SIMPSON
Strong-Tie
®

CONNECTORS
for Cold-Formed Steel Construction

C-CFS-**15**

(800) 999-5099
www.strongtie.com

Our Commitment

At Simpson Strong-Tie, we're committed to being your total solution provider for cold-formed steel (CFS) commercial curtain wall, mid-rise and residential construction. From fully tested and engineered products and design software to connectors and clips that can be installed faster and with fewer screws, we deliver innovative solutions for CFS applications.

Complete, Tested Solutions to Meet Specifier Needs

We are committed to developing fully engineered products through extensive system testing – capturing the interaction of the connector with the framing member, and interaction of the connector with the anchorage. System testing mitigates design risk by eliminating member behavior assumptions near the connector, and eccentricity and prying-action assumptions for fasteners and anchors.

We also provide our specifiers with state-of-the-art software, enabling powerful, efficient and accurate member/connector analysis and design in accordance with AISI specifications. Our Simpson Strong-Tie® CFS Designer™ software is an affordable, easy-to-use solution – helping you handle most of your day-to-day CFS design needs. Visit **www.strongtie.com/software** to learn more.

Lowered Installed Costs to Meet Contractor Budgets

Our commitment extends to reducing your installed costs – designing products to minimize screw count, eliminate the need for pre-drilling the connector, and to minimize tool clearance issues without compromising strength and durability. We field test our products to ensure they can be installed accurately and efficiently according to specifications.

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VALUE ENGINEERED This icon indicates a product that is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

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Company Profile

For nearly 60 years, Simpson Strong-Tie has focused on creating structural products that help people build safer and stronger homes and buildings. A leader in structural systems research and technology, Simpson Strong-Tie is one of the largest suppliers of structural building products in the world. The Simpson Strong-Tie commitment to product development, engineering, testing and training is evident in the consistent quality and delivery of its products and services.

For more information, visit the company's website at **www.strongtie.com**.

The Simpson Strong-Tie Company Inc. "No Equal" pledge includes:

- Quality products value-engineered for the lowest installed cost at the highest-rated performance levels
- Most thoroughly tested and evaluated products in the industry
- Strategically located manufacturing and warehouse facilities
- National code agency listings
- Largest number of patented connectors in the industry
- Global locations with an international sales team
- In-house R&D and tool and die professionals
- In-house product testing and quality control engineers
- Support of industry groups including AISI, AITC, ASTM, ASCE, AWC, AWPA, ACI, AISC, CSI, CFSEI, ICFA, NBMDA, NLBMDA, SDI, SETMA, SFA, SFIA, STAFDA, SREA, NFBA, TPI, WDSC, WIJMA, WTCA and local engineering groups.

The Simpson Strong-Tie Quality Policy

We help people build safer structures economically. We do this by designing, engineering and manufacturing "No Equal" structural connectors and other related products that meet or exceed our customers' needs and expectations. Everyone is responsible for product quality and is committed to ensuring the effectiveness of the Quality Management System.

Karen Colonias
Chief Executive Officer

Getting Fast Technical Support

When you call for engineering technical support, we can help you quickly if you have the following information at hand. This will help us to serve you promptly and efficiently.

- Which Simpson Strong-Tie catalog are you using? (See the front cover for the form number).
- Which Simpson Strong-Tie product are you using?
- What is your load requirement?
- What is the carried member's thickness, width and height?
- What is the supporting member's thickness, width and height?
- What are the carried and supporting members' material and application?

We Are ISO 9001-2008 Registered

Simpson Strong-Tie is an ISO 9001-2008 registered company. ISO 9001-2008 is an internationally-recognized quality assurance system that lets our domestic and international customers know they can count on the consistent quality of Simpson Strong-Tie® products and services.

nqa. ISO 9001 Registered

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Product Identification Key

Products are divided into twelve general categories, identified by tabs along the page's outer edge.

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How To Use This Catalog

New Products

New products are shown with the NEW symbol. There are also new sizes within existing model series.

Value Engineered

This icon indicates a product that is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

Extra Corrosion Protection

This icon identifies products that are available with additional corrosion protection (ZMAX®, Hot-Dip Galvanized or Stainless Steel). Check with Simpson Strong-Tie for availability. The end of the product name will indicate what type of extra corrosion protection is provided (Z = ZMAX, HDG = Hot-Dip Galvanized or SS = Stainless Steel). See pages 17-20 for information on corrosion. Visit our website at **www.strongtie.com/info** for more technical information on this topic.

How We Determine Allowable Loads

Allowable loads in this catalog are determined using calculations and/or one or more of the following methods:

- a minimum of 3 static load tests in CFS assemblies;
- a minimum of 3 static load tests in structural steel jigs;
- a minimum of 3 static load tests of products embedded in concrete or masonry.

Where available, testing is performed to test criteria established by industry (ASTM, AISI or ICC-ES Acceptance Criteria). Where a test standard is unavailable, testing is conducted per sound engineering principles. Some tests include only portions of a product such as purlin anchor tests—only the embedded hook is tested, not the screwed or bolted section of the strap, which is calculated. Testing to determine allowable loads in this catalog is not done on connection systems in buildings. Testing is conducted in an IAS accredited laboratory. **Typically the allowable load is limited to an average test load at ⅛" deflection, an average or lowest test value (nominal load) divided by a safety factor or the calculated value. The safety factor is prescribed by Section F of AISI-S100. For LRFD, the nominal connector strength is multiplied by a resistance factor, also prescribed by Section F of AISI-S100.**

For detailed information regarding how Simpson Strong-Tie tests specific products, contact Simpson Strong-Tie.

Allowable Design Loads: The maximum load imposed on a connection during the life of a structure. There may be multiple design loads acting in different directions (up, down, lateral, perpendicular, etc.) imposed on a connection. When connectors are attached to 2 CFS members of different thicknesses, the Designer shall use the thinner of the 2 members for selecting allowable loads.

Dimensions: This shows the product dimensions (material thickness, length and width in this case.) The product drawing includes these callouts as a cross-reference.

Model No.: This is the Simpson Strong-Tie product name.

Fasteners: This shows the fastener quantity and type required to achieve the table loads.

Thickness: The thickness of the CFS supporting member to which the product is attached. Allowable Load is based on this CFS supporting member thickness.

Code Ref: See page 11 for the Code Reference Key Chart, to determine which code reports include this product.

Model No.	Connector Material Thickness mil (ga)	Dimensions		Fasteners (Total)			Allowable ASD Tension Loads			Code Ref.
		W	L	Rafter/Stud/Joist Thickness			33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)	
				33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)				
LSTA9	33 (20 ga)	1¼	9	8 - #10	8 - #10	8 - #10	705	1120	1190	F1
LSTA12		1¼	12	10 - #10	10 - #10	8 - #10	885	1190	1190	
LSTA15		1¼	15	12 - #10	12 - #10	10 - #10	1060	1190	1190	
LSTA18		1¼	18	14 - #10	12 - #10	10 - #10	1190	1190	1190	

OTHER CATALOG DEFINITIONS:

Deflection: The distance a point moves when a load is applied.

Nominal Tension Load (Strength): The capacity of a structure or component to resist the effects of loads, as determined in accordance with AISI-S100 using specified material strengths and dimensions. Typically taken as the average value of at least 3 tests.

The Nominal Tension Load should not be compared against design loads (ASD, LRFD), but used only where the AISI Lateral Design Standard requires the holdown to have nominal tension load (strength) to resist the lesser of the amplified seismic load or what the system can deliver.

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New Products for 2015

Simpson Strong-Tie® CFS Designer™ Software

Simpson Strong-Tie CFS Designer™ gives cold-formed steel (CFS) Designers the ability to design CFS beam-column members according to AISI specifications as well as analyze complex beam loading and span conditions. Intuitive design tools automate common CFS systems such as wall openings, compression posts for shearwalls, and floor joists with unbalanced live-load combinations.

See page 22 for more information.

SSC, SFC and SJC Utility Clip Connectors

To maximize versatility and ease of installation, our utility clip connectors come in a wide range of sizes and gauges, and are pre-punched with holes for screws and concrete anchors. Although specifiers can use these for custom designs that require non-standard hole patterns, we also provide tabulated values that are based on system testing for the most common applications.

See pages 35, 43, and 48 for more information.

MSSC-KW Kneewall Connectors

Our MSSC utility clips are designed to work in tandem with our BP1½-3 bearing plates to provide solutions for moment resisting kneewall applications.

See page 41 for more information.

MSCB45.5 and MSCB47.5 Bypass Framing Slide-Clips

The new MSCB connectors are heavier gauge versions of our SCB bypass framing slide-clips. Depending on the stud gauge and load direction, MSCB clips are up to 50% stronger than SCB clips.

See page 24 for more information.

LSUBH3.25 U-Channel Bridging Connector

The new LSUBH3.25 is a lighter-gauge version of our popular SUBH3.25 bridging connector. The LSUBH is system tested for 33 mil (20 ga.) – 54 mil (16 ga.) studs in web depths of 3⅝", 6", and 8".

See page 53 for more information.

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New Products for 2015

DBC2.5 U-Channel Bridging Connector

The DBC2.5 is designed to work with ¾" u-channel bridging for drywall studs. The innovative design allows for a single screw installation in most cases. Tabulated loads are based on system testing for 15 mil (25 ga. EQ) through 33 mil (20 ga.) studs in web depths of 3⅝" and 6".

See page 62 for more information.

TJC57 Jack Truss Connector

The new TJC57 complements our existing TJC37 model and is a versatile connector for skewed member applications that demand higher loads.

See page 136 for more information.

S/DTT2Z Tension Ties

The S/DTT2Z is a cost-effective tension-tie solution suitable for light-duty holdown applications for CFS stud shearwalls. It is fastened to the stud with standard #14 self-drilling screws and, depending on the application, can be secured to the foundation using a variety of Simpson Strong-Tie products, including the PAB anchor bolt, SET-XP® anchoring adhesive or Titen HD® screw anchor. A standard ½" diameter washer is included.

See page 115 for more information.

LTA2 Lateral Truss Anchor

The new LTA2 is an embedded truss anchor for uplift and minimal heel height requirements.

See page 135 for more information.

Strong Frame® Special Moment Frame

The new Strong Frame® special moment frame represents the latest innovative lateral system solution from Simpson Strong-Tie. Its patented Yield-Link™ structural fuse is designed to bear the brunt of lateral forces during a seismic event which isolates damage within the frame and keeps the structural integrity of the beams and columns intact. With bolt-on/bolt-off ability, the fuses are fully replaceable if damaged, which makes replacement much easier since the beam and columns can remain in the structure during repairs.

See page 144 for more information.

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New Products for 2015

Self-Drilling E Metal Screw

The new #14x1" Self-Drilling E Metal screw is designed for steel-framing applications and for use with a wide variety of Simpson Strong-Tie® connectors. This high-performance screw is compliant with ASTM C1513 and achieves superior shear and tension strength.

See page 67 for more information.

Strong-Drive® XE Exterior Structural Metal Screw

The new #10x¾" Strong-Drive® XE Exterior Structural Metal Screw has a hex-head and is QuikGuard® coated for corrosion resistance. The screw has undergone a dual hardness heat treatment process not utilized in standard self-drilling screws. The tip is hardened to facilitate drilling efficiency. The load-bearing, threaded shank is kept at a lower hardness so that it is ductile and less prone to hydrogen embrittlement, making it an ideal solution for exterior applications.

See page 66 for more information.

Strong-Drive® XL Large-Head Metal Screw

Strong-Drive® XL Large-Head Metal Screws have been engineered as a 1-for-1 replacement option for pins and ⅝" welds in steel decking. This means you can keep the same spacing and easily substitute screws for pins. This screw is also an ideal solution for CFS connectors that demand high pullover values.

See pages 72-73 for more information.

Strong-Drive® PPSD Sheathing-to-CFS Screw

The Strong-Drive® PPSD Sheathing-to-CFS screw is available in #8, #10 and #12 diameters and lengths ranging from 1 15⁄16" to 3". It is an ideal fastener for subfloor and wood sheathing attachment to CFS and is rated for use with shear walls and diaphragms.

See pages 76-77 for more information.

GDPSK Spiral Knurled Gas Pins

GDPSK gas pins are designed for attaching plywood and OSB to cold-formed steel studs. The spiral knurl provides a positive lock and resists back out. Installed with the GCN-MEP (with magazine) concrete nailers, the GDPSK-138 gas pin provides faster installation and setup times, which contributes to lower labor costs.

See pages 101-102 for more information.

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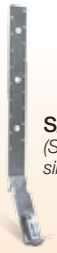
Discontinued Products

Products that will be discontinued in 2015

Simpson Strong-Tie is dedicated to continuously expanding our line of structural connectors with innovative new products that address the changing needs of our customers. As new connectors are introduced that improve upon older designs, it becomes necessary to discontinue the old versions in the interest of efficiency and product-line simplicity.

The table below lists products that are no longer included in the *Connectors for Cold-Formed Steel Construction* catalog as well as the products recommended to replace them. Although technical information for discontinued products will be maintained on our website, Simpson Strong-Tie asks that our customers begin to substitute the replacement products shown below in their designs and inventories. While it is hard to say when they will no longer be available from our distribution partners, production of some of these connectors ended in previous years and others will be phased out of production in 2015. Verify with the Designer prior to substituting replacement product for specified product.

For the most current information on discontinued products, visit **www.strongtie.com/discontinued**. If you have questions about any of the products shown below, please call (800) 999-5099 for assistance.

DISCONTINUED PRODUCT		REPLACEMENT PRODUCT (C-CFS-15 Page #)	
Tension Ties and Strap Holdowns			
S/HTT14	S/HTT14 →	HTT4 or HTT5 *(page 115)*	HTT4 HTT5
 S/PAHD *(S/HPAHD similar)*	S/PAHD →	STHD *(page 118)*	STHD
	S/HPAHD →	STHD *(page 118)*	
Truss Connectors			
S/TSR	S/TSR →	TSBR *(page 139)*	TSBR
S/GTC	S/GTC →	S/LS50 or S/LS70 *(pages 52, 125, 136)*	S/LS50 *(S/LS70 similar)*
Straps and Ties			
H2.5	H2.5 →	H3 *(page 130)*	H3
LTA1	LTA1 →	LTA2 *(page 135)*	LTA2

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Code Reference Column in Load Tables

The alpha-numeric "Code Reference numbers" that appear in the "Code Reference" column in load tables throughout this catalog are intended to identify products listed in evaluation agency reports, typically called "code reports," and the specific reports that cover them. The letter designates the evaluation agency from which the report was obtained. The Code Reference column, used in conjunction with the chart at right, indicates which code listing applies to a product. The reference numbers also clearly identify:

- Products submitted for evaluation report listing (160)
- Products with no evaluation report listing (170)
- Products not submitted because they have no load rating and an evaluation report listing is not necessary (180)
- Products that meet prescriptive or conventional construction code requirements (190)
- Products are calculated per code; testing is not required (200)

Where a model has been submitted for listing (160) or does not have an evaluation report listing (170), Simpson Strong-Tie can supply complete test data to support our published loads. Please contact us for a copy of our product test documentation at (800) 999-5099. Product acceptance may be obtained through the Alternate Methods and Materials section of the applicable building code.

Some loads and applications may not be covered in the code report, and specific reductions and restrictions may be required by other product evaluation agencies. Visit **www.strongtie.com/codes** or visit the product evaluation agencies' websites for the current evaluation reports.

Simpson Strong-Tie products are listed by several product evaluation agencies including ICC-ES; IAPMO UES; UL, FM; the City of Los Angeles, California; and the State of Florida.

Simpson Strong-Tie currently maintains more than 60 ICC-ES ESR and IAPMO UES ER reports evaluated to the 2006/2009/2012 IBC and IRC. We continue to submit product information to ICC-ES and IAPMO UES in order to update reports or receive additional reports for products in compliance with the latest codes.

To quickly determine which of our stamped and welded connector products are listed in ESR reports, we have obtained ICC-ES ESR-2523 index report. This report is a reference document to other ESR reports held by Simpson Strong-Tie and will be updated frequently by ICC-ES and IAPMO UES as new stamped and welded connector evaluation services reports are issued. Please visit **www.strongtie.com/codes** for the latest information or contact ICC Evaluation Service at **www.icc-es.org**.

IAPMO Uniform Evaluation Service has been evaluating products for more than 80 years and has the same ANSI accreditation as ICC Evaluation Service for evaluating structural building products to the building codes. IAPMO UES began evaluating structural building products in 2004, utilizing licensed structural engineers to perform quality reviews. To quickly determine which of our stamped and welded connector products are listed in ER reports, we have obtained IAPMO UES ER-102 index report, which will be updated frequently as products are added to ERs. Please visit **www.strongtie.com/codes** for the latest information or contact IAPMO Uniform Evaluation Service at **www.iapmoes.org**.

In November 2010, the California Division of the State Architect issued a revised IR 23-1. The revised Interpretation of Regulation (IR) addresses and clarifies issues relating to Pre-fabricated Wood Construction Connectors. IR 23-1 defines the Purpose and Scope and clarifies Listing Requirements, Acceptable Load Capacities, Design Requirements, Installation Requirements Connector Fabrication (which addresses corrosion resistant material and/or coatings), and testing requirements. Also IR A-5, updated in October 2012, addresses product and evaluation report acceptance. Please contact the DSA at **www.dsa.dgs.ca.gov/Publications/default.htm** for more information.

On October 1, 2003, the State of Florida's Statewide Product Approval System became effective. The purpose of this system is to provide a single product evaluation and approval system that applies statewide to operate in coordination with the Florida Building Code. This Florida product evaluation and approval system is governed by Florida Statutes, Chapter 553, Section 553.842. Since this law specifies that the product approval system is to apply statewide, Notice of Acceptance is no longer necessary where a product has a statewide approval that is applicable in the High Velocity Hurricane Zone (HVHZ) and is installed in accordance with its conditions of use.

To locate pertinent code reports for Simpson Strong-Tie products, you can access our Code Report Finder Software at **www.strongtie.com/codes**.

Code Report Reference Key Chart

AGENCY	CODE LISTING	CODE REFERENCE
ICC-ES ESR	ESR-1161	I1
	ESR-2138	I2
	ESR-2508	I3
	ESR-2555	I4
	ESR-2611	I5
	ESR-2713	I6
	ESR-2811	I7
	ESR-2920	I8
	ESR-1679	I9
	ESR-3006	I10
IAPMO UES ER	ER-124	IP1
	ER-238	IP2
	ER-242	IP3
	ER-326	IP4
	ER-263	IP5
City of Los Angeles, California	RR 25469	L1
	RR 25489	L2
	RR 25741	L3
	RR 25744	L4
	RR 25827	L5
	RR 25837	L6
	RR 25851	L7
	RR 25943	L8
	RR 25960	L9
	RR 25625	L10
	RR25670	L11
	RR25917	L12
State of Florida	FL11470	F1
	FL13326	F2
	FL13628	F3
	FL13872	F4
	FL14571	F5
	FL15608	F6
	FL15730	F7
	FL15957	F8
	FL15731	F9
	FL5113	F10
	FL2355.1	F11
	FL11473	F12
Submitted for Listing	Call us for Status and Test Data	160
No Code Listing	Call us for Test Data	170
No Load Rating	—	180
Prescriptive Code	—	190
Calculation Per Code	—	200

* Because code reports can be issued throughout the year, we encourage you to visit **www.strongtie.com**, **www.icc-es.org**, **www.iapmoes.org**, **www.ladbs.org**, **www.dsa.dgs.ca.gov**, and **www.floridabuilding.org** for the most current information, call Simpson Strong-Tie at 800-999-5099, or contact the code agency directly.

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Important Information and General Notes

Warning

Simpson Strong-Tie Company Inc. structural connectors, anchors, and other products are designed and tested to provide specified design loads. To obtain optimal performance from Simpson Strong-Tie products and to achieve maximum allowable design load, the products must be properly installed and used in accordance with the installation instructions and design limits provided by Simpson Strong-Tie. To ensure proper installation and use, designers and installers must carefully read the following General Notes, General Instructions to the Installer and General Instructions to the Designer, as well as consult the applicable catalog pages for specific product installation instructions and notes.

Proper product installation requires careful attention to all notes and instructions, including these basic rules:

1. Be familiar with the application and correct use of the connector.
2. Follow all installation instructions provided in the applicable catalog, website, Pocket Installers Guide or any other Simpson Strong-Tie publications.
3. Install all required fasteners per installation instructions provided by Strong-Tie: (a) use proper fastener type; (b) use proper fastener quantity; (c) fill all specified fastener holes; (d) do not overdrive or underdrive nails, including when using gun nailers; and (e) ensure screws are completely driven.
4. Only bend products that are specifically designed to be bent. For those products that require bending, do not bend more than once.
5. Cut joists to the correct length, do not "short-cut". The gap between the end of the joist and the header material should be no greater than ⅛" unless otherwise noted.

