 6 Rough	PBS66R	AC6R	18	1-1/4	2-5/16	2-3/16	6	8-1/2	10	16d	10	16d	1845	1275	1010

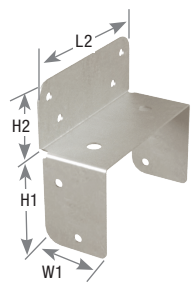
1) Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
2) Load and nail schedules for two-piece models are per pair of post caps.
3) **NAILS:** 16d nails are 0.162" dia. x 3-1/2" long.



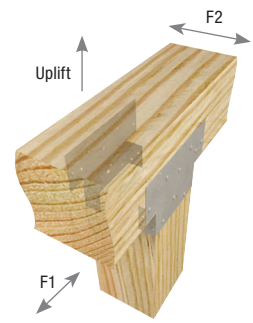
PBS



PBES



PB44-6TZ



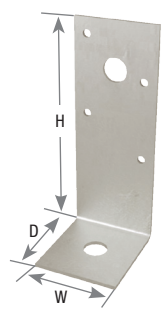
Typical PBS installation

6 Post to Foundation

TDL5 Concrete Angles

USP Stock No.	Ref. No.	Steel Gauge	Dimensions (in)			Fastener Schedule[4,5]						DF/SP Allowable Loads (Lbs.)[1,2,3]	
						Anchor Bolts		Strap				Uplift 160%	
								Nails		Bolts			
			W	H	D	Qty	Dia. (in)	Qty	Type	Qty	Dia. (in)	Nails	Bolts
TDL5	A24	12	2	5-3/16	2-1/4	1	1/2	4	16d	1	1/2	955	1105

1) Allowable loads are based on the use of either nails or bolts; nail and bolt values cannot be combined.
2) The bolt values are based on single shear with a minimum member thickness of 3-1/2".
3) Allowable loads have been increased in accordance with the code; no further increase shall be permitted.
4) Designer must specify anchor bolt type, length, and embedment.
5) **NAILS:** 16d nails are 0.162" dia. x 3-1/2" long.



TDL5

Typical TDL5 embedded interior installation

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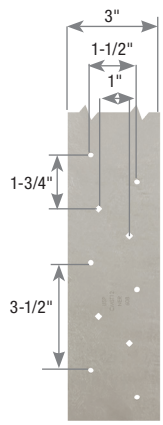
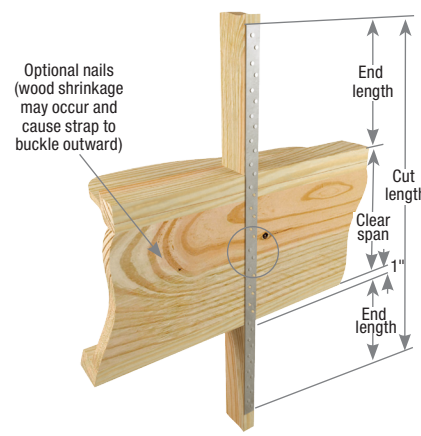
MSTC / CMSTC Strap Ties

USP Stock No.	Ref. No.	Steel Gauge	Dimensions (in) W	Dimensions (in) L	Rim Joist Installation Cut Length	Rim Joist Installation End Length	Fastener Schedule[4,5] Total Qty[2]	Fastener Schedule[4,5] Min Qty[3]	Fastener Schedule[4,5] Type	Nail Spacing O.C.	DF/SP Allowable Tension Loads (Lbs.)[1] 160%
MSTC28	MSTC28	16	3	28-1/4	--	--	36	36	10d	--	3455
					--	--	36	34	16d	--	3860
MSTC40	MSTC40	16	3	40-1/4	--	--	52	52	10d	--	4715
					--	--	52	46	16d	--	4715
MSTC52	MSTC52	16	3	52-1/4	--	--	70	60	10d	--	4715
					--	--	70	52	16d	--	4715
MSTC66	MSTC66	14	3	65-3/4	--	--	88	72	10d	--	6015
					--	--	88	62	16d	--	6015
MSTC78	MSTC78	14	3	77-3/4	--	--	104	76	10d	--	6015
					--	--	104	66	16d	--	6015
CMST14	CMST14	14	3	52-1/2	Clear Span + 58"	29"	--	64	16d	1-3/4"	6630
					Clear Span + 130"	65"	--	74	10d	3-1/2"	
					Clear Span + 256"	128"	--	74	10d	7"	