In addition to following the basic rules provided above as well as all notes, warnings and instructions provided in the catalog, installers, designers, engineers and consumers should consult the Simpson Strong-Tie website at **www.strongtie.com** to obtain additional design and installation information, including:

- Instructional builder/contractor training kits containing an instructional video, an instructor guide and a student guide in both English and Spanish;
- *Installer's Pocket Guide* (form S-INSTALL; contact Simpson Strong-Tie for more information) which is designed specifically for installers and uses detailed graphics and minimal text in both English and Spanish to explain visually how to install many key products;
- Information on workshops Simpson Strong-Tie conducts at various training centers throughout the United States;
- Product specific installation videos;
- Specialty catalogs;
- Code reports – Simpson Strong-Tie® Code Report Finder software;
- Technical fliers, bulletins and engineering letters;
- Master format specifications;
- Material safety data sheets;
- Corrosion information;
- Connector selection guides for engineered wood products (by manufacturer);
- Simpson Strong-Tie Connector Selector™ software;
- Simpson Strong-Tie AutoCAD® menu;
- Simpson Strong-Tie CFS Designer™ software;
- Simpson Strong-Tie Anchor Designer software
- Simpson Strong-Tie Strong-Wall® Selector software;
- Simpson Strong-Tie Strong Frame® Selector;
- Simpson Strong-Tie Fastener Finder; and
- Answers to frequently asked questions and technical topics.

Failure to fully follow all of the notes and instructions provided by Simpson Strong-Tie may result in improper installation of products. Improperly installed products may not perform to the specifications set forth in this catalog and may reduce a structure's ability to resist the movement, stress, and loading that occurs from gravity loads as well as impact events such as earthquakes and high velocity winds.

Simpson Strong-Tie Company Inc. does not guarantee the performance or safety of products that are modified, improperly installed or not used in accordance with the design and load limits set forth in this catalog.

General Notes

These notes are provided to ensure proper installation of Simpson Strong-Tie® products and must be followed fully.

a. Simpson Strong-Tie Company Inc. reserves the right to change specifications, designs and models without notice or liability for such changes.

b. Steel used for each Simpson Strong-Tie product is individually selected based on the product's steel specifications, including strength, thickness, formability, finish, and weldability. Contact Simpson Strong-Tie for steel information on specific products.

c. Unless otherwise noted, dimensions are in inches and loads are in pounds.

d. Unless otherwise noted, welds, bolts, screws and nails may not be combined to achieve highest load value.

e. Unless otherwise noted, catalog loads are based on cold-formed steel members having a minimum yield strength, F_y, of 33 ksi and tensile strength, F_u, of 45 ksi for 43 mils (18 ga) and thinner, and a minimum yield strength, F_y, of 50 ksi and tensile strength, F_u, of 65 ksi for 54 mils (16 ga) and thicker.

f. Simpson Strong-Tie Company Inc. will manufacture non-catalog products provided prior approval is obtained and an engineering drawing is included with the order. Steel specified on the drawings as ⅛", 3⁄16", and ¼" will be 11 gauge (0.120"), 7 gauge (0.179"), and 3 gauge (0.239"), respectively. The minimum yield and tensile strengths are 33 ksi and 52 ksi, respectively.

g. SSTB (page 109) is ASTM A36, RFB (page 111) is ASTM A307.

h. Unless otherwise noted, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry load and must be replaced.

i. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger or cutting the subfloor to accommodate the top flange thickness.

j. Built-up members (multiple members) must be fastened together to act as one unit to resist the applied load (excluding the connector fasteners). This must be determined by the Designer/Engineer of Record.

k. Do not overload. Do not exceed catalog allowable loads, which would jeopardize the connection.

l. Some model configurations may differ from those shown in this catalog. Contact Simpson Strong-Tie for details.

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General Notes (cont.)

m. Some combinations of hanger options are not available. In some cases, combinations of these options may not be installable. Horizontal loads induced by sloped joists must be resisted by other members in the structural system. A qualified designer must always evaluate each connection, including carried and carrying member limitations, before specifying the product. Fill all fastener holes with fastener types specified in the tables, unless otherwise noted. Hanger configurations, height and fastener schedules may vary from the tables depending on joist size, skew and slope. See the allowable table load for the non-modified hanger, and adjust as indicated. Material thickness may vary from that specified depending on the manufacturing process used. W hangers normally have single stirrups; occasionally, the seat may be welded. S/B, S/LBV, W and WP hangers for sloped seat installations are assumed backed.

n. Simpson Strong-Tie will calculate the net height for a sloped seat. The customer must provide the H1 joist height before slope.

o. Do not weld products listed in this catalog unless this publication specifically identifies a product as acceptable for welding, or unless specific approval for welding is provided in writing by Simpson Strong-Tie. Some steels have poor weldability and a tendency to crack when welded. Cracked steel will not carry load and must be replaced.

p. Steel for the framing members must comply with ASTM A1003 Grade 33 minimum.

q. Quik Drive® screws have been tested per AISI Standard Test Method S904.

r. Consideration should be given to the screw head specified as this may affect the attached materials.

s. Do not add fastener holes or otherwise modify Simpson Strong-Tie products. The performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.

t. All references to bolts or machine bolts (MBs) are for structural quality through bolts (not lag screws or carriage bolts) equal to or better than ASTM Standard A307, Grade A.

General Instructions to the Installer

These general instructions for the installer are provided to ensure proper selection and installation of Simpson Strong-Tie products and must be followed carefully. These general instructions are in addition to the specific installation instructions and notes provided for each particular product, all of which should be consulted prior to and during installation of Simpson Strong-Tie products.

a. All specified fasteners must be installed according to the instructions in this catalog. Incorrect fastener quantity, size, type, material, or finish may cause the connection to fail.

b. Holes for ½" diameter or greater bolts shall be no more than a maximum of 1/16" larger than the bolt diameter per AISI S100 Table E3a, Appendix A.

c. Install all specified fasteners before loading the connection.

d. Some hardened fasteners may have premature failure if exposed to moisture. The fasteners are recommended to be used in dry interior applications.

e. Use proper safety equipment.

f. When installing a joist into a connector with a seat, the joist shall bear completely on the seat. The gap between the end of the joist and the connector or header shall not exceed ⅛" per ICC-ES AC 261 and ASTM D1761 test standards, unless otherwise noted.

g. For holdowns, anchor bolt nuts should be finger-tight plus ⅓ to ½ turn with a hand wrench. Care should be taken to not over-torque the nut and impact wrenches should not be used. This may preload the holdown.

h. Holdowns and tension ties may be raised off the track as dictated by field conditions to accommodate an anchor mislocated no more than 1½". The holdown shall be raised off the bottom track at least 3" for every ¼" that the anchor is offset from the model's centerline. Anchor bolt slope shall be no greater than 1:12 (or 5 degrees). Contact the Designer if the holdown anchor is offset more than 1½" or raised more than 18". Raised holdown height is measured from the top of the concrete to the top of the holdown bearing plate.

i. All screws shall be installed in accordance with the screw manufacturer's recommendations. All screws shall penetrate and protrude through the attached materials a minimum of 3 full exposed threads per AISI S200 General Provisions Section D1.3.

j. Welding galvanized steel may produce harmful fumes; follow proper welding procedures and safety precautions. Welding should be in accordance with American Welding Society (AWS) standards. Unless otherwise noted, Simpson Strong-Tie connectors cannot be welded.

k. Temporary lateral support for members may be required during installation.

General Instructions to the Designer

These general instructions for the Designer are provided to ensure proper selection and installation of Simpson Strong-Tie Company Inc. products and must be followed carefully. These general instructions are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the design process.

a. Allowable loads are determined per the AISI S100 unless otherwise specified. Other code agencies may use different methodologies.

b. The allowable load is typically limited to an average test load at ⅛" deflection, or an average or lowest test value (nominal load) divided by a safety factor or the calculation value. The safety factor is prescribed by Section F1 of the AISI S100.

c. Allowable simultaneous loads in more than one direction on a single connector must be evaluated as follows:

$$\frac{\text{Design Uplift}}{\text{Allowable Uplift}} + \frac{\text{Design Lateral Parallel to Track}}{\text{Allowable Lateral Parallel to Track}} + \frac{\text{Design Lateral Perpendicular to Track}}{\text{Allowable Lateral Perpendicular to Track}} \leq 1.0$$

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General Instructions to the Designer (cont.)

The three terms in the unity equation are due to the three possible directions that exist to generate force on a connector. The number of terms that must be considered for simultaneous loading is at the sole discretion of the Designer and is dependent on their method of calculating wind forces and the utilization of the connector within the structural system.

d. The term "Designer" used throughout this catalog is intended to mean a licensed/certified building design professional, a licensed professional engineer, or a licensed architect.

e. All connected members and related elements shall be designed by the Designer.

f. Unless otherwise noted, member strength is not considered in the loads given and, therefore, one should reduce allowable loads when member strength is limiting.

g. The average ultimate breaking strength for some models is listed under "nominal tension load".

h. Simpson Strong-Tie strongly recommends the following addition to construction drawings and specifications: "Simpson Strong-Tie connectors and fasteners are specifically required to meet the structural calculations of plan. Before substituting another brand, confirm load capacity based on reliable published testing data or calculations. The Engineer/Designer of Record should evaluate and give written approval for substitution prior to installation."

i. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners, and develop the top flange bearing length.

j. Simpson Strong-Tie will provide, upon request, code testing data on all products that have been code tested.

k. Most of the allowable loads published in this catalog are for use when utilizing the traditional Allowable Stress Design (ASD) methodology. A method for using Load and Resistance Factor Design (LRFD) for cold-formed steel is also included in AISI S100. When designing with LRFD, the nominal connector strength multiplied by the resistance factor must be used. If not listed or noted in a table footnote, contact Simpson Strong-Tie for the LRFD values of products listed in this catalog.

l. All steel-to-steel connector screws must comply with ASTM C1513.

m. Screw strength shall be calculated in accordance to AISI S100 Section E4 or shall be based upon the manufacturer's design capacity determined from testing.

n. Simpson Strong-Tie recommends that hanger height be at least 60% of joist height for stability.

o. Local and/or regional building codes may require meeting special conditions. Building codes often require special inspection of anchors installed in concrete and masonry. For compliance with these requirements, it is necessary to contact the local and/or regional building authority. Except where mandated by code, Simpson Strong-Tie products do not require special inspection.

p. When connectors are attached to two CFS members of different thicknesses, the Designer shall use the thinner of the two members for selecting allowable loads.

Additional Important Information and General Notes for Hybrid (Steel-to-Wood) Connections

These notes are in addition to the previous notes for steel-to-steel connections and are provided to ensure proper installation of Simpson Strong-Tie® products and must be followed fully.

a. Unless otherwise noted, allowable loads are for Douglas Fir-Larch under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code. The section from the AC13 criteria indicating the range of specific gravity reads as follows: 3.2.3 The species of lumber used shall have a specific gravity not greater than 0.55 as determined in accordance with the NDS. This chart shows specific gravity and perpendicular to grain compression capacities for the different wood species:

Species	$F_{c\perp}$	Specific Gravity
Douglas Fir-Larch (DFL)	625 psi	0.50
Southern Pine (SP)	565 psi	0.55
Spruce-Pine-Fir (SPF)	425 psi	0.42
Hem Fir (HF)	405 psi	0.43
Glulam	650 psi	0.50
LVL (DF/SP)	750 psi	0.50
TimberStrand® LSL (E=1.3x106)	680 psi	0.50
TimberStrand® LSL (E>1.5x106)	880 psi	0.50
Parallam® PSL	750 psi	0.50

b. For face-mount hangers and straight straps, use 0.86 of table loads for Spruce-Pine-Fir.

c. A fastener that splits the wood will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry wood may split more easily and should be evaluated as required. If wood tends to split, consider pre-boring holes with diameters not exceeding 0.75 of the nail diameter (2012 NDS 11.1.5.3).

d. Wood shrinks and expands as it loses and gains moisture, particularly perpendicular to its grain. Take wood shrinkage into account when designing and installing connections. Simpson Strong-Tie manufactures products to fit common dry lumber dimensions. If you need a connector with dimensions other than those listed in this catalog, Simpson Strong-Tie may be able to vary connector dimensions; contact Simpson Strong-Tie. The effects of wood shrinkage are increased in multiple lumber connections, such as floor-to-floor installations. This may result in the vertical rod nuts becoming loose, requiring post-installation tightening.

e. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger, and notching the beam or cutting the subfloor to accommodate the top flange thickness.

f. Built-up lumber (multiple members) must be fastened together to act as one unit to resist the applied load (excluding the connector fasteners). This must be determined by the Designer/Engineer of Record.

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Additional Instructions for the Installer for Hybrid (Steel-to-Wood) Connections

a. Bolt holes into wood members shall be at least a minimum of 1/32" and no more than a maximum of 1/16" larger than the bolt diameter (per the 2012 NDS 11.1.3.2 and AISI S100 Table E3a, if applicable).

b. The joist shall bear completely on the connector seat, and the gap between the joist end and the header shall not exceed 1/8" per ICC-ES AC13 and ASTM D1761 test standards.

c. For holdowns, anchor bolt nuts should be finger-tight plus 1/3 to 1/2 turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut and impact wrenches should not be used. This may preload the holdown.

Additional Instructions for the Designer for Hybrid (Steel-to-Wood) Connections

a. Loads are based on the AISI S100 and the 2012 AF National Design Specifications (NDS), unless otherwise specified. Other code agencies may use different methodologies.

b. Duration of load adjustments for fasteners into wood as specified by the code are as follows:

"FLOOR" and "DOWN" (100) – no increase for duration of load.
"SNOW" (115) – 115% of design load for 2-month duration of load.
"ROOF LOAD" (125) – 125% of design load for 7 day duration of load.
"EARTHQUAKE/WIND" (160) – 160% of design load for earthquake/wind loading.

c. Some catalog illustrations show connections that could cause cross-grain tension or bending of the wood during loading if not sufficiently reinforced. In this case, mechanical reinforcement should be considered.

d. Most of the allowable loads published in this catalog are for use when utilizing the traditional Allowable Stress Design (ASD) methodology. A method for using Load and Resistance Factor Design (LRFD) for cold-formed steel is also included in AISI S100. When designing with LRFD, the nominal connector strength multiplied by the resistance factor must be used. If not listed or noted in a table footnote, contact Simpson Strong-Tie for the LRFD values of products listed in this catalog. A method for using Load and Resistance Factor Design (LRFD) for wood has been published in ASTM D5457. For more information, refer to the 2012 NDS Appendix N, which contains a conversion procedure that can be used to derive LRFD capacities. When designing with LRFD, reference lateral resistances must be used.

e. Simpson Strong-Tie recommends that hanger height be at least 60% of joist height for stability.

f. Pneumatic or powder-actuated fasteners may deflect and injure the operator or others. Unless otherwise noted, powder-actuated fasteners should not be used to install connectors. Pneumatic nail tools may be used to install connectors, provided the correct quantity and type of fasteners are properly installed in the fastener holes. Tools with fastener hole-locating mechanisms should be used. Follow the manufacturer's instructions and use the appropriate safety equipment. Over driving fasteners may reduce allowable loads. Contact Simpson Strong-Tie as needed.

General Information

Additional Important Information and General Notes for Allowable Anchorage Load Tables for SCB, SCW, SSB and FCB Connectors

1. Allowable loads for #12 – 14 self-drilling screws and PDPT powder-actuated fasteners are based on installation in minimum 3/16" thick structural steel with F_y = 36 ksi. It is the responsibility of the Designer to select the proper length fasteners based on the installation.

2. Allowable loads for Simpson Strong-Tie® Titen® screws are based on installation in concrete with a minimum f'_c = 2500 psi and a maximum f'_c = 4000 psi. Reference the current *Anchoring and Fastening Systems for Concrete and Masonry* catalog for more information about Titen screws.

3. Allowable loads for welded connections require E70XX electrodes with a minimum throat size equal to the clip thickness. Welding shall be in compliance with AWS D1.3. Welding galvanized steel may produce harmful fumes; follow proper welding procedures and precautions.

4. Allowable loads are for anchorage only. It is the responsibility of the Designer to verify the strength and stability of the structure for the loads imposed by the cold-formed steel framing connections.

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Important Information and General Notes

Limited Warranty

Simpson Strong-Tie Company Inc. warrants catalog products to be free from defects in material or manufacturing. Simpson Strong-Tie Company Inc. products are further warranted for adequacy of design when used in accordance with design limits in this catalog and when properly specified, installed and maintained. This warranty does not apply to uses not in compliance with specific applications and installations set forth in this catalog, or to non-catalog or modified products, or to deterioration due to environmental conditions.

Simpson Strong-Tie® connectors are designed to enable structures to resist the movement, stress and loading that results from impact events such as earthquakes and high-velocity winds. Other Simpson Strong-Tie products are designed to the load capacities and uses listed in this catalog. Properly-installed Simpson Strong-Tie products will perform in accordance with the specifications set forth in the applicable Simpson Strong-Tie catalog. Additional performance limitations for specific products may be listed on the applicable catalog pages.

Due to the particular characteristics of potential impact events, the specific design and location of the structure, the building materials used, the quality of construction, and the condition of the soils involved, damage may nonetheless result to a structure and its contents even if the loads resulting from the impact event do not exceed Simpson Strong-Tie catalog specifications and Simpson Strong-Tie connectors are properly installed in accordance with applicable building codes.

All warranty obligations of Simpson Strong-Tie Company Inc. shall be limited, at the discretion of Simpson Strong-Tie Company Inc., to repair or replacement of the defective part. These remedies shall constitute Simpson Strong-Tie Company Inc.'s sole obligation and sole remedy of purchaser under this warranty. In no event will Simpson Strong-Tie Company Inc. be responsible for incidental, consequential, or special loss or damage, however caused.

This warranty is expressly in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, all such other warranties being hereby expressly excluded. This warranty may change periodically – consult our website **www.strongtie.com** for current information.

Terms and Conditions of Sale

Product Use

Products in this catalog are designed and manufactured for the specific purposes shown, and should not be used with other connectors not approved by a qualified Designer. Modifications to products or changes in installations should only be made by a qualified Designer. The performance of such modified products or altered installations is the sole responsibility of the Designer.

Indemnity

Customers or Designers modifying products or installations, or designing non-catalog products for fabrication by Simpson Strong-Tie Company Inc. shall, regardless of specific instructions to the user, indemnify, defend and hold harmless Simpson Strong-Tie Company Inc. for any and all claimed loss or damage occasioned in whole or in part by non-catalog or modified products.

Non-Catalog And Modified Products

Consult Simpson Strong-Tie Company Inc. for applications for which there is no catalog product, or for connectors for use in hostile environments, with excessive wood shrinkage, or with abnormal loading or erection requirements.

Non-catalog products must be designed by the customer and will be fabricated by Simpson Strong-Tie in accordance with customer specifications.

Simpson Strong-Tie cannot and does not make any representations regarding the suitability of use or load-carrying capacities of non-catalog products. Simpson Strong-Tie provides no warranty, express or implied, on non-catalog products. F.O.B. Shipping Point unless otherwise specified.

Conversion Charts

Metric Conversion

Imperial	Metric
1 in	25.40 mm
1 ft	0.3048 m
1 lb	4.448N
1 Kip	4.448 kN
1 psi	6895 Pa

Bolt Diameter

in.	mm
⅜	9.5
½	12.7
⅝	15.9
¾	19.1
⅞	22.2
1	25.4

If Common Rafter Roof Pitch is...

Rise/Run	Slope
1/12	5°
2/12	10°
3/12	14°
4/12	18°
5/12	23°
6/12	27°
7/12	30°
8/12	34°
9/12	37°
10/12	40°
11/12	42°
12/12	45°

Then Hip/Valley Rafter Roof Pitch becomes...

Rise/Run	Slope
1/17	3°
2/17	7°
3/17	10°
4/17	13°
5/17	16°
6/17	19°
7/17	22°
8/17	25°
9/17	28°
10/17	30°
11/17	33°
12/17	35°

Use these Roof Pitch to Hip/Valley Rafter Roof Pitch conversion tables only for hip/valley rafters that are skewed 45° right or left. All other skews will cause the slope to change from that listed.

US Standard Steel Gauge Equivalents in Nominal Dimensions

Min. Thick.	Design Thick.	Ref. Ga[2]	Thickness of Steel Sheets (in.)		
mils	in.		Uncoated Steel	Galvanized Steel (G90)	ZMAX® (G185)
229	0.2405	3	0.239	—	—
171	0.1795	7	0.179	0.186	—
118	0.1240	10	0.134	0.138	0.140
111	0.1163	11	0.120	0.123	0.125
97	0.1017	12	0.105	0.108	0.110
68	0.0713	14	0.075	0.078	0.080
54	0.0566	16	0.060	0.063	0.065
43	0.0451	18	0.048	0.052	0.054
33	0.0346	20	0.036	0.040	0.042
27	0.0283	22	0.030	0.033	0.035

1. Steel thickness may vary according to industry mill standards.
2. Gauge numbers shown are for reference only.

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Corrosion Information

Understanding the Corrosion Issue

Many environments and materials can cause corrosion, including ocean salt air, fire retardants, fumes, fertilizers, preservative-treated wood, de-icing salts, dissimilar metals and more. Metal connectors, fasteners and anchors could corrode and lose load-carrying capacity when installed in corrosive environments or when installed in contact with corrosive materials.

The many variables present in a building environment make it impossible to accurately predict if, or when, corrosion will begin or reach a critical level. This relative uncertainty makes it crucial that specifiers and users are knowledgeable of the potential risks and select a product suitable for the intended use. It is also prudent that regular maintenance and periodic inspections are performed, especially for outdoor applications.

It is common to see some corrosion in outdoor applications. Even stainless steel can corrode. The presence of some corrosion does not mean that load capacity has been affected or that failure is imminent. If significant corrosion is apparent or suspected, then the framing members, fasteners and connectors should be inspected by a qualified engineer or qualified inspector. Replacement of affected components may be appropriate.

Some wood-preservative chemicals and fire-retardant chemicals and retentions pose increased corrosion potential and are more corrosive to steel connectors and fasteners than others. Testing by Simpson Strong-Tie has shown that ACQ-Type D is more corrosive than Copper Azole Type C, Micronized Copper Azole and CCA-C. At the same time, others have shown that the inorganic boron treatment chemicals, specifically SBX-DOT, are less corrosive than CCA-C.

Due to the many different chemical treatment formulations, chemical retention levels, moisture conditions and regional formulation variants, selection of fasteners has become a complex task. We have attempted to provide basic knowledge on the subject here, but it is important to fully educate yourself by reviewing our technical bulletins on the topic (**www.strongtie.com/info**) and also by reviewing information, literature and evaluation reports published by others.

Treatment Use Categories and Exposure Conditions

The American Wood Protection Association (AWPA) identifies 12 Use Category designations (UC) for wood treatment chemicals that are based on protection of the wood material; the Use Categories are based on service conditions and environments and agents of deterioration. At the same time, the building codes require specific corrosion resistance for connectors and fasteners that are in contact with chemically treated wood, and the corrosion resistance is independent of the service environments and treatments that are the basis of the AWPA Use Categories. From the building code perspective, fastener corrosion resistance is provided by hot-dip galvanization applied following ASTM A153, Class D, or by a corrosion-resistant base metal, such as stainless steel, silicon bronze or copper, regardless of exposure. Connectors in contact with preservative-treated wood require a minimum of ASTM A653, Type G185 zinc-coated galvanized steel, or equivalent.

Some exceptions are provided in the International Code Council's (ICC) International Residential Code (IRC) for mechanical galvanization applied to screws. The International Building Code (IBC) has exceptions for plain carbon steel fasteners, nuts and washers in SBX/DOT and zinc borate preservative-treated wood in interior, dry environments.

The International Code Council – Evaluation Service (ICC-ES) implemented AC257 as a method to evaluate alternate corrosion resistance mechanisms for fasteners used in wood construction where hot-dip galvanization (ASTM A153, Class D) is used as the benchmark performance. Under AC257, fastener corrosion resistance is qualified for one or more of four exposure conditions with no salt exposure: (1) treated wood in dry service; (2) clean wood in a salt air dry-service environment; (3) treated wood in a wet-service condition with no salt exposure; and (4) general use with no limitations.

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Corrosion Information

Coatings Available

Not all products are available in all finishes. Contact Simpson Strong-Tie for product availability, ordering information and lead times.

Finish/Material	Description	Level of Corrosion Resistance
Gray Paint	Water-based paint intended to protect the product while it is warehoused and in transit to the jobsite.	Low
Powder Coating	Baked-on paint finish that is more durable than our standard paint and produces a better looking finished product.	Low
Standard G90 Zinc Coating	Zinc galvanized coating containing 0.90 oz. of zinc per square foot of surface area (total both sides).	Low
Electrocoating (E-Coat™)	Electrocoating utilizes electrical current to deposit the coating material on the fastener. After application, the coating is cured in an oven. Electrocoating provides a minimum amount of corrosion protection and is recommended for dry, non-corrosive applications only.	Low
ZMAX G185	Galvanized (G185) 1.85 oz. of zinc per square foot of surface area (hot-dip galvanized per ASTM A653 total both sides). These products require hot-dip galvanized fasteners (fasteners which meet the specifications of ASTM A153).	Medium
HDG HOT DIP GALVANIZED®	Products are hot-dip galvanized after fabrication (14 ga. and thicker). The coating weight increases with material thickness. The minimum average coating weight is 2.0 oz./ft2 (per ASTM A123 total both sides). These products require hot-dip galvanized fasteners (fasteners which meet the specifications of ASTM A153). Anchor bolts are hot-dip galvanized per ASTM F2329.	Medium
Type 410 Stainless Steel with Protective Top Coat	Carbon martensitic grade of stainless steel which is inherently magnetic, with an added protective top coat. This material can be used in mild atmospheres and many mild chemical environments.	Medium
Mechanically Galvanized Coating, Class 55	Simpson Strong-Tie Strong-Drive® SD Connector screws are manufactured with a mechanically applied zinc coating in accordance with ASTM B695, Class 55 with a supplemental overcoat. These fasteners are compatible with painted and zinc-coated (G90 and ZMAX) connectors.	Medium
Double-Barrier Coating	Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws are manufactured with two different finishes that together provide a level of corrosion protection that equals that provided by the previous HDG coating.	Medium
SSt300 STAINLESS STEEL®	Connectors are manufactured from Type 316L stainless steel, and provide greater durability against corrosion. Stainless-steel nails are required with stainless-steel products, and are available from Simpson Strong-Tie.	High/Severe

See Corrosion Information for more specific performance and application information on these finishes.

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Corrosion Information

Simpson Strong-Tie General Recommendations

Simpson Strong-Tie has evaluated the AWPA Use Categories (AWPA U1-13) and the ICC-ES, AC257 Exposure Conditions and developed from that evaluation a set of Corrosion Resistance Recommendations. These recommendations address the coating systems and materials used by Simpson Strong-Tie for connector and fastener products.

Dry-service (or damp-service) environments lead to wood moisture contents less than or equal to 19%. The corrosion potential, even in chemically treated wood, is reduced in these conditions. These conditions are typical of AWPA UC1 and UC2 for wood treatment and AC257 Exposure Condition 1. See the Corrosion Resistance Classification Table for the Simpson Strong-Tie assessment of corrosion needs in these conditions. The AC257 Exposure Condition 2 reflects the presence of air-borne salt in a dry-service environment and corrosion hazard to exposed metal surfaces; it does not include effects of treatment chemicals.

Outdoor environments are generally more corrosive to steel either because the moisture exposure is elevated (greater than 19%) and/or the treatment chemical retention level is higher than for interior service. The AWPA classifies exterior above ground treatments as Use Categories UC3 (A and B) depending on moisture run-off; and for ground-contact levels of protection, it has Use Categories UC4 (A-C). ICC-ES considers the exterior exposure to be limited by the type of chemicals and retention level of the chemicals in the qualification testing and whether the exposure includes salt exposure. In general, The AC257 Exposure Condition 3 includes AWPA Use Categories UC1 (interior dry) to UC4A (exterior ground contact, general use).

Types 316/305/304 stainless steel, copper, silicon bronze and hot-dip galvanized (Class-C) are the most effective protection against corrosion risk, where Type 316 is the best choice for salt marine and chloride containing environments regardless of treatment chemicals or wood species. If you choose to use hot-dip galvanized (Class-D), mechanically galvanized (C3, N2000, or Class 55), double-barrier or Quik Guard® coated fasteners on outdoor projects (e.g., a deck), you should periodically inspect the fasteners or have a professional inspection performed, and regular maintenance is a good practice. See the Corrosion Resistance Classifications Table for the Simpson Strong-Tie assessment of the corrosion resistance associated with materials and coatings and an appropriate level of corrosion resistance for various environments.

Due to the many variables involved, Simpson Strong-Tie cannot provide estimates of service life of connectors and fasteners. We suggest that all users and specifiers obtain recommendations on corrosion from the treated wood supplier or for the type of wood used. As long as Simpson Strong-Tie recommendations are followed, Simpson Strong-Tie stands behind its product performance and our standard warranty applies (page 16).

Simpson Strong-Tie does not recommend painting stainless steel fasteners or hardware. The reason behind this recommendation is that sometimes painting can facilitate corrosion. Stainless steel is “stainless” because it forms a protective chromium oxide film on the surface by passive oxidation with air. The paint film on the stainless steel surface may be imperfect or it can be injured during service, and in either case the metal may be exposed. Microscopic-sized film imperfections and scratches facilitate collection of dirt and water that can be stagnant and degrade or block the passive formation of the protective chromium oxide film. When this happens, crevice corrosion can initiate. Crevice corrosion eventually becomes visible as a brown stain or as red rust. This is the reason that painting usually does not improve corrosion resistance of stainless steel.

Guidelines for Selecting Corrosion-Resistant Connectors and Fasteners

Evaluate the Application

Consider the importance of the connection.

Evaluate the Exposure

Consider these moisture and treatment chemical exposure conditions:

- **Dry Service:** Generally INTERIOR applications and includes wall and ceiling cavities, raised floor applications in enclosed buildings that have been designed to prevent condensation and exposure to other sources of moisture. Prolonged exposure during construction should also be considered, as this may constitute a Wet Service or Elevated Service Condition.
- **Wet Service:** Generally EXTERIOR construction in conditions other than Elevated Service. These include Exterior Protected and Exposed and General Use Ground Contact as described by the AWPA UC4A.
- **Elevated Service:** Includes fumes, fertilizers, soil, some preservative-treated wood (AWPA UC4B and UC4C), industrial zones, acid rain and other corrosive elements.
- **Uncertain:** Unknown exposure, materials or treatment chemicals.
- **Ocean/Water Front:** Marine environments that include airborne chlorides and some splash. Environments with de-icing salts are included.
- **Treatment Chemicals:** See AWPA Use Category Designations. The preservative-treated wood supplier should provide all of the pertinent information about the wood being used. The information should include Use Category Designation, wood species group, wood treatment chemical and chemical retention. See appropriate evaluation reports for corrosion effects of treatment chemicals and fastener corrosion resistance recommendations.

Use the Simpson Strong-Tie® Corrosion Classification Table

If the treatment chemical information is incomplete, Simpson Strong-Tie recommends the use of a 300-series stainless-steel product. Also if the treatment chemical is not shown in the Corrosion Classification Table, then Simpson Strong-Tie has not evaluated it and cannot make any recommendations other than the use of coatings and materials in the Severe category. Manufacturers may independently provide test results of other product information; Simpson Strong-Tie expresses no opinion regarding such information.

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Corrosion Information

Corrosion Resistance Recommendations

Low	Medium	High	Severe
FASTENERS			
Phosphate (gray, black), Clear (bright) zinc (ASTM F1941), Heavy electro-galvanized (ASTM A641-Class 1), Yellow zinc (ASTM F1941), Electrocoat (E-coat), Type 410 stainless steel	Mechanically galvanized (AS 3566.2-C3, N2000, ASTM B695-Class 55), Quik Guard® coating, Hot-dip galvanized (ASTM A153-Class D), Double-barrier coating, Type 410 stainless steel with protective top coat	Type 304 stainless steel, Type 305 stainless steel	Type 316 stainless steel, Hot-dip galvanized (ASTM A153-Class C), Silicon bronze, Copper
CONNECTORS			
Simpson Strong-Tie® gray paint Powder coating Standard G90 zinc coating	ZMAX® (G185) Hot-dip galvanized (ASTM A153 - Class D)	Type 316L stainless steel	Type 316L stainless steel

Corrosion Resistance Classifications

Environment	Material To Be Fastened						
	Untreated Wood or Other Material	Preservative-Treated Wood					FRT Wood
		SBX-DOT Zinc Borate	Chemical Retention ≤ AWPA, UC4A	Chemical Retention > AWPA, UC4A	ACZA	Other or Uncertain	
Dry Service	Low	Low	Low	High	High	High	Med
Wet Service	Med	N/A	Med	High	High	High	High
Elevated Service	High	N/A	Severe	Severe	High	Severe	N/A
Uncertain	High	High	High	Severe	High	Severe	High
Ocean/Water Front	Severe	N/A	Severe	Severe	Severe	Severe	N/A

1. These are general guidelines that may not consider all application criteria. Refer to product specific information for additional guidance.
2. Type 316/305/304 stainless steel products are recommended where preservative-treated wood used in ground contact has a chemical retention level equal to or greater than those for AWPA UC4A: CA-C, 0.1 pcf; CA-B, 0.21 pcf; micronized CA, 0.20 pcf; ACQ-Type D (or C), 0.40 pcf.
3. Testing by Simpson Strong-Tie following ICC-ES AC257 showed that mechanical galvanization (ASTM B695, Class 55), Quik Guard coating, and Double Barrier coating will provide corrosion resistance equivalent to hot-dip galvanization (ASTM A153, Class D) in contact with chemically treated wood in dry service and wet service exposures (AWPA UC1-UC4A, ICC-ES AC257 Exposure Conditions 1 and 3) and will perform adequately subject to regular maintenance and periodic inspection.
4. Mechanical galvanizations C3 and N2000 should not be used in conditions that would be more corrosive than AWPA UC3A (exterior, above ground, rapid water run off).
5. If uncertain about Use Category, treatment chemical, or environment, use Types 316/305/304 stainless steel, silicon bronze or copper.
6. Some treated wood may have excess surface chemicals making it potentially more corrosive than lower retentions. If this condition is suspected, use Type 316/305/304 stainless steel, silicon bronze, or copper fasteners.
7. Type 316 stainless steel, silicon bronze, and copper fasteners are the best recommendation for ocean salt-air and other chloride-containing environments. Hot-dip galvanized fasteners with at least ASTM A153, Class C protection can also be an alternate for some applications in environments with ocean air and/or elevated wood moisture content.

Interior Dry

Exterior

Severe

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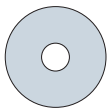
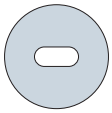
Fastening Information



Round Holes

Purpose:
to fasten a connector.

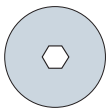
Fill Requirements:
always fill, unless noted otherwise.



Obround Holes

Purpose:
to make fastening a connector in a tight location easier.

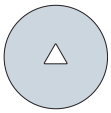
Fill Requirements:
always fill.



Hexagonal Holes

Purpose:
to fasten a connector to concrete or masonry.

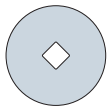
Fill Requirements:
always fill when fastening a connector to concrete or masonry.



Triangular Holes

Purpose:
to increase a connector's strength or to achieve Max strength.

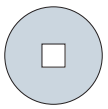
Fill Requirements:
when the Designer specifies Max nailing.



Diamond Holes

Purpose:
to temporarily fasten a connector to make installing it easier.

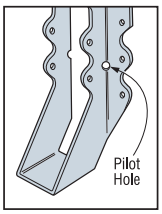
Fill Requirements:
none.



Square Holes

Purpose:
to provide fastening option for unique custom designs

Fill Requirements:
only when specified by Designer.



Pilot Holes

Tooling holes for manufacturing purposes. No fasteners required.

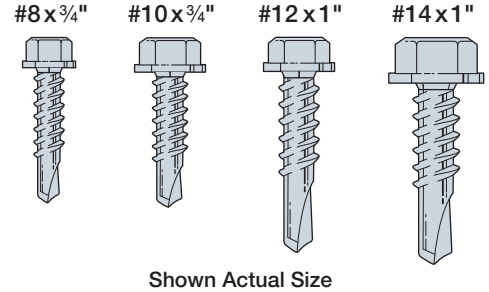
To achieve the loads shown in this catalog, the Designer must verify that the self-tapping screws used for connector installation have Pss/Ω and Pts/Ω values greater than or equal to the values tabulated in this table.

Hex head screws shown are required for connectors in this catalog. Where sheathing or finishes will be applied over the screws and low-profile heads are needed (such as with bracing connectors, hurricane ties and stud-plate tips), the Designer is to ensure that the minimum screw head diameter complies with ASME B18.6.4.

Minimum ASD Loads for AISI Connector Screws (lbs.)

Screw No. Designation	Nominal Diameter d (in.)	Washer Diameter d_W (in.)	Allowable Screw Shear Strength (P_{SS}/Ω)	Allowable Shear Connection Strength (P_{NS}/Ω, P_{SS}/Ω) Steel Thickness mil (ga.)					Allowable Screw Tension Strength (P_{ts}/Ω)	Allowable Tensile Pull-Out Strength (P_{not}/Ω, P_{ts}/Ω) Steel Thickness mil (ga.)				
				33-33 (20-20)	43-43 (18-18)	54-54 (16-16)	68-68 (14-14)	97-97 (12-12)		33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
#8	0.164	0.318	470	150	235	335	335	335	605	70	95	170	215	305
#10	0.190	0.375	540	165	255	510	540	540	820	75	110	200	250	355
#12	0.216	0.375	840	175	260	545	730	755	845	75	110	215	285	405
#14	0.242	0.500	1045	180	285	555	795	825	1220	85	120	215	295	455

1. Allowable loads are for use when utilizing the traditional Allowable Stress Design methodology. The tabulated loads may be multiplied by a Factor of Safety (Ω) of 3 to determine the screw nominal strength. The LRFD load may be determined by multiplying the nominal screw load by a Resistance Factor (ϕ) of 0.50.
2. Allowable loads may not be increased for wind or seismic load unless otherwise noted.
3. Allowable loads are based on cold-formed steel members with a minimum yield strength, F_y, of 33 ksi and tensile strength, F_u, of 45 ksi for 43 mil (18 ga.) and thinner, and a minimum yield strength of 50 ksi and tensile strength of 65 ksi for 54 mil (16 ga.) and thicker.
4. Allowable loads are based on design steel thickness for 33 mil = 0.0346", 43 mil = 0.0451", 54 mil = 0.0566", 68 mil = 0.0713", and 97 mil = 0.1017" per AISI S201 Product Data, Table B2-1.
5. Self-drilling tapping screw fasteners for steel-to-steel connections used for connectors in this catalog shall be in compliance with ASTM C1513.
6. Minimum required screw length is the greater of ¾" and the minimum length required for the screw to extend through the steel connection a minimum of (3) exposed threads per AISI S200-07 General Provisions Standard, Sect. D1.3.
7. Screw diameters per AISI S100-07 Commentary Table C-E4-1.
8. Size ¼" diameter self-tapping screws may be substituted for #14 screws.



Shown Actual Size

See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

Screw Suitability

Screw Point Type	Screw Size	Maximum Material Thickness[1,2] (in.)	(mm)
#2	#6	0.100	2.54
	#8	0.100	2.54
	#10	0.100	2.54
#3	#7	0.125	3.18
	#8	0.140	3.56
	#10	0.175	4.45
	#12	0.210	5.33
	#14	0.220	5.59
#4	#12	0.250	6.35
	#14	0.250	6.35
#5	#12	0.500	12.70
	#14	0.500	12.70

1. Total thickness of all steel, including any spacing between layers.
2. Drill and tap capacities may vary.
3. Table is guideline only; see individual product for specific maximum material thickness.