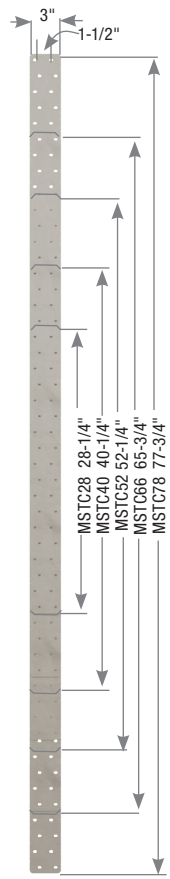
1) Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
2) Total number of nail and/or bolt holes provided in the strap.
3) Minimum quantity of fasteners to be installed with equal fasteners at each end of the connection. Product may have additional nail holes not needed to meet published allowable load of product.
4) 16d sinker nails may be substituted for 10d nails with no load reduction.
5) **NAILS:** 10d nails are 0.148" dia. x 3" long, 16d nails are 0.162" dia. x 3-1/2" long.



CMST



Typical rim joist installation



MSTC

8 Member to Member In-Plane Shear

MPF Multi-Lateral Plates

USP Stock No.	Ref. No.	Steel Gauge	Installation Type[2,4]	Fastener Schedule[5]				Direction of Load[2]	DF/SP Allowable Loads (Lbs.)[1,3,4]			
				Header or Stud		Joist or Plate						
				Qty	Type	Qty	Type		100%	115%	125%	160%
MP4F	LTP4	20	Type 1	6	8d x 1-1/2	6	8d x 1-1/2	V	565	650	705	845
				6	8d x 1-1/2	6	8d x 1-1/2	H	565	650	705	845
			Type 2	6	8d x 1-1/2	6	8d x 1-1/2	V	565	650	705	845
				6	8d x 1-1/2	6	8d x 1-1/2	H	565	650	660	660
			Type 1	6	8d	6	8d	V	565	650	705	845
				6	8d	6	8d	H	565	650	705	845
			Type 2	6	8d	6	8d	V	565	650	705	845
				6	8d	6	8d	H	565	650	660	660
MP6F	LTP5	20	Type 1	6	8d x 1-1/2	6	8d x 1-1/2	V	565	605	605	605
				6	8d x 1-1/2	6	8d x 1-1/2	H	565	605	605	605
			Type 2	6	8d x 1-1/2	6	8d x 1-1/2	V	565	605	605	605
				6	8d x 1-1/2	6	8d x 1-1/2	H	565	605	605	605
			Type 1	6	8d	6	8d	V	565	605	605	605
				6	8d	6	8d	H	565	605	605	605
			Type 2	6	8d	6	8d	V	565	605	605	605
				6	8d	6	8d	H	565	605	605	605

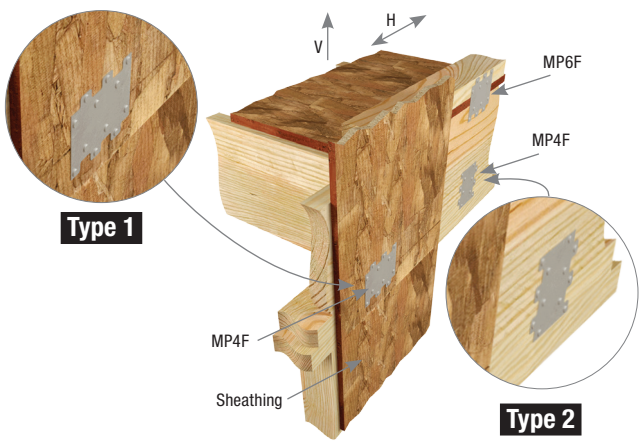
1) Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.

2) Refer to drawings for installation type and definition of the various load directions.

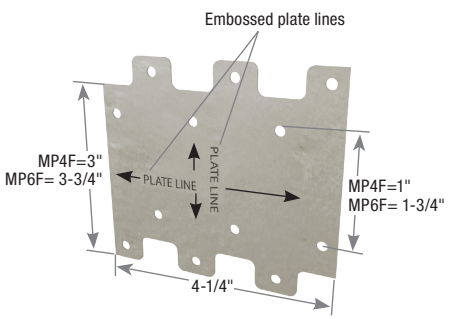
3) If installing MP4F or MP6F over plywood, use 8d common nails for 100% of table load.

4) Loads are shown per angle. When using a single anchor, joist must be constrained from rotation.

5) **NAILS**: 8d x 1-1/2" nails are 0.131" dia. x 1-1/2" long, 8d nails are 0.131" dia. x 2-1/2" long



Typical MPF installation



MP_F

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