CFS Framing Member

Mils	Gauge	Design Thickness (in.)	(mm)	Minimum Thickness (in.)	(mm)
18	25	0.0188	0.48	0.0179	0.45
27	22	0.0283	0.72	0.0269	0.68
30	20 (drywall)	0.0312	0.79	0.0296	0.75
33	20 (structural)	0.0346	0.88	0.0329	0.84
43	18	0.0451	1.14	0.0428	1.09
54	16	0.0566	1.44	0.0538	1.37
68	14	0.0713	1.81	0.0677	1.72
97	12	0.1017	2.58	0.0966	2.45

1. One "mil" is 1/1000 (0.001) of an inch. Mil thickness measures the uncoated base material.

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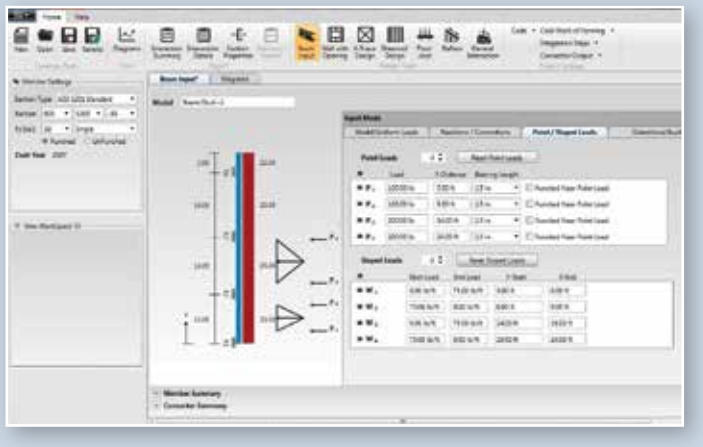
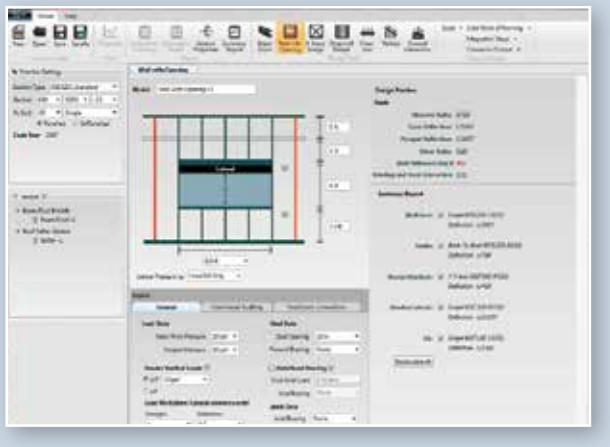
GET THERE QUICKER!

With Simpson Strong-Tie® **CFS Designer**™ Software

Efficient, accurate, AISI-compliant design of cold-formed steel (CFS) structures is made possible by Simpson Strong-Tie® CFS Designer™ software. Powerful design tools automate common CFS systems, complicated AISI design provisions, complex loading scenarios and more. A modern development platform and intuitive user interface enable fast input and simplify file management, as multiple systems can be saved within a single job file. Output is generated in PDF files that can be saved separately, if needed.



Beam-column design tool models up to 3-span beams with overhangs at each end



Design automation tools for framed wall openings, x-braced and sheathed shearwalls, floor joists, and rafters

ADDITIONAL KEY FEATURES:

- Enables input of a complicated array of axial loads, distributed loads, sloped loads, and point loads.
- Supports 2010, 2007, and 2004 AISI Specifications
- Member design includes single stud and track sections, box-sections, I-Sections, built-up stud and track sections, and HSS sections per AISC 13th Edition.
- Automates the selection of Simpson Strong-Tie SUBH/MSUBH bridging connectors, and SCB, SCW, SSB, and FCB curtain-wall connectors.

System Requirements

1. Microsoft Windows® 2003 or newer
2. Microsoft .NET Framework 4.0 Client Profile
3. Adobe Reader 9.0
4. Display Resolution 1280 x 768

Please visit www.strongtie.com/cfsdesigner to:

- View complete system features
- Compare to LGBEAMER™ software
- Test drive the demo version
- View release notes
- Purchase and download CFS Designer™ software

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Innovative Solutions for Curtain-Wall Framing

Simpson Strong-Tie has developed a line of connectors for use with curtain-wall steel stud framing. Curtain-wall projects require a variety of connectors that provide a load path from the curtain wall to the primary structure for wind loads, seismic loads and dead loads. Slide-clip connectors enable the structural building frame to deflect independently of the curtain-wall system. Fixed-clip connectors support the dead load of a curtain wall from the structural frame. Fixed clips have the added benefit of providing connector solutions for load-bearing walls and for roof systems utilizing steel trusses and rafters.

Our connectors for curtain-wall construction accommodate many different bypass framing applications in a variety of stand-off conditions. We also offer connectors for head-of-wall and strut applications.

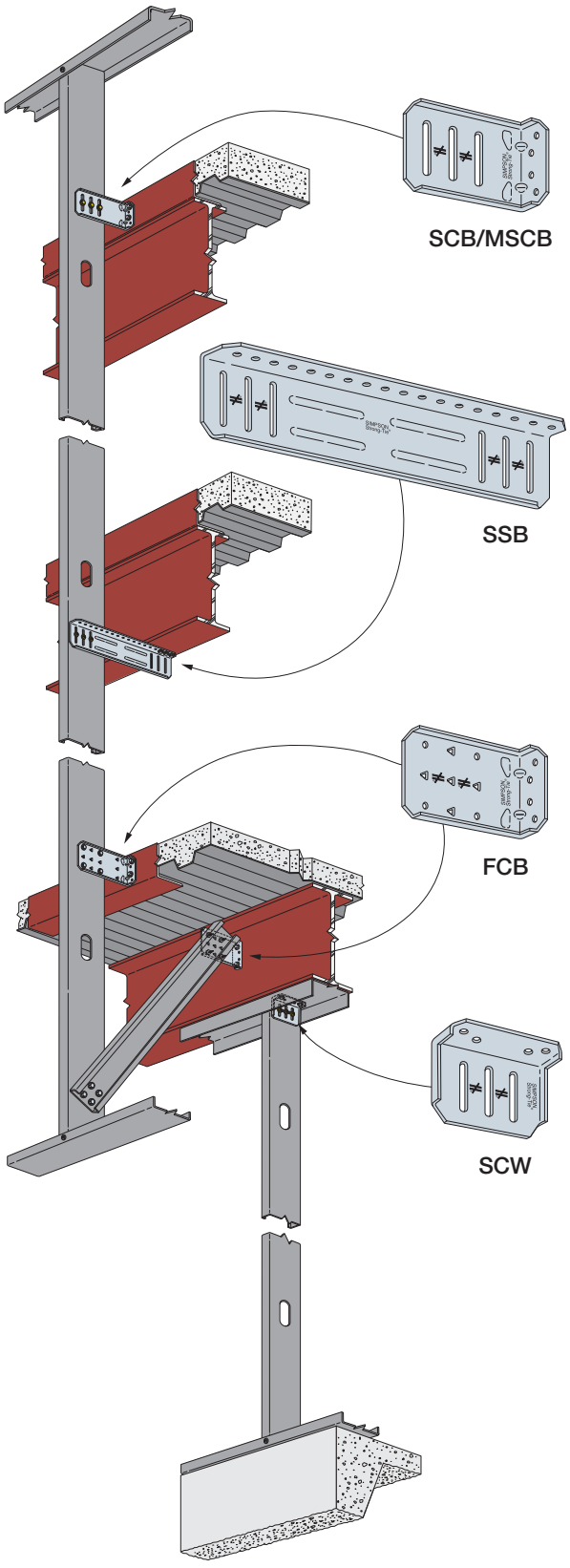
Tailored to Your Design

All our standard slide clips accommodate 1" of both upward and downward movement, equivalent to an L/360 live-load deflection for a 30' span. Our standard clips also accommodate stand-offs as large as 12¼". For deflections greater than 1", or stand-offs greater than 12¼", Simpson Strong-Tie can provide custom clips to suit most framing needs (see page xx).

Complete, Tested Solutions

Designers of curtain walls will often know the capacity of a connector, but since the capacity does not take into account the way in which the connector is anchored to the supporting structure, the Designer must then manually calculate this important aspect of the connection design. These calculations are complicated by considerations of eccentric and prying forces that often exist but are difficult to predict. Through comprehensive testing Simpson Strong-Tie provides total, code-listed connector solutions. Our testing extends from the capacity of the connector and its attachment to the framing, to the anchorage of the connector to the primary structure. By providing complete data on the entire connection system, we save the Designer time and ensure that all forces, including eccentric and prying forces, are adequately considered.

As with all Simpson Strong-Tie® products, our slide-clip and fixed-clip connectors for curtain-wall steel stud framing carry our promise of quality and performance, and are backed by prompt, knowledgeable service.



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SCB/MSCB Bypass Framing Slide-Clip Connector

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The SCB/MSCB slide-clip connectors are high-performance connectors for bypass framing applications designed to reduce design time and overall installed cost. Various anchorage methods have been tested, and the resulting allowable loads eliminate the need to design connector anchorage. The SCB/MSCB can accommodate applications that typically require two parts with a single connector, reducing material and labor cost. These connectors are manufactured in five different lengths to accommodate a variety of stand-off conditions and steel-stud sizes.

Features:

- Provides a full 1" of both upward and downward movement
- The precision-manufactured shouldered screws provided with the SCB/MSCB connector are designed to prevent overdriving and to ensure the clip functions properly
- Strategically placed stiffeners, embossments and anchor holes maximize connector performance
- Simpson Strong-Tie® "No-Equal" stamps mark the center of the slots to help ensure correct shouldered-screw placement

Material: SCB – 54 mil (16 ga.); MSCB – 68 mil (14 ga.)

Finish: Galvanized (G90)

Installation:

- Use the specified type and number of anchors.
- Use the specified number of #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the "No-Equal" stamp.
- Use a maximum of 1 screw per slot.

Codes: See page 11 for Code Report Reference Key Chart.

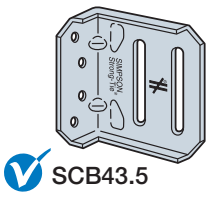
Ordering Information:

SCB43.5-KT contains:

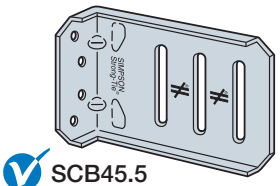
- 25 connectors
- (55) #14 shouldered screws

SCB45.5-KT, MSCB45.5-KT, SCB47.5-KT, MSCB47.5-KT, SCB49.5-KT, and SCB411.5-KT contain:

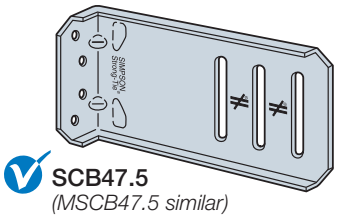
- 25 connectors
- (83) #14 shouldered screws



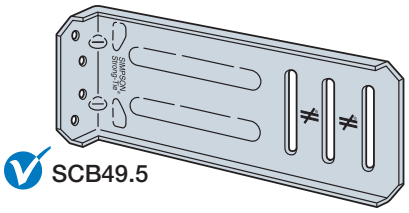
SCB43.5



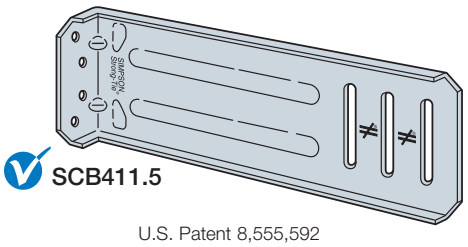
SCB45.5
(MSCB45.5 similar)



SCB47.5
(MSCB47.5 similar)

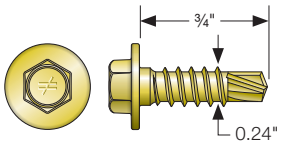


SCB49.5

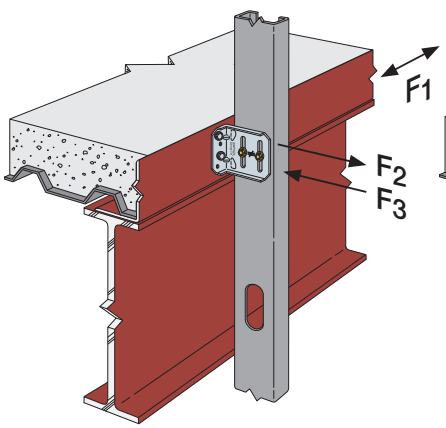


SCB411.5

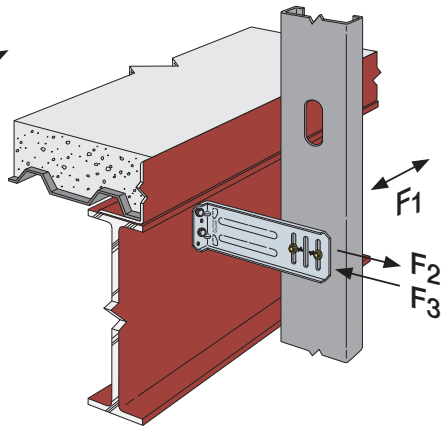
U.S. Patent 8,555,592



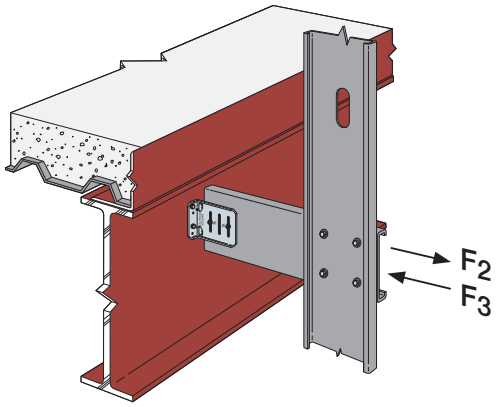
#14 Shouldered Screw



Typical SCB/MSCB Installation



SCB/MSCB Installation at Fascia Beam



Typical SCB/MSCB Installation with Stud Strut

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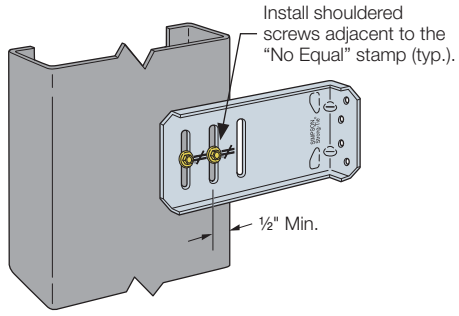
SCB/MSCB Bypass Framing Slide-Clip Connector

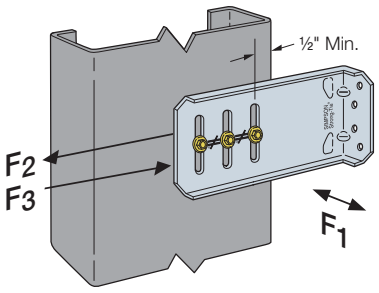
SCB/MSCB Allowable Connector Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	No. of #14 Shouldered Screws	Stud Thickness												Code Ref.
				33 mil (20 ga.)			43 mil (18 ga.)			54 mil (16 ga.)			68 mil (14 ga.)			
				F_1[3,4]	F_2[2]	F_3[2]	F_1[3,4]	F_2[2]	F_3[2]	F_1[3,4]	F_2[2]	F_3[2]	F_1[3,4]	F_2[2]	F_3[2]	
SCB43.5	54 (16)	3½	2	100	520	520	155	610	690	185	760	975	185	760	975	IP2, L8, F6
SCB45.5	54 (16)	5½	2[2]	75	490	520	85	610	690	85	760	975	85	760	975	
			3	120	675	675	140	895	1000	140	990	1260	140	990	1260	
NEW MSCB45.5	68 (14)	5½	2[2]	75	490	520	120	780	690	135	1055	1200	135	1195	1475	160
			3	120	675	675	185	1070	1000	225	1220	1930	225	1365	1930	
SCB47.5	54 (16)	7½	2[2]	55	490	520	55	610	690	55	760	945	55	760	945	IP2, L8, F6
			3	70	675	675	70	895	1000	70	990	1260	70	990	1260	
NEW MSCB47.5	68 (14)	7½	2[2]	70	490	520	75	780	690	85	1055	1200	85	1195	1475	160
			3	90	675	675	90	1070	1000	110	1220	1930	110	1365	1930	
SCB49.5	54 (16)	9½	2[2]	40	490	520	40	690	690	40	760	945	40	760	945	IP2, L8, F6
			3	45	675	675	45	895	1000	45	990	1260	45	990	1260	
SCB411.5	54 (16)	11½	2[2]	30	490	520	30	690	690	30	990	920	30	990	920	
			3	35	675	675	35	860	1000	35	990	1260	35	990	1260	

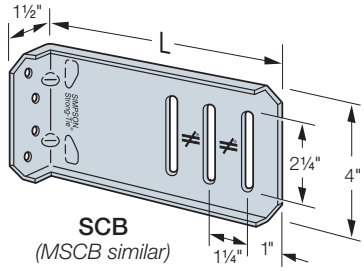
1. When the SCB or MSCB connector is used with 2 shouldered screws, the screws may be installed in any 2 slots.
2. Allowable loads are based on clips installed with (4) #12-14 screws in the anchor leg. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCB/MSCB Allowable Anchorage Loads table below.
3. Anchorage to the supporting structure using welds or a minimum of (2) #12-14 self-drilling screws is required.
4. Allowable loads are based on in-plane loads applied to the stud fasteners that are nearest the support with complete rotational restraint at the studs. For a more extensive treatment of in-plane loads please refer to Simpson Strong-Tie Engineering Letter L-CF-CWCF1DIR14.
5. Reference Simpson Strong-Tie Engineering Letter L-CF-CWCLRFD13 for LRFD design strengths.



SCB/MSCB Installation with 2 Shouldered Screws



SCB/MSCB Installation with 3 Shouldered Screws

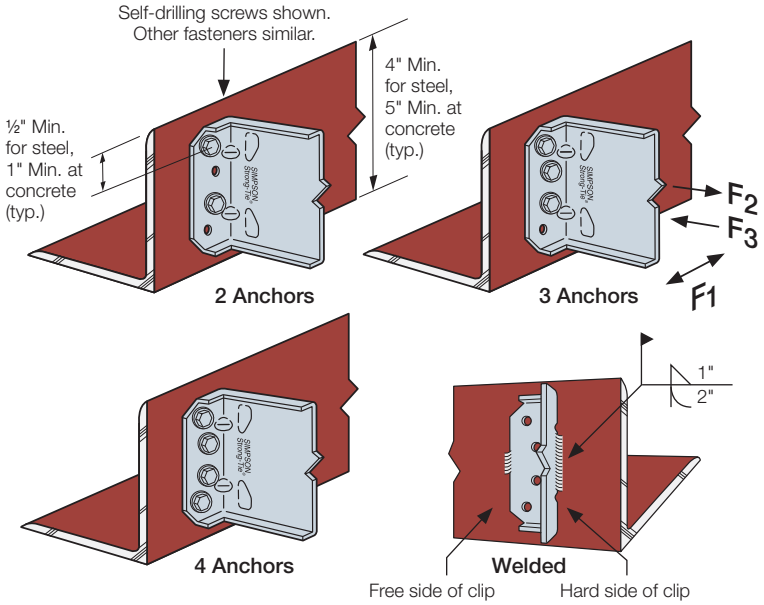


SCB
(MSCB similar)

SCB/MSCB Allowable Anchorage Loads

Anchorage Type	No. of Anchors	Allowable Loads F_2 and F_3 (SCB)	Allowable Loads F_2 and F_3 (MSCB)
#12-14 Self-Drilling Screws[3]	2	795	795
	3	1120	1365
	4	1260	1540
Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT Powder-Actuated Fasteners	2	280	280
	3	390	390
	4	555	555
¼"x1¾" Simpson Strong-Tie® Titen® Hex-Head Screws	2	380	380
	3	445	445
	4	510	510
Welded	Hard side: 2"	1260	1540
	Free side: 1"		

1. For additional important information, see General Notes for Allowable Anchorage Load Tables on page 15.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCB/MSCB Allowable Connector Loads table above.
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



SCB/MSCB Anchor Layout

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SSB Bypass Framing Slide-Clip Strut Connector

The SSB connector is a versatile strut connector that is commonly used at the bottom of a steel beam to accommodate large stand-off conditions. It accommodates 1" of upward and 1" of downward movement.

Material: 54 mil (16 ga.)

Finish: Galvanized (G90)

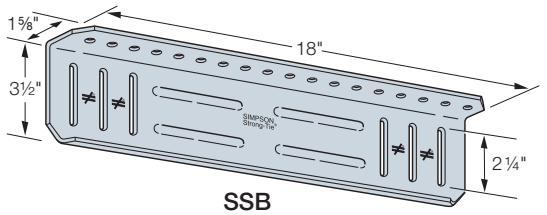
Codes: See page 11 for Code Report Reference Key Chart.

Installation:

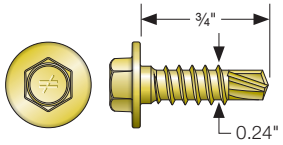
- Use the specified type and number of anchors.
- Use the specified number of #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the "No-Equal" stamp.
- Use a maximum of 1 screw per slot.
- If the SSB intrudes on interior space, it can be trimmed. The trimmed part shall allow an edge distance from the center of the nearest anchor to the end of the trimmed part of ½" or greater.

Ordering Information: SSB3.518-KT contains:

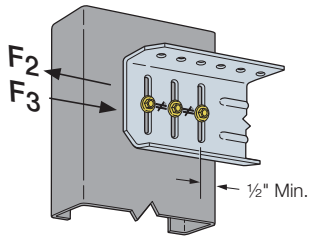
- Box of 25 connectors
- 83 shouldered screws



SSB
U.S. Patent 8,555,592



#14 Shouldered Screw

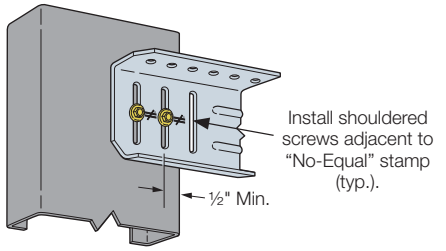


SSB Installation with 3 Shouldered Screws

SSB Allowable Connector Loads

Model No.	Connector Material Thickness mil (ga.)	No. of #14 Shouldered Screws	Stud Thickness						Code Ref.
			33 mil (20 ga.)		43 mil (18 ga.)		54 mil (16 ga.)		
			F2	F3	F2	F3	F2	F3	
SSB3.518	54 (16)	2[2]	520	520	690	690	1075	960	IP2, L8, F6
		3	815	815	1030	1080	1335	1225	

1. When the SSB connector is used with 2 shouldered screws, the screws may be installed in any 2 slots.
2. Allowable loads are based on clips installed with (3) #12-14 screws in the anchor leg. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SSB Allowable Anchorage Loads table below.
3. Reference Simpson Strong-Tie Engineering Letter L-CF-CWCLRFD13 for LRFD design strengths.

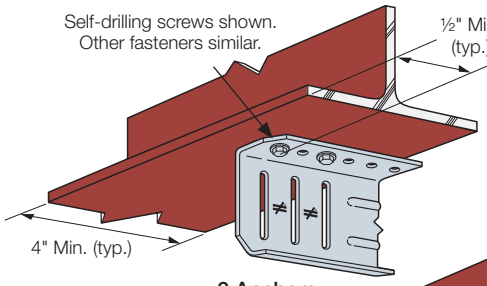


SSB Installation with 2 Shouldered Screws

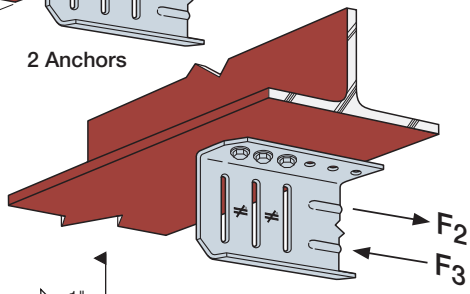
SSB Allowable Anchorage Loads

Anchorage Type	No. of Anchors	Allowable Loads F_2 and F_3
#12-14 Self-Drilling Screws[3]	2	1250
	3	1335
Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT Powder-Actuated Fasteners	2	1320
	3	1335
Welded	Hard side: 2" Free side: 1"	1335

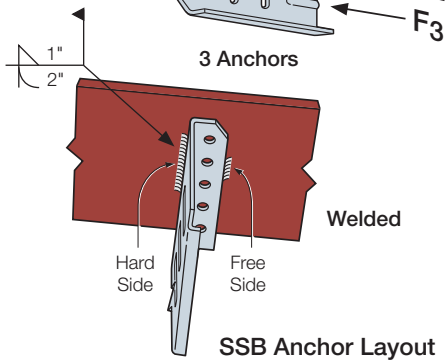
1. For additional important information, see General Notes on page 15.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SSB Allowable Connector Loads table above.
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



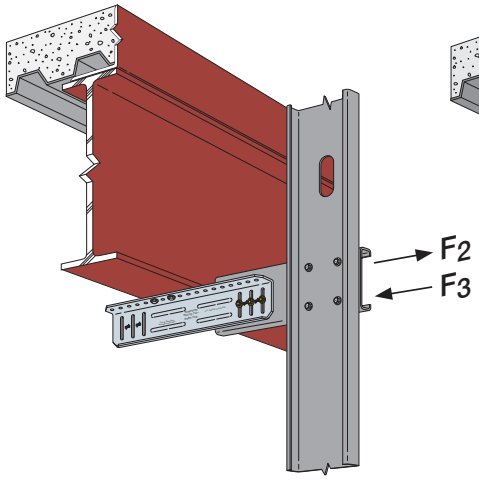
2 Anchors



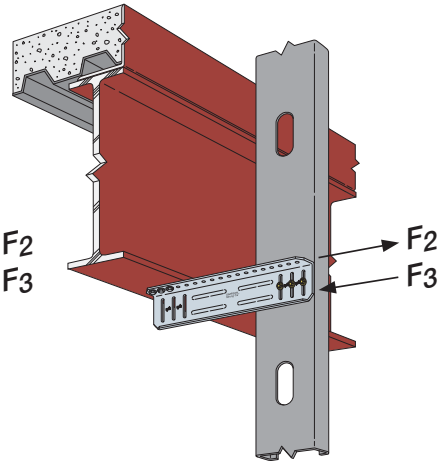
3 Anchors



Welded



Typical SSB Installation with Stud Strut



Typical SSB3.518 Installation

SSB Anchor Layout

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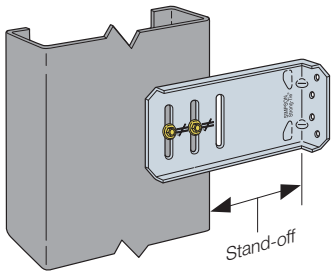
Design Aid – SCB, SSB and FCB

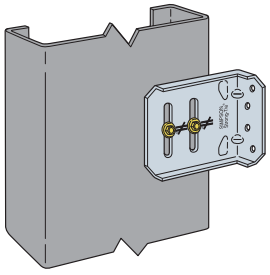
Curtain Wall Connector Stand-Off Distances

Model No.	Fastener Pattern[2]	Depth of Stud				
		3⅝"	6"	8"	10"	12"
SCB43.5	A	0" to 1"	0" to 1"	0" to 1"	0" to 1"	0" to 1"
SCB45.5/MSCB45.5	B	1⅞" to 2¾"	0" to 2¾"	0" to 2¾"	0" to 2¾"	0" to 2¾"
	C, D & E	—	0" to 1½"	0" to 1½"	0" to 1½"	0" to 1½"
SCB47.5/MSCB47.5	B	3⅞" to 4¾"	1½" to 4¾"	0" to 4¾"	0" to 4¾"	0" to 4¾"
	C, D & E	—	1½" to 3½"	0" to 3½"	0" to 3½"	0" to 3½"
SCB49.5	B	5⅞" to 6¾"	3½" to 6¾"	1½" to 6¾"	0" to 6¾"	0" to 6¾"
	C, D & E	—	3½" to 5½"	1½" to 5½"	0" to 5½"	0" to 5½"
SCB411.5	B	7⅞" to 8¾"	5½" to 8¾"	3½" to 8¾"	1½" to 8¾"	0" to 8¾"
	C, D & E	—	5½" to 7½"	3½" to 7½"	1½" to 7½"	0" to 7½"
SSB3.518	B[2]	0" to 12¼"	0" to 12¼"	0" to 12¼"	0" to 12¼"	0" to 12¼"
	C, D & E[3]	—	0" to 11"	0" to 11"	0" to 11"	0" to 11"
FCB43.5	Min.[4]	0" to 1"	0" to 1"	0" to 1"	0" to 1"	0" to 1"
	Max.[4]	0" to 1"	0" to 1"	0" to 1"	0" to 1"	0" to 1"
FCB45.5	Min.[4]	—	0" to 1½"	0" to 1½"	0" to 1½"	0" to 1½"
	Max.[4]	—	0" to 1½"	0" to 1½"	0" to 1½"	0" to 1½"
FCB47.5	Min.[4]	—	1½" to 3½"	0" to 3½"	0" to 3½"	0" to 3½"
	Max.[4]	—	—	0" to 1"	0" to 1"	0" to 1"
FCB49.5	Min.[4]	—	3½" to 5½"	1½" to 5½"	0" to 5½"	0" to 5½"
	Max.[4]	—	—	—	0" to 1"	0" to 1"
FCB411.5	Min.[4]	—	5½" to 7½"	3½" to 7½"	1½" to 7½"	0" to 7½"
	Max.[4]	—	—	—	—	0" to 1"

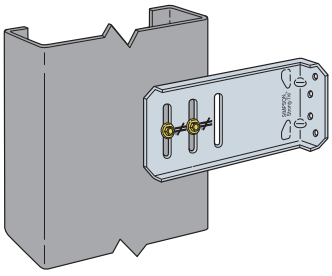
1. The stand-off is the distance from the interior flange of the stud to the face of the supporting structure (see illustration below). All dimensions assume fasteners are installed a minimum of ½" from the edge of stud, and the connector does not extend beyond the exterior flange of the stud; "—" designates conditions where fastener pattern will not fit on stud.
2. A tabulated maximum stand-off of 12¼" is based on 3 anchors. For 2 anchors, maximum stand-off is 13¼".
3. A tabulated maximum stand-off of 11" is based on 3 anchors. For 2 anchors, maximum stand-off is 12".
4. For FCB fixed connectors (pages 30-31), minimum indicates fill all round holes, and maximum indicates fill all round and triangle holes.
5. Fastener patterns are as follows:



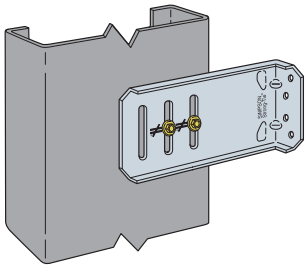
Stand-Off Distance



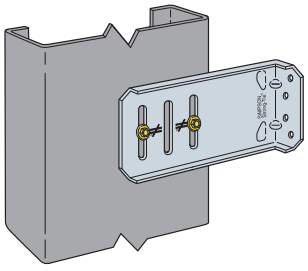
PATTERN A
2 screws installed with 1 in each slot



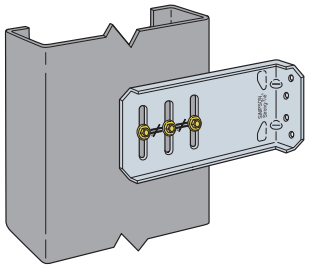
PATTERN B
2 screws installed in slots farthest from the anchor leg



PATTERN C
2 screws installed in slots closest to the anchor leg



PATTERN D
2 screws installed in outer slots with center slot empty



PATTERN E
3 screws

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SCW Head-of-Wall Slide-Clip Connector

The SCW connectors offer 1" of upward and 1" of downward movement. They are primarily used in head-of-wall applications that require vertical movement relative to the structure. SCW connectors are often used to strengthen window and door jambs for projects that utilize slip track.

Material: 54 mil (16 ga.)

Finish: Galvanized (G90)

Installation:

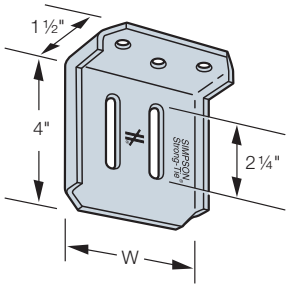
- Use the specified type and number of anchors.
- Use the specified number of #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the "No-Equal" stamp.
- Use a maximum of 1 screw per slot.

Codes: See page 11 for Code Report Reference Key Chart.

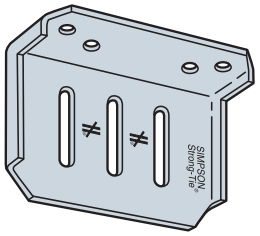
Ordering Information:

SCW3.25-KT contains:
- Box of 25 connectors
- 55 shouldered screws

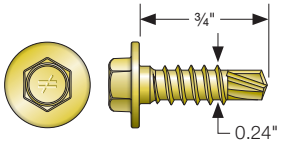
SCW5.5-KT contains:
- Box of 25 connectors
- 83 shouldered screws



SCW3.25



SCW5.5

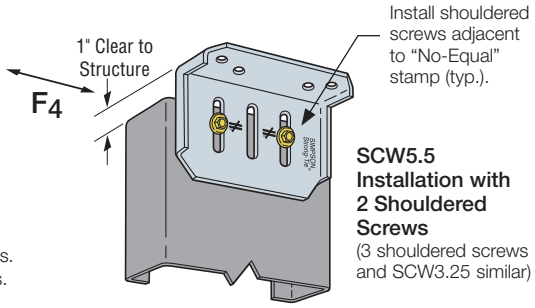


#14 Shouldered Screw

SCW Allowable Connector Loads

Model No.	Connector Material Thickness mil (ga.)	W (in.)	No. of #14 Shouldered Screws	Stud Thickness			Code Ref.
				33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	
				F_4	F_4	F_4	
SCW3.25	54 (16)	3 ¼	2	455	630	755	IP2, L8, F6
SCW5.5	54 (16)	5 ½	2[2]	455	630	995	
			3	455	630	1220	

1. When the SCW5.5 connector is used with 2 shouldered screws, install screws in the outermost slots.
2. Allowable loads are based on clips installed with all holes in the anchor leg filled with #12-14 screws. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCW Allowable Anchorage Loads table below.
3. Reference Simpson Strong-Tie Engineering Letter L-CF-CWCLRFD13 for LRFD design strengths.

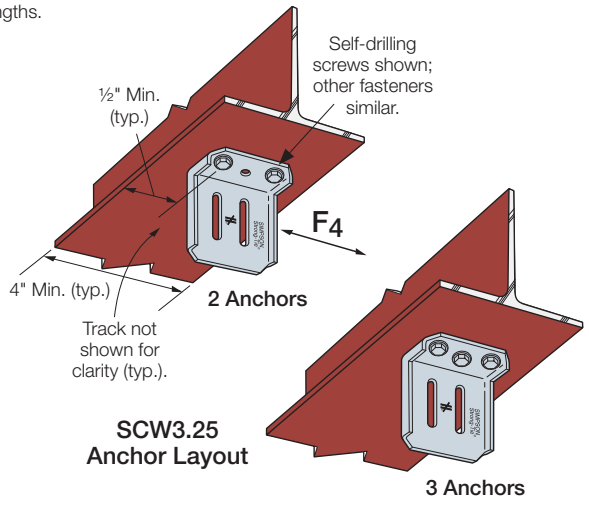


SCW5.5 Installation with 2 Shouldered Screws
(3 shouldered screws and SCW3.25 similar)

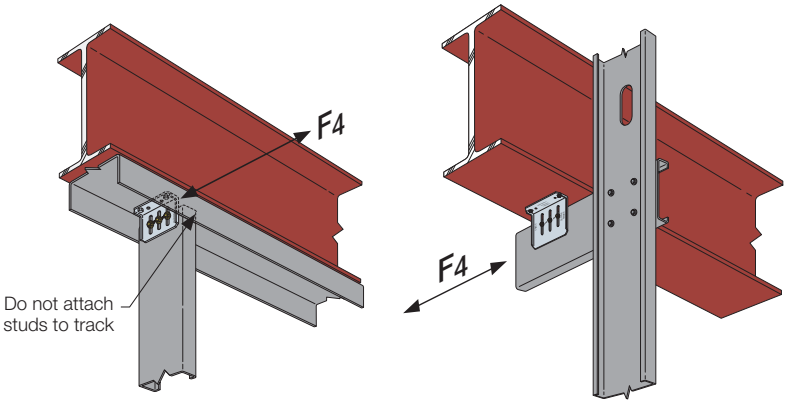
SCW Allowable Anchorage Loads

Model No.	Anchorage Type	No. of Anchors	Allowable Loads F_4
SCW3.25	#12-14 Self-Drilling Screws[3]	2	640
		3	755
	Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT Powder-Actuated Fasteners	2	520
		3	560
SCW5.5	#12-14 Self-Drilling screws[3]	2	1200
		4	1220
	Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT Powder-Actuated Fasteners	2	920
		4	1220

1. For additional important information, see General Notes on page 15.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCW Allowable Connector Loads table above.
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

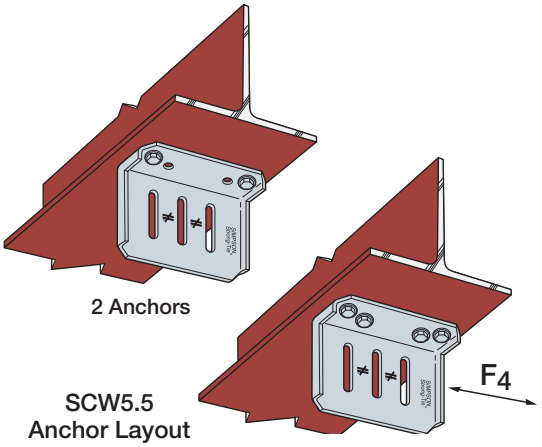


SCW3.25 Anchor Layout



Typical SCW Installation at Stud

Typical SCW Installation with Stud Strut



SCW5.5 Anchor Layout

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DTC Head-of-Wall Slide-Clip Application

DTC clips are a cost-effective solution for light-duty, head-of-wall slide clip applications. The 1⅝" slot will allow ¾" movement in each direction.

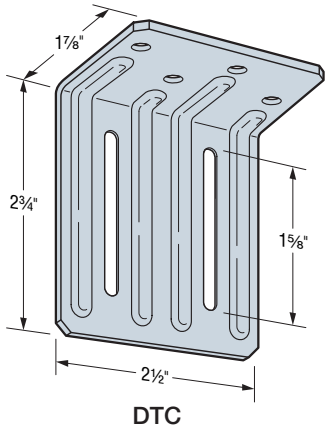
Material: 43 mil (18 ga.)

Finish: Galvanized (G90)

Installation:

- Use specified type and number of anchors per the installation drawing below.
- Install (2) #8 screws centered in the vertical slots.

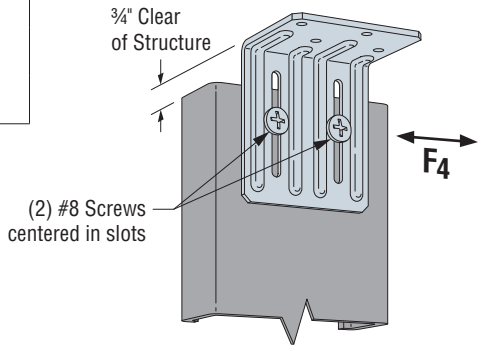
Codes: See page 11 for Code Report Reference Key Chart.



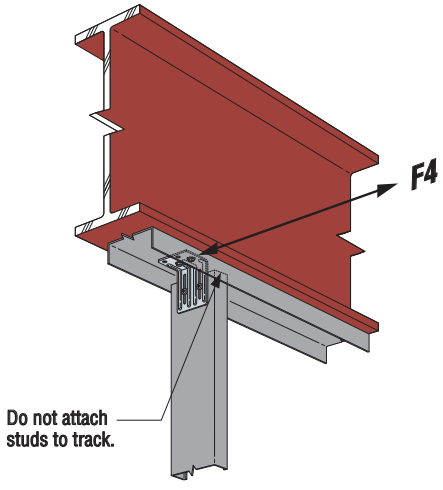
DTC

Model No.	Connector Material mil (ga.)	Fasteners	Anchorage	Stud Thickness mil (ga.)	Stud Steel Strength F_y (ksi)	Allowable Load F_4	Code Ref.
DTC	43 (18)	2 – #8 Self-Drilling Screws[4]	2 – 0.145" PDPT Powder-Actuated Fasteners or 2 – #12 Self-Drilling Screws[4]	15 (25 EQ)	50	60	170
				18 (25)	33	70	
				19 (20 EQ)	65	80	
				20 (20 EQ)	57		
				30 (20 DW)	33	165	
				33 (20 STR)	33	170	
				43 (18)	33	215	

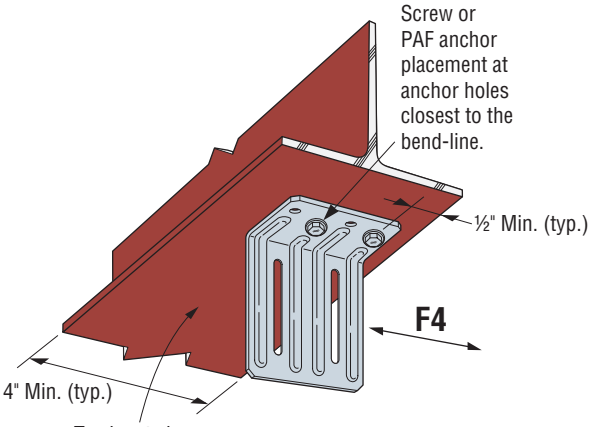
1. Allowable loads may not be increased for wind or seismic load.
2. Clips do not replace stud lateral or stability bracing. Design of bracing is the responsibility of the Designer.
3. It is the responsibility of the Designer to verify the adequacy of the stud. Allowable loads are based on clips installed an adequate distance away from penetrations, notches, ends of studs and other conditions that may affect the clip performance.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical DTC Screw Installation



Typical DTC Installation at Stud



DTC Anchor Layout

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FCB Bypass Framing Fixed-Clip Connector

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The FCB clip is an economical, high-performance fixed-clip connector that can be used for a variety of framing applications. It is rated for tension, compression, shear and in-plane loads and offers the Designer the flexibility of specifying different screw and anchorage patterns that conform to desired load levels.

Features:

- Rated for tension, compression, shear and in-plane loads
- Provides design flexibility with varying screw and anchorage patterns that achieve different load levels
- Strategically placed stiffeners, embossments and anchor holes maximize connector performance

Material: 54 mil (16 ga.)

Finish: Galvanized (G90)

Installation:

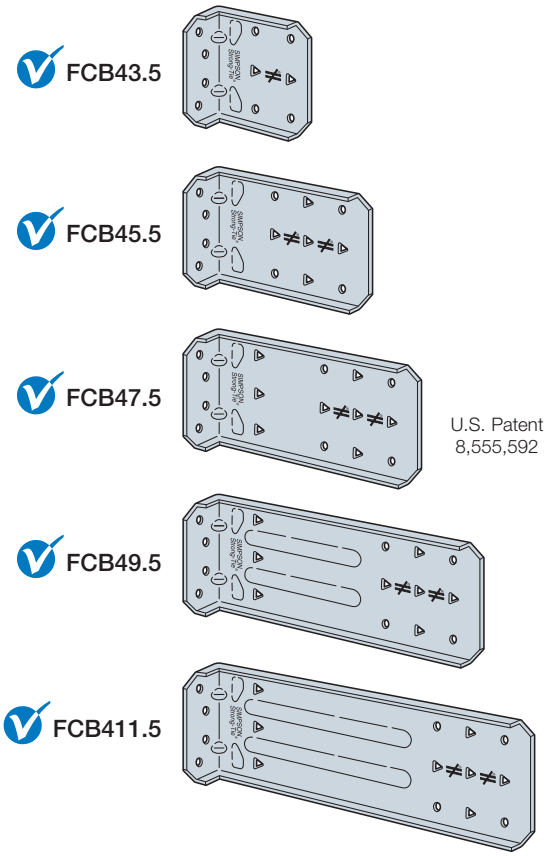
- Use the specified type and number of anchors.
- Use the specified number of #12 self-drilling screws to CFS framing.

Codes: See page 11 for Code Report Reference Key Chart.

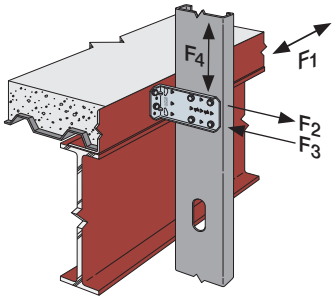
Ordering Information:

FCB43.5-R25, FCB45.5-R25, FCB47.5-R25, FCB49.5-R25, and FCB411.5-R25 contain:

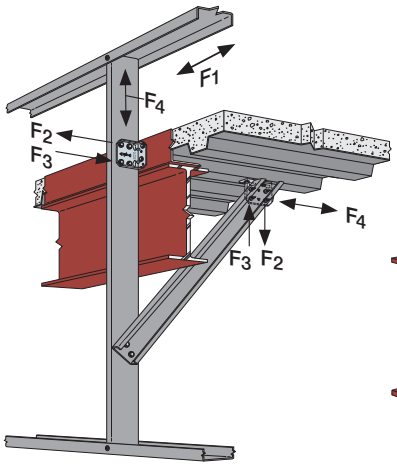
- Box of 25 connectors (screws not included)



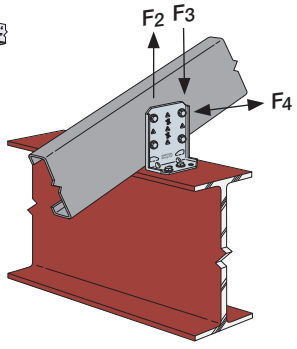
U.S. Patent 8,555,592



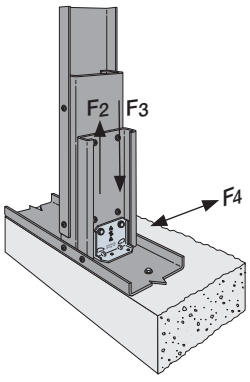
Typical FCB Installation at Bypass Framing



Typical FCB Installation at Sprandrel Studs and Kickers



Typical FCB Installation for Roof Rafters



Typical FCB Installation at the Base of a 6" Jamb Stud

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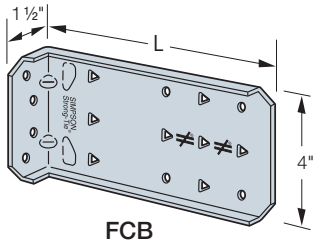
FCB Bypass Framing Fixed-Clip Connector

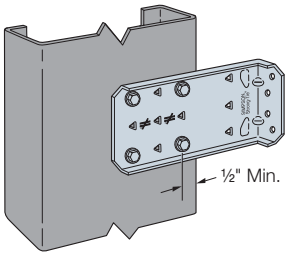
FCB Allowable Connector Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Min./ Max.	No. of #12-14 Self-Drilling Screws	Stud Thickness												Code Ref.
					33 mil (20 ga.)				43 mil (18 ga.)				54 mil (16 ga.)				
					F_1[3,4]	F_2[2]	F_3[2]	F_4[2]	F_1[3,4]	F_2[2]	F_3[2]	F_4[2]	F_1[3,4]	F_2[2]	F_3[2]	F_4[2]	
FCB43.5	54 (16)	3½	Min.	4	135	755	755	755	205	1105	975	1120	235	1250	975	1490	IP2, L8, F6
			Max.	6	205	1100	1130	1130	205	1105	1260	1455	235	1250	1735	1910	
FCB45.5	54 (16)	5½	Min.	4	120	755	755	755	175	1105	975	945	175	1105	975	1325	
			Max.	9	155	1100	1260	1180	175	1105	1260	1485	175	1105	1735	1925	
FCB47.5	54 (16)	7½	Min.	4	90	755	755	220	90	1105	945	330	90	1105	945	365	
			Max.	12	205	1100	1260	705	235	1105	1260	1050	235	1105	1735	1445	
FCB49.5	54 (16)	9½	Min.	4	60	755	755	170	60	1105	945	255	60	1105	945	365	
			Max.	12	205	1100	1260	750	235	1105	1260	1115	235	1105	1735	1200	
FCB411.5	54 (16)	11½	Min.	4	45	755	755	140	45	1105	920	205	45	1105	920	365	
			Max.	12	205	1100	1260	795	235	1105	1260	860	235	1105	1735	860	

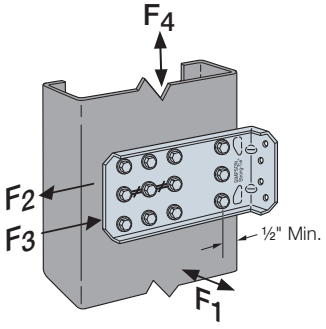
1. Min. fastener quantity and load values—fill all round holes; max. fastener quantity and load values—fill all round and triangular holes.
2. Allowable loads are based on clip capacity only and do not consider anchorage. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the FCB Allowable Anchorage Loads table below.
3. Anchorage to the supporting structure using welds or a minimum of (2) #12-14 self-drilling screws is required.
4. Allowable loads are based on in-plane loads applied to the stud fasteners that are nearest the support with complete rotational restraint at the studs. For a more extensive treatment of in-plane loads please refer to Simpson Strong-Tie Engineering Letter L-CF-CWCF1DIR14.



FCB



FCB Installation with Min. Fasteners

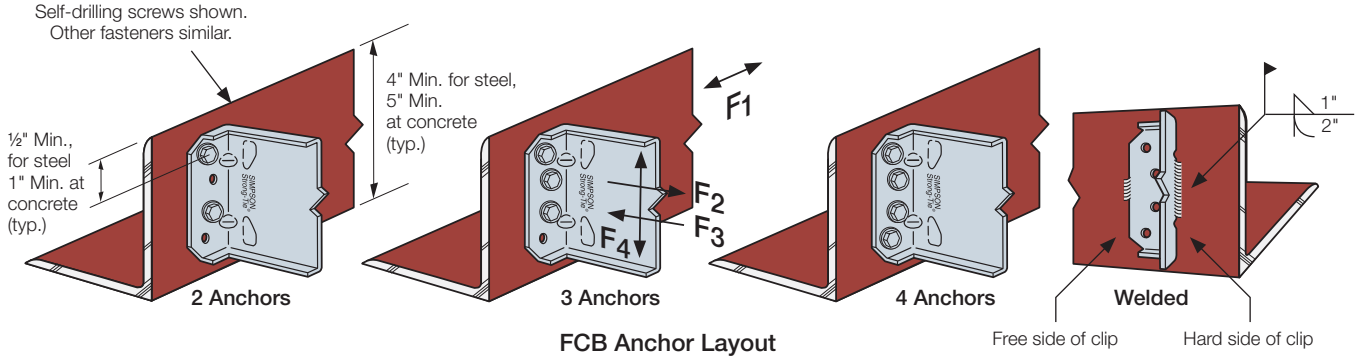


FCB Installation with Max. Fasteners

FCB Allowable Anchorage Loads

Anchorage Type	No. of Anchors	Allowable Loads								
		F_2 and F_3	F_4							
			FCB43.5	FCB45.5	FCB47.5		FCB49.5		FCB411.5	
			Min./Max.	Min./Max.	Min.	Max.	Min.	Max.	Min.	Max.
#12-14 Self-Drilling Screws[4]	2	795	625	410	255	445	185	265	120	190
	3	1120	690	450	280	490	200	295	135	210
	4	1585	1255	820	365	890	350	535	275	380
Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT Powder-Actuated Fasteners	2	280	410	265	165	290	120	175	75	125
	3	390	465	305	190	330	135	195	85	140
	4	555	840	550	340	595	245	355	145	255
¼"x1 ¾" Simpson Strong-Tie® Titen® Hex-Head Screws	2	380	415	270	165	295	120	175	215	125
	3	445	470	310	190	335	140	200	100	145
	4	510	645	420	260	455	190	275	280	195
Welded	Hard side: 2"	1735	1910	1925	365	1445	365	1200	365	860
	Free side: 1"									

1. For additional important information, see General Notes on page 15.
2. Min. and max. refer to stud fasteners. See FCB Allowable Connector Loads table above.
3. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the FCB Allowable Connector Loads table above.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



FCB Anchor Layout

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Special Order Custom Clips and Connectors

Simpson Strong-Tie can make a variety of flat and bent steel clips and connectors for cold-formed steel framing. Most custom clips can be punched with different holes and slots.

Material: 229 mil (3 ga.) maximum, 43 mil (18 ga.) minimum mill-certified steel (carbon and type 316L stainless steel)

Finish: Galvanized, Simpson Strong-Tie® gray paint. Contact Simpson Strong-Tie for availability.

TO OBTAIN QUOTE:

- Supply a CAD drawing in .dwg or .dxf format complete with all dimensions, hole diameter and centerline locations, bend angles, steel strength (min. F_y and F_u), thickness (mils and/or ga.) and finish: (galvanized to G90, G185) or Simpson Strong-Tie gray paint (specify).
- Total shape and size up to a maximum of 48" x 48" (approx. 1/16" tolerance).
- Simpson Strong-Tie does not provide product engineering or load values for special-order custom clips and connectors.
- Contact Simpson Strong-Tie for pricing information.
- For additional information, please refer to Important Information and General Notes on pages 12-16.

SPECIFICATION EXAMPLE:

Quantity: XX pieces

Dimensions: Per the attached CAD drawing (.dwg or .dxf format)

Drawing must be fully dimensioned, including:

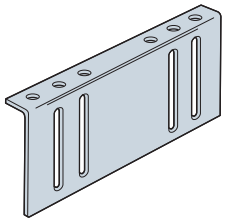
- Overall dimensions
- Leg dimensions
- Bend angles (if required)
- Hole/slot sizes and centerlines (if required)

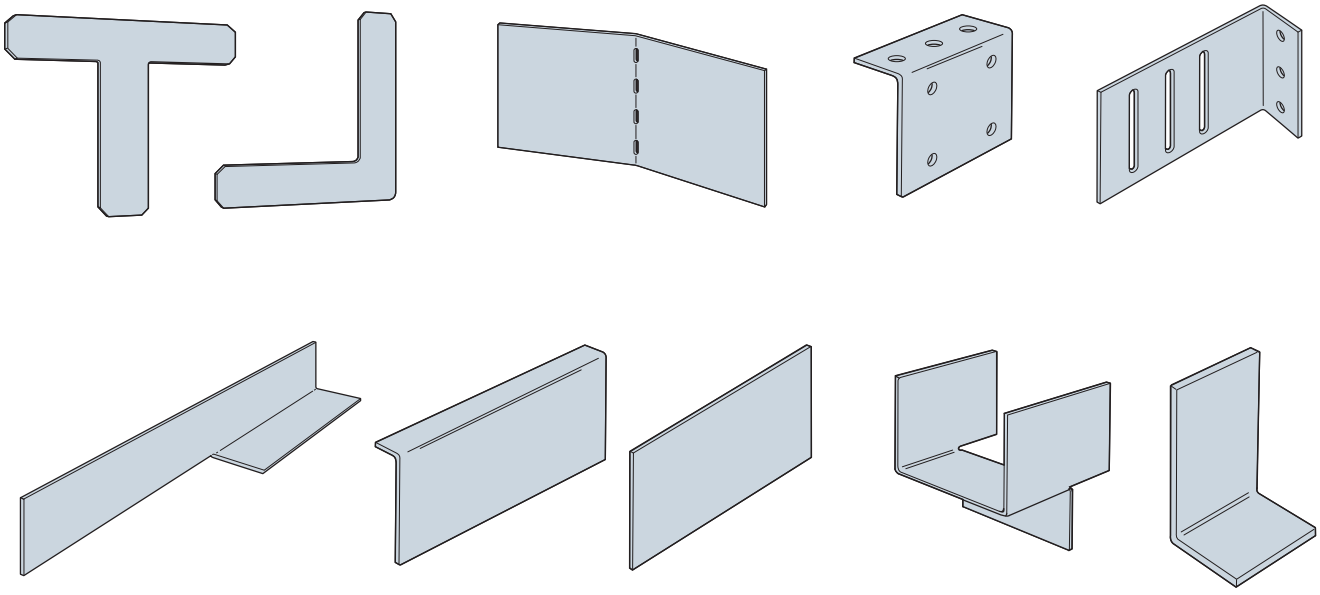
Material Specification: Contact Simpson Strong-Tie for availability

Thickness: 54 mil (16 ga.)

Strength: Min. Yield Strength (F_y) = 33 ksi, Min. Tensile Strength (F_u) = 45 ksi

Finish: Galvanized G90





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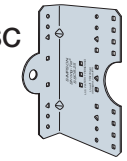
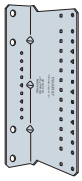
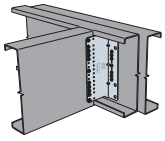
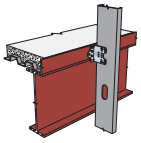
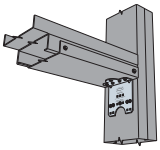
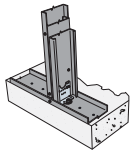
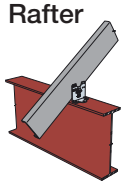
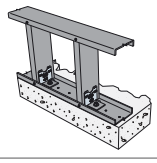
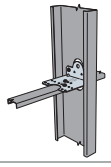
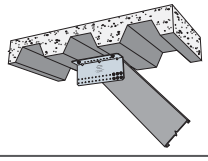
Raise Your Expectations, Lower Your Installed Costs!

Utility Clip Connectors

The latest additions to the CFS product line are the SSC steel stud connector, the SJC steel joist connector and the SFC steel framing connector. Pre-punched holes and intuitive fastener hole patterns ensure that the structural needs of the Designer and the efficient installation goals of the contractor are both satisfied.

Testing You Can Trust

Simpson Strong-Tie® utility clip connectors have undergone industry-first testing to provide maximum benefit to both the installer and the Designer. By testing these connectors as part of a complete system in the applications for which they are intended, rather than only testing the physical capabilities of the connector, Simpson Strong-Tie is able to provide comprehensive allowable loads for real-world conditions. This system-based approach eliminates the need for Designers to manually calculate connector performance and anchorage, and provides confidence that designs based on these values have been thoroughly evaluated by the industry leader in structural connector research and development.

	Product Category		
Tested Application	SSC 	SJC 	SFC
Steel-to-steel 	✓	✓	✓
Bypass Framing 	✓		
Headers 	✓		
Base of Jamb 	✓		
Rafter 	✓		
Kneewall 	✓		
U-Channel Bridging 	✓		✓
Kicker 		✓	

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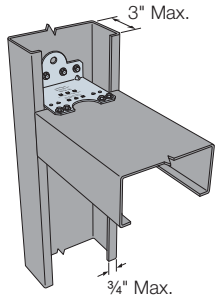
Innovative Design Lets You Work Smarter... Not Harder!

Simpson Strong-Tie® utility clip connectors have been designed with both the contractor and Designer in mind. Connector dimensions and fastener/anchor locations have been developed to maximize design flexibility and installation efficiency.

Intelligent Connector Dimensions

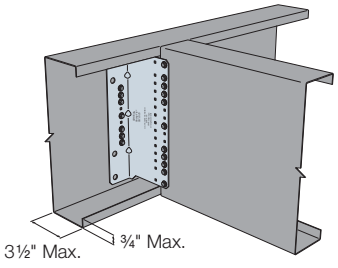
SSC Steel Stud Connectors

Designed to accommodate open-side connections with flanges up to 3" wide and stiffener lips up to ¾"*



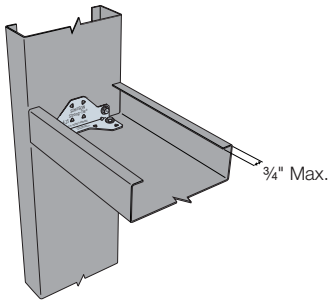
SJC Steel Joist Connectors

Designed to accommodate open-side connections with flanges up to 3½" wide and stiffener lips up to ¾"



SFC Steel Framing Connectors

Designed to accommodate open-side connections with stiffener lips up to ¾" long**



*SSC2.25 clips will accommodate 2" wide flange and ⅝" stiffener lips.
**SFC2.25 clips will accommodate ⅝" long stiffener lips.

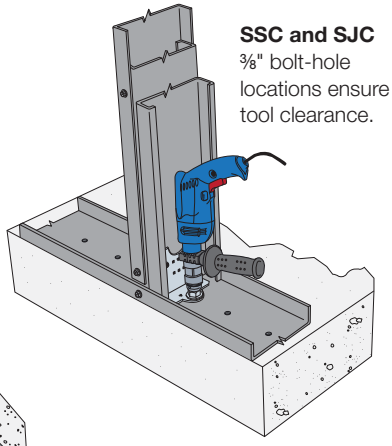
For detailed product dimensions, refer to pages 50-51.

Intuitive Fastener Patterns

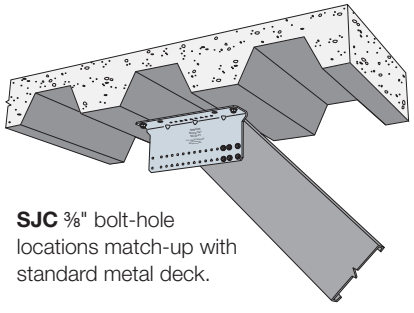
SSC and SJC Connectors include pre-punched holes for ⅜" diameter anchors that enable easy anchorage to concrete.

SSC and SJC anchorage leg also includes pre-punched holes for #10 self-drilling screws.

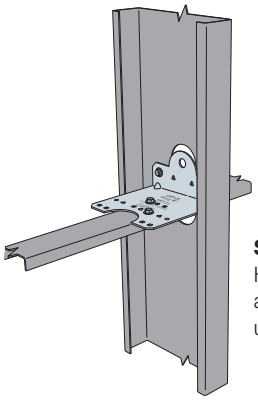
SSC and SJC clips include round and triangle holes for minimum and maximum tabulated load values. Square holes are also provided, and can be combined with round and triangle holes for custom screw patterns per installation needs.



SSC and SJC ⅜" bolt-hole locations ensure tool clearance.



SJC ⅜" bolt-hole locations match-up with standard metal deck.



SSC and SFC Hole locations accommodate u-channel.

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SSC Steel-Stud Connector

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

SSC connectors are versatile utility clips ideal for a variety of stud-to-stud and stud-to-structure applications in cold-formed steel construction. The clips have been designed to enable easy installation on the open side of studs or joists with flanges up to 3" long and return lips up to ¾". A wide pattern of strategic fastener locations allows the SSC to accommodate a variety of traditional and custom designs.

Features:

- Pre-punched holes reduce installation cost by eliminating pre-drilling
- Intuitive fastener hole positions ensure accurate clip installation in accordance with design, support a wide range of design and application requirements and provide installation flexibility
- Angle lengths accommodate either hard-side or soft-side attachment for studs and joists with return lips up to ¾"*
- 4" leg length enables soft-side connections for studs and joists with flanges up to 3"*
- Also suitable for u-channel bridging

Product Information:

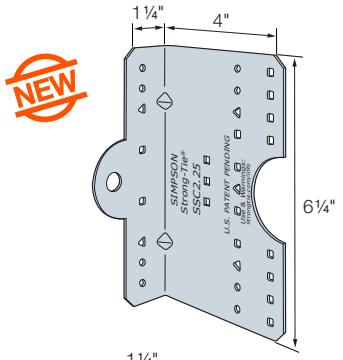
Material: LSSC – 54 mil (50 ksi); SSC – 68 mil (50 ksi); MSSC – 97 mil (50 ksi)

Finish: Galvanized (G90)

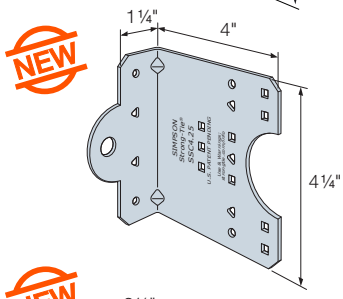
Installation: Use all specified fasteners/anchors.

Codes: See page 11 for Code Report Reference Key Chart.

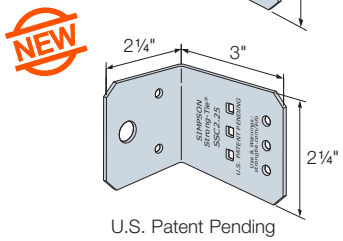
For detailed product dimensions, refer to page 50.



SSC6.25
(LSSC6.25, MSSC6.25 similar)



SSC4.25
(LSSC4.25, MSSC4.25 similar)

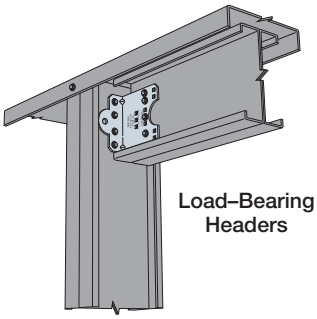


SSC2.25
(MSSC2.25 similar)

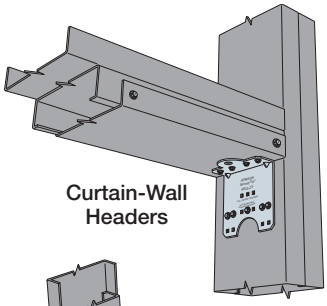
U.S. Patent Pending

Ordering Information

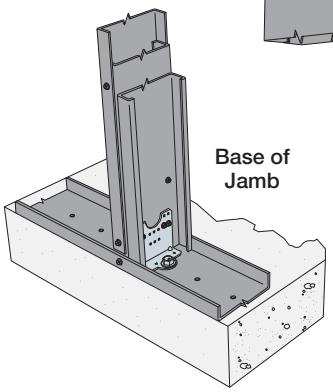
Model Number	Ordering SKU	Package Quantity
SSC2.25	SSC2.25-R125	Bucket of 125
MSSC2.25	MSSC2.25-R90	Bucket of 90
LSSC4.25	LSSC4.25-R50	Bucket of 50
SSC4.25	SSC4.25-R50	
MSSC4.25	MSSC4.25-R50	
LSSC6.25	LSSC6.25-R30	Bucket of 30
SSC6.25	SSC6.25-R30	
MSSC6.25	MSSC6.25-R30	



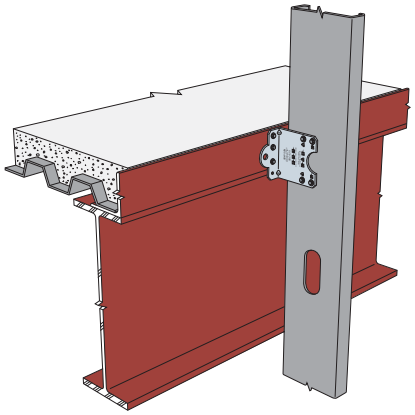
Load–Bearing Headers



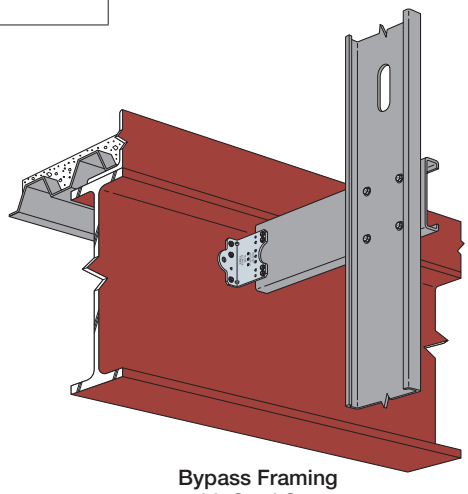
Curtain-Wall Headers



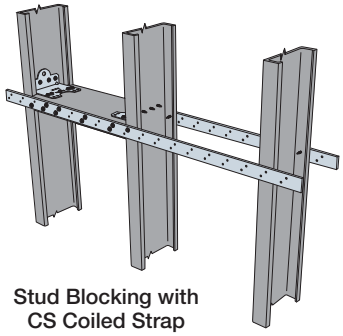
Base of Jamb



Bypass Framing



Bypass Framing with Stud Strut



Stud Blocking with CS Coiled Strap

*SSC2.25 clips will accommodate 2" wide flange and ⅝" stiffener lips.

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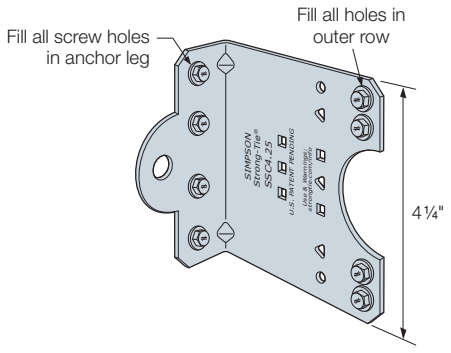
SSC Steel-Stud Connector

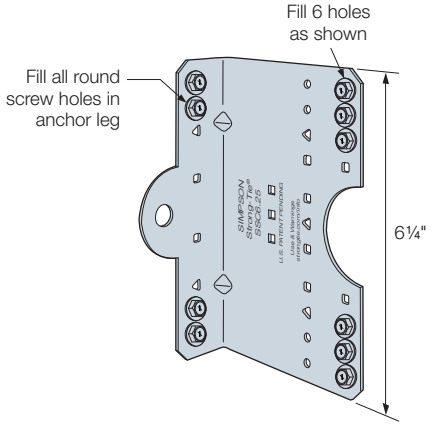
SSC Connectors: Steel-to-Steel Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Framing Member Depth (in.)	Fasteners[4]			Allowable F_4 Loads (lbs.)[2]				Code Ref.
							Minimum Member Thickness			Maximum Connector Load[3]	
				Pattern[1]	Carried Member	Carrying Member	33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)		
SSC2.25	68 (14)	2¼	3⅝	Min.	3 - #10	2 - #10	165	225	345	690	160
MSSC2.25	97 (12)	2¼	3⅝	Min.	3 - #10	2 - #10	165	225	345	690	
LSSC4.25	54 (16)	4¼	6	Min.	2 - #10	2 - #10	215	440	675	1615	
				Max.	5 - #10	4 - #10	215	440	725		
				Outer	4 - #10	4 - #10	200	310	520		
SSC4.25	68 (14)	4¼	6	Min.	2 - #10	2 - #10	355	525	890	1615	
				Max.	5 - #10	4 - #10	365	600	1005		
				Outer	4 - #10	4 - #10	235	330	625		
MSSC4.25	97 (12)	4¼	6	Min.	2 - #10	2 - #10	355	525	890	1615	
				Max.	5 - #10	4 - #10	365	600	1005		
				Outer	4 - #10	4 - #10	235	330	625		
LSSC6.25	54 (16)	6¼	8	Min.	4 - #10	4 - #10	265	660	1190	2590	
				Max.	7 - #10	6 - #10	265	660	1190		
				Outer	6 - #10	4 - #10	270	375	695		
SSC6.25	68 (14)	6¼	8	Min.	4 - #10	4 - #10	385	720	1190	2590	
				Max.	7 - #10	6 - #10	385	720	1190		
				Outer	6 - #10	4 - #10	270	460	725		
MSSC6.25	97 (12)	6¼	8	Min.	4 - #10	4 - #10	385	720	1190	2590	
				Max.	7 - #10	6 - #10	385	720	1365		
				Outer	6 - #10	4 - #10	270	460	725		

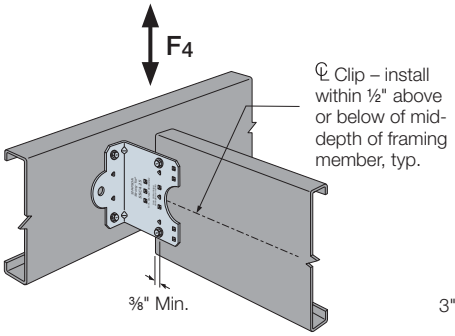
1. Min. fastener quantity and load values—fill all round holes; Max. fastener quantity and load values—fill all round and triangular holes; Outer fastener quantity and load values—see illustrations for fastener placement.
2. Allowable loads are based on bracing of the members located within 12" of the connection.
3. Maximum allowable load for connector that may not be exceeded when designing custom installations. Designer is responsible for member and fastener design.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



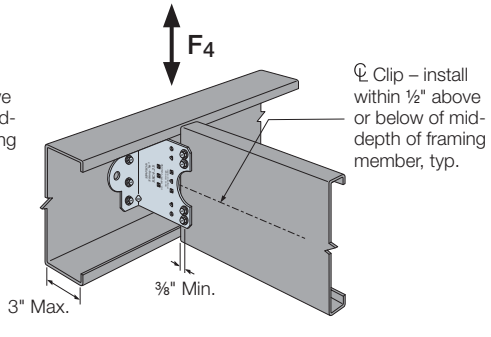
SSC4.25 – Outer Fastener Pattern
(LSSC4.25 and MSSC4.25 Similar)



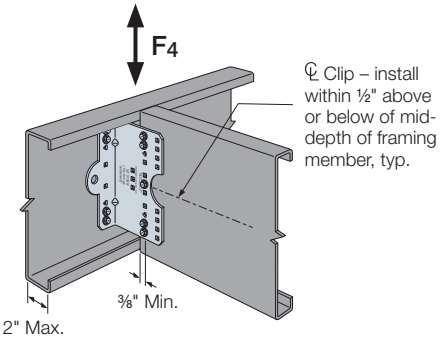
SSC6.25 – Outer Fastener Pattern
(LSSC6.25 and MSSC6.25 Similar)



Typical SSC Installation



SSC Installation with Carried Member Fasteners in Outer Row



SSC Installation with Carried Member Fasteners in Inner Row

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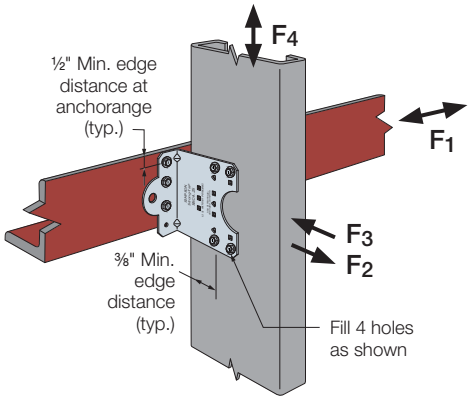
SSC Steel-Stud Connector

SSC Connectors: Bypass Framing Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Fasteners[1,4]		Allowable Loads (lbs.)												Code Ref.
			Anchorage[2]	Stud	33 mil (20 ga.)				43 mil (18 ga.)				54 mil (16 ga.)				
					F_1[3]	F_2	F_3	F_4	F_1[3]	F_2	F_3	F_4	F_1[3]	F_2	F_3	F_4	
SSC4.25	68 (14)	4¼	3 - #12 or 3 - PDPAT	4 - #10	40	705	705	700	40	870	1050	850	40	935	1210	850	160
MSSC4.25	97 (12)	4¼	3 - #12 or 3 - PDPAT	4 - #10	105	705	705	705	105	1050	1050	880	105	1385	1210	880	

1. See illustration for fastener placement.
2. Allowable loads are based on anchors installed in minimum 3⁄16"-thick structural steel with F_y = 36 ksi.
3. Allowable loads based on in-plane loads applied at the centroid of the fasteners to the stud, with no rotational restraint of stud.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

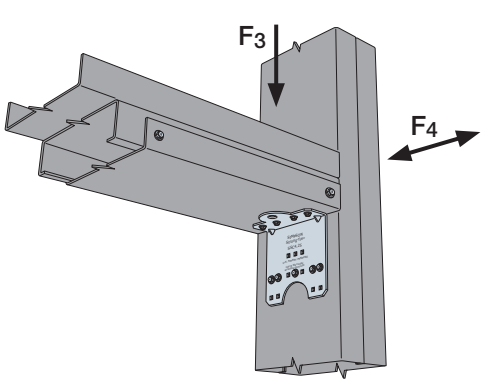


Typical SSC Installation

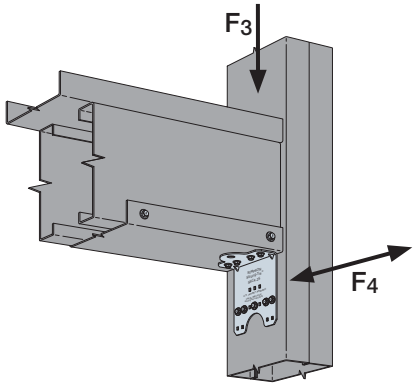
SSC Connectors: Headers Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Jamb Stud Depth (in.)	Fasteners[4]			Jamb & Header Thickness mil (ga.)	Allowable F_3 Loads (lbs.)		Allowable F_4 Loads (lbs.)	Code Ref.
				Pattern	Jamb	Header		Nested Stud and Track Header[3]	Back to Back Header[2]		
LSSC4.25	54 (16)	4¼	6	Max.	5 - #10	4 - #10	33 (20)	140	455	215	160
							43 (18)	220	660	440	
SSC4.25	68 (14)	4¼	6	Max.	5 - #10	4 - #10	54 (16)	375	1055	1005	
							68 (14)	570	1055	1005	
LSSC6.25	54 (16)	6¼	8	Max.	7 - #10	6 - #10	33 (20)	160	455	265	
							43 (18)	250	730	660	
SSC6.25	68 (14)	6¼	8	Max.	7 - #10	6 - #10	54 (16)	410	1110	1190	
							68 (14)	640	1110	1190	

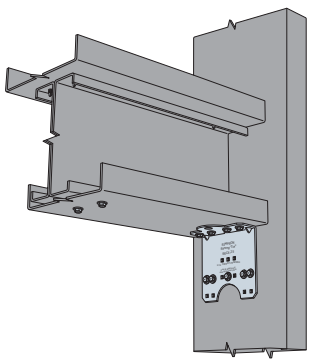
1. Max. fastener quantity and load values—fill all round and triangular holes.
2. Designer is responsible for checking web crippling of the header and reducing allowable loads accordingly.
3. Also applies to box header per illustration below.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Nested Stud and Track



Box Header



Back-to-Back Header

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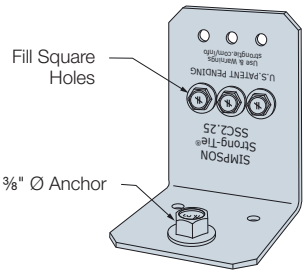
SSC Steel-Stud Connector

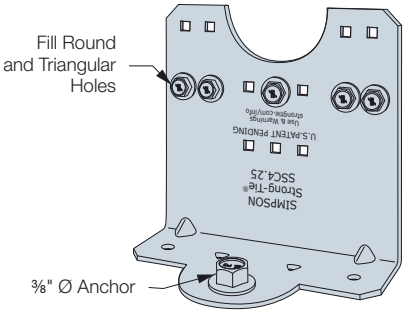
SSC Connectors: Base of Jamb Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Stud Member Depth (in.)	Fasteners[5]		Stud Thickness mil (ga.)	Allowable F_4 Load (lbs.)	Code Ref.
				Anchor Diameter	Stud Fasteners[3]			
SSC2.25	68 (14)	2¼	3⅝	⅜	3-#10	33 (20)	390	160
						43 (18)	605	
						54 (16)	940	
SSC4.25	68 (14)	4¼	6	⅜	5-#10	33 (20)	420	
						43 (18)	685	
						54 (16)	975	
SSC6.25	68 (14)	6¼	8	⅜	7-#10	33 (20)	470	
						43 (18)	715	
						54 (16)	1020	

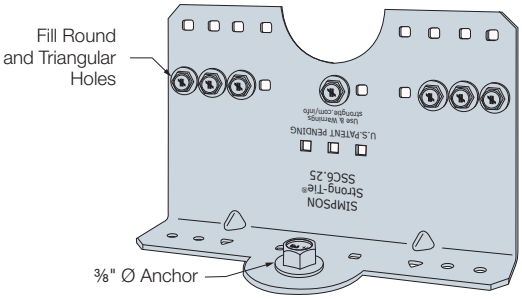
1. Allowable loads are based on minimum 33 mil (20 ga.) track for 33 mil (20 ga.) and 43 mil (18 ga.) studs, and minimum 43 mil (18 ga.) track for 54 mil (16 ga.) studs, with one #10 screw into each stud flange.
2. Allowable loads assume adequate torsional bracing is provided. Bracing design is the reponsibility of the Designer.
3. See illustrations for fastener placement.
4. Designer is responsible for anchorage design.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



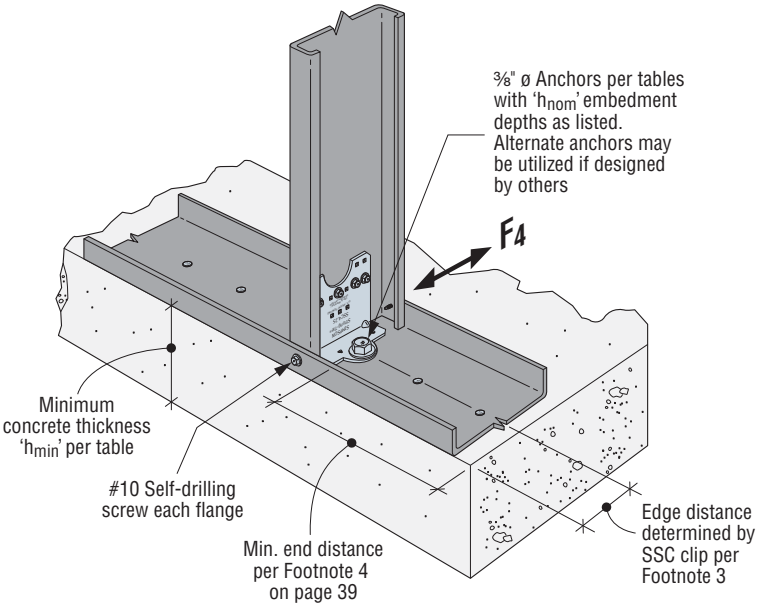
SSC2.25 Fastener Pattern



SSC4.25 Fastener Pattern



SSC6.25 Fastener Pattern



Typical SSC Installation

Titen HD® Screw Anchor | **Strong-Bolt® 2 Wedge Anchor** | **AT-XP® Adhesive**

See page 39 and pages 87-113 for Simpson Strong-Tie anchor solutions for this application.

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SSC Steel-Stud Connector

Base of Jamb Anchorage Solutions

Uncracked Concrete, Wind and Seismic in SDC A & B[8]						
Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Anchor Load, F_4 (lbs.)		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC
SSC2.25	4"	Titen HD	2½"	275	455	530
	6"	Titen HD	3¼"	290	485	560
		SET-XP	4"	345	510	590
		AT-XP	4"	345	510	590
SSC4.25	4"	Titen HD	2½"	550	920	975
	6"	Titen HD	3¼"	620	975	975
		SET-XP	4"	735	880	880
		AT-XP	4"	735	880	880
SSC6.25	4"	Titen HD	2½"	735	1020	1020
	6"	Titen HD	3¼"	960	1020	1020
		SET-XP	4"	880	880	880
		AT-XP	4"	880	880	880
Cracked Concrete, Wind and Seismic in SDC A & B[8]						
Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Anchor Load, F_4 (lbs.)		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC
SSC2.25	4"	Titen HD	2½"	195	325	375
	6"	Titen HD	3¼"	210	345	400
		SET-XP	4"	245	360	420
		AT-XP	4"	245	360	420
SSC4.25	4"	Titen HD	2½"	395	655	760
	6"	Titen HD	3¼"	445	740	855
		SET-XP	4"	525	775	880
		AT-XP	4"	525	775	880
SSC6.25	4"	Titen HD	2½"	525	875	1010
	6"	Titen HD	3¼"	685	1020	1020
		SET-XP	4"	810	880	880
		AT-XP	4"	810	880	880
Cracked Concrete, Seismic in SDC C through F[9]						
Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Anchor Load, F_4 (lbs.)		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC
SSC2.25	4"	Titen HD	2½"	90	150	175
	6"	Titen HD	3¼"	95	160	185
		SET-XP	4"	115	170	195
		AT-XP	4"	115	170	195
SSC4.25	4"	Titen HD	2½"	185	305	355
	6"	Titen HD	3¼"	205	345	400
		SET-XP	4"	245	355	355
		AT-XP	4"	245	350	350
SSC6.25	4"	Titen HD	2½"	245	410	470
	6"	Titen HD	3¼"	320	480	480
		SET-XP	4"	355	355	355
		AT-XP	4"	350	350	350

1. Allowable anchor capacities have been determined using ACI 318-11 Appendix D calculations with the minimum concrete compressive strength, f'_c and slab thickness listed. Sand-lightweight concrete is abbreviated as "SWLC" while normal-weight concrete is abbreviated as "NWC".
2. Nominal Embedment Depth/Effective Embedment Depth relationships:
   - ⅜" Titen HD® in 4" Slab : 2.50" (h_{nom}) / 1.77" (h_{ef})
   - ⅜" Titen HD in 6" Slab or thicker : 3.25" (h_{nom}) / 2.40" (h_{ef})
   - SET-XP® or AT-XP® Adhesive with ⅜" F1554 Gr. 36 All-Thread Rod in 6" Slab or thicker : 4.0" (h_{nom}) = 4" (h_{ef})
3. Edge distances are assumed to be 1.81", 3.0", and 4.0" (½ of stud width) as determined for 3⅝", 6" and 8" studs, respectively.
4. End distances are assumed as 1.5 x Min. Edge Distance in one direction and 'N/A' in the other direction. See figure on page 38.
5. Load values are for a single anchor based on ACI 318-11, condition B, load factors from ACI 318 Section 9.2, no supplemental edge reinforcement, $\psi_{c,V}$ = 1.0 for cracked concrete and periodic special inspection. Reference ICC-ES or IAPMO-UES evaluation reports for further information.
6. Adhesive values assume a maximum short-term temperatures of 180°F, maximum long-term temperatures of 110°F and dry hole conditions. Other conditions may be evaluated using Anchor Designer™ Software for ACI 318, ETAG and CSA. See **www.strongtie.com/software**.
7. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha (α), of 0.7 for seismic loads and 0.6 for wind loads. ASD values for other load combinations may be determined using alternate conversion factors.
8. Tabulated allowable ASD loads for Wind and Seismic in SDC A & B are based on using wind conversion factors and may be increased by 1.17 for SDC A & B only.
9. Allowable loads have been divided by an Omega (Ω) seismic factor of 2.5 for brittle failure as required by ACI 318-11 Appendix D.
10. Allowable F_4 load based on loading direction towards the edge of slab.
11. Tabulated capacities are based on maximum allowable anchorage loads only. The capacity of the connection system shall be the minimum of the tabulated value and the allowable load value from the SSC Connectors: Base of Jamb Allowable Load Tables.

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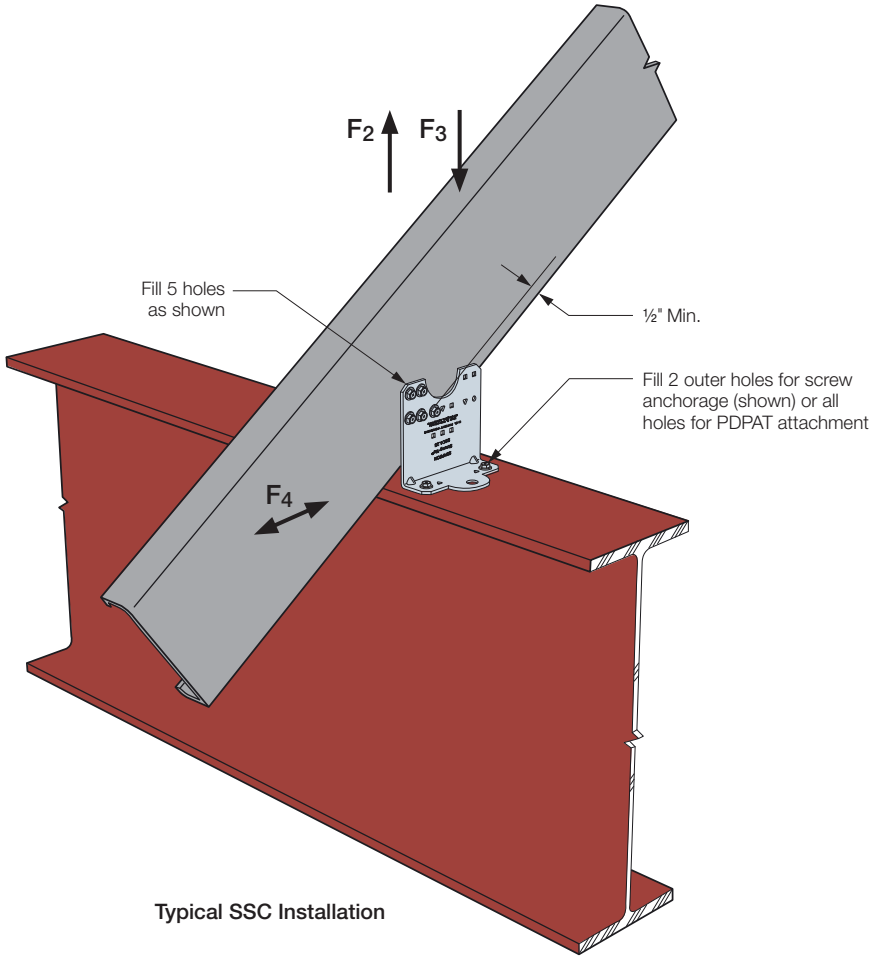
SSC Steel-Stud Connector

SSC Connectors: Rafters Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Fasteners[1,4]		Allowable Loads (lbs.)			Code Ref.
			Anchorage to Steel[2]	Supported Member	43 mil (18 ga.)			
					F_2	F_3	F_4	
SSC4.25	68 (14)	4¼	2 - #12	5 - #10	710	1075	595	160
			4 - PDPAT	5 - #10	1020	1075	630	
MSSC4.25	97 (12)	4¼	2 - #12	5 - #10	710	1335	595	
			4 - PDPAT	5 - #10	1025	1335	815	

1. See illustrations for fastener placement.
2. Allowable loads are based on anchors installed in minimum 3/16"-thick structural steel with F_y = 36 ksi.
3. Allowable loads are based on a 6" deep member. For deeper members, Designer must consider web crippling of the member and reduce loads accordingly.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical SSC Installation

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MSSC4.25KW and MSSC6.25KW Kneewall Connectors

MSSC connectors are designed to work in tandem with Simpson Strong-Tie® BP½-3 bearing plates to provide solutions for moment-resisting kneewall applications.

Features:

- One simple custom hole pattern for each stud size simplifies specification and installation
- ⅜" diameter anchor bolt location enables easy tool access

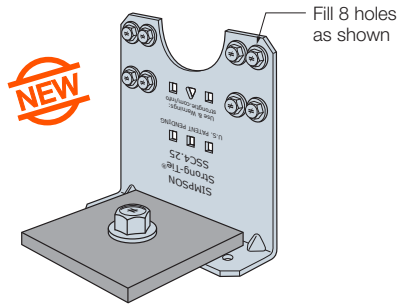
Material: MSSC – 97 mil (50 ksi); BP – 229 mil (33 ksi)

Finish: MSSC – Galvanized (G90); BP – None

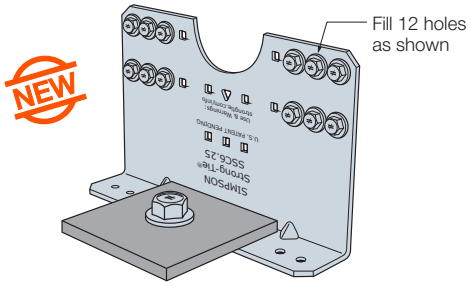
Installation:

- Use all specified fasteners/anchors.
- Install BP½-3 bearing plate over anchor leg of MSSC connectors as shown in the illustrations.

Codes: See page 11 for Code Report Reference Key Chart.



MSSC4.25KW Fastener Pattern



MSSC6.25KW Fastener Pattern

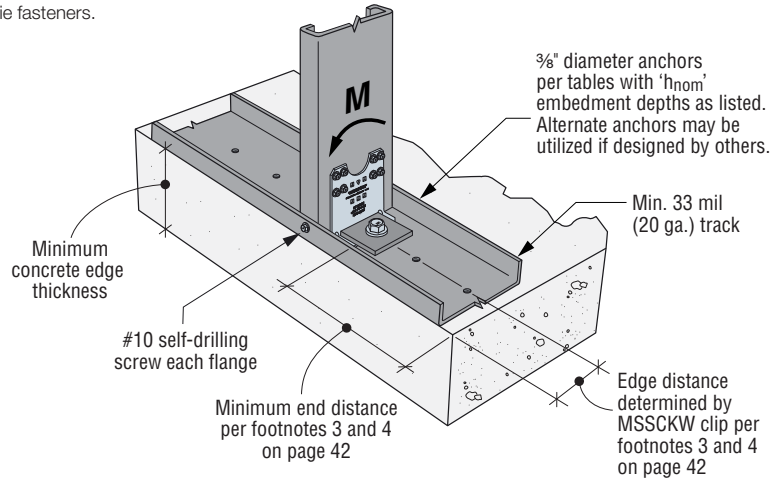
Ordering Information

Model Number	Ordering SKU	Package Quantity
MSSC4.25KW	MSSC4.25KW-KT20	Box of 20 connectors and 20 BP bearing plates
MSSC6.25KW	MSSC6.25KW-KT20	

Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Framing Member Depth (in.)	Fasteners[5]		Stud Thickness mil (ga.)	Allowable Moment, M (in.-lbs.)[1]	Anchor Tension at Allowable Moment (lbs.)[2]	Rotational Stiffness for Wind Deflection (in.-lbs./rad.)[3,4]	Code Ref.
				Anchor Dia. (in.)	Stud					
MSSC4.25KW	97 (12)	4¼	6	⅜	8 - #10	33 (20)	3135	1690	64,800	160
						43 (18)	4320	2375		
						54 (16)	5830	2765		
MSSC6.25KW	97 (12)	6¼	8	⅜	12 - #10	33 (20)	3845	1705	110,350	
						43 (18)	3845	1705		
						54 (16)	8350	2885		

1. Tabulated values correspond to maximum connector strength without consideration of serviceability. Designer must check out-of-plane deflections using tabulated rotational stiffness.
2. Uplift may be linearly interpolated for design moment less than allowable. Designer is responsible for anchorage design.
3. Tabulated stiffness is applicable for walls up to 38" tall. For taller walls, the Designer must consider additional deflection due to bending in the studs.
4. Tabulated stiffness has been increased for deflection checks using component and cladding wind loads in lieu of reducing loads in accordance with IBC table 1604.3, footnote f. Multiply rotational stiffness by 0.7 for other loading conditions.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical MSSCKW Installation

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MSSC4.25KW and MSSC6.25KW Kneewall Connectors

Kneewall Connector Anchorage Solutions

Uncracked Concrete, Wind and Seismic in SDC A & B [8,10]

Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Moment, M (in-lbs.)					
				Edge of Slab[3]			Center of Slab[4]		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC	3000 psi SLWC	3000 psi NWC	4000 psi NWC
MSSC4.25KW	4" or thicker	STB2	2¼"	—	—	—	1220	2040	2365
		Titen HD	2½"	1255	2090	2425	1255	2090	2425
	6" or thicker	STB2	2⅞"	—	—	—	1555	2590	2995
		Titen HD	3¼"	1795	2995	3450	2075	3465	3995
		SET-XP	4"	725	1425	1425	1930	3705	3705
		AT-XP	4"	750	1470	1470	2005	3705	3705
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	670	1320	1320	3610	3705	3705
		AT-XP	7½"	695	1360	1360	3690	3705	3705
MSSC6.25KW	4" or thicker	STB2	2¼"	—	—	—	1515	2530	2930
		Titen HD	2½"	1555	2590	3005	1555	2590	3005
	6" or thicker	STB2	2⅞"	—	—	—	1930	3215	3715
		Titen HD	3¼"	2570	4295	4950	2570	4295	4950
		SET-XP	4"	1110	2170	2170	2395	4595	4595
		AT-XP	4"	1135	2235	2235	2480	4595	4595
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	1030	2015	2015	4480	4595	4595
		AT-XP	7½"	1055	2065	2065	4575	4595	4595

Cracked Concrete, Wind and Seismic in SDC A & B [8,10]

Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Moment, M (in-lbs.)					
				Edge of Slab[3]			Center of Slab[4]		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC	3000 psi SLWC	3000 psi NWC	4000 psi NWC
MSSC4.25KW	4" or thicker	STB2	2¼"	—	—	—	860	1435	1660
		Titen HD	2½"	575	955	1100	575	955	1100
	6" or thicker	STB2	2⅞"	—	—	—	1295	2150	2495
		Titen HD	3¼"	1255	2095	2430	1255	2095	2430
		SET-XP	4"	1175	2305	2305	1485	2915	2915
		AT-XP	4"	1220	2395	2395	1560	3065	3065
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	2200	3705	3705	2790	3705	3705
		AT-XP	7½"	2290	3705	3705	2935	3705	3705
MSSC6.25KW	4" or thicker	STB2	2¼"	—	—	—	1070	1780	2055
		Titen HD	2½"	715	1185	1365	715	1185	1365
	6" or thicker	STB2	2⅞"	—	—	—	1605	2665	3090
		Titen HD	3¼"	1555	2600	3010	1555	2600	3010
		SET-XP	4"	1795	3505	3505	1840	3615	3615
		AT-XP	4"	1860	3645	3645	1935	3800	3800
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	3350	4595	4595	3455	4595	4595
		AT-XP	7½"	3490	4595	4595	3640	4595	4595

Cracked Concrete, Seismic in SDC C through F [9,10]

Model No.	Min. Concrete Thickness (h_{min})	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Allowable Moment, M (in-lbs.)					
				Edge of Slab[3]			Center of Slab[4]		
				3000 psi SLWC	3000 psi NWC	4000 psi NWC	3000 psi SLWC	3000 psi NWC	4000 psi NWC
MSSC4.25KW	4" or thicker	STB2	2¼"	—	—	—	300	500	580
		Titen HD	2½"	200	335	385	200	335	385
	6" or thicker	STB2	2⅞"	—	—	—	450	755	870
		Titen HD	3¼"	440	735	850	440	735	850
		SET-XP	4"	410	805	805	520	1020	1020
		AT-XP	4"	430	840	840	550	1070	1070
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	770	1495	1495	975	4325	4325
		AT-XP	7½"	800	1575	1575	1025	4325	4325
MSSC6.25KW	4" or thicker	STB2	2¼"	--	--	--	375	620	720
		Titen HD	2½"	250	415	480	250	415	480
	6" or thicker	STB2	2⅞"	--	--	--	560	935	1080
		Titen HD	3¼"	545	910	1050	545	910	1050
		SET-XP	4"	625	1225	1225	645	1265	1265
		AT-XP	4"	650	1275	1275	680	1330	1330
	Concrete Thickness ≥ 9.5"	SET-XP	7½"	1180	5360	5360	1210	5360	5360
		AT-XP	7½"	1220	5310	5310	1270	5310	5310

1. Allowable Moments have been determined using ACI 318-11 Appendix D anchorage calculations with the minimum concrete compressive strength, f'_c and slab thickness listed. Sand-Lightweight Concrete is abbreviated as 'SLWC', Normal Weight Concrete is abbreviated as 'NWC'.
2. Nominal Embedment Depth/Effective Embedment Depth relationships:
   - ⅜" Titen HD® in 4" concrete: 2.50" (h_{nom}) / 1.77" (h_{ef})
   - ⅜" Titen HD in 6" concrete: 3.25" (h_{nom}) / 2.40" (h_{ef})
   - ⅜" Carbon Steel STB2 into 4" concrete: 2.25"(h_{nom})/1.875"(h_{ef})
   - ⅜" Carbon Steel STB2 into 6" concrete: 2.875"(h_{nom})/2.5"(h_{ef})
   - SET-XP® or AT-XP® Adhesive with ⅜" F1554 Gr. 36 All-Thread Rod in 6" concrete: 4.0" (h_{nom}) = 4" (h_{ef})
   - SET-XP or AT-XP Adhesive with ⅜" F1554 Gr. 36 All-Thread Rod in 9.5" concrete: 7.5" (h_{nom}) = 7.5" (h_{ef})
3. At edge of slab, edge distances are assumed to be 3.0" and 4.0" (½ of stud width) as determined for 6" and 8" studs, respectively. 'End distances' are assumed as 1.5 x Min. Edge Distance in one direction and 'N/A' in the other direction. See figure on page 41.
4. At center of slab; edge and end distances are assumed as 'N/A' in all directions at locations away from edge of slab. See figure on page 41.
5. Load values are for a single anchor based on ACI 318-11, condition B, load factors from ACI 318 Section 9.2, no supplemental edge reinforcement, $\psi_{c,V} = 1.0$ for cracked concrete and periodic special inspection. Reference ICC-ES or IAPMO-UES evaluation reports for further information.
6. Adhesive values assume a maximum short-term temperatures of 180°F, maximum long-term temperatures of 110°F and dry hole conditions. Other conditions may be evaluated using Anchor Designer™ Software for ACI 318, ETAG and CSA. See **www.strongtie.com/software.**
7. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha (α), of 0.7 for seismic loads and 0.6 for wind loads. ASD values for other load combinations may be determined using alternate conversion factors.
8. Tabulated allowable ASD loads for Wind and Seismic in SDC A & B are based on using wind conversion factors and may be increased by 1.17 for SDC A & B only.
9. Allowable loads have been divided by an Omega (Ω) seismic factor of 2.5 for brittle failure as required by ACI 318-11 Appendix D, unless steel failure governs.
10. Tabulated allowable moments are for MSSC Kneewall Connectors attached to studs with 33 (20) or 43 (18) mil (ga.) thickness. Allowable moment may be increased for MSSC Kneewall Connectors attached to studs with 54 (16) mil (ga.) thickness by multiplying by a factor of 1.16 for MSSC4.25KW and 1.28 for MSSC6.25KW.
11. Tabulated capacities assume lateral force applied at height of 38" above concrete. Tabulated capacities are based on maximum allowable anchorage loads only. The capacity of the connection system shall be the minimum of the tabulated value and the allowable load value from the MSSCKW Connectors: Allowable Load Tables.

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SJC Steel-Joist Connectors

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

SJC connectors have been specifically designed for various CFS joist, rafter and underside of metal-deck applications. The unique clip dimensions enable easy installation on the open side of joists and rafters with up to 3½" flanges and return lips up to ¾". For metal-deck applications, the pre-punched ⅜" holes easily accommodate 6", 8", 10" and 12" on-center metal-deck flutes.

Features:

- Pre-punched holes reduce installation cost by eliminating predrilling
- Intuitive fastener hole positions ensure accurate clip installation in accordance with design, support a wide range of design and application requirements and provide installation flexibility
- Angle lengths accommodate either hard-side or soft-side attachment for joists with return lips up to ¾"
- 4½" leg length enables soft-side connections for joists with flanges up to 3½"
- Also accommodates kicker-to-metal-deck applications

Material: SJC – 68 mil (50 ksi); MSJC – 97 mil (50 ksi)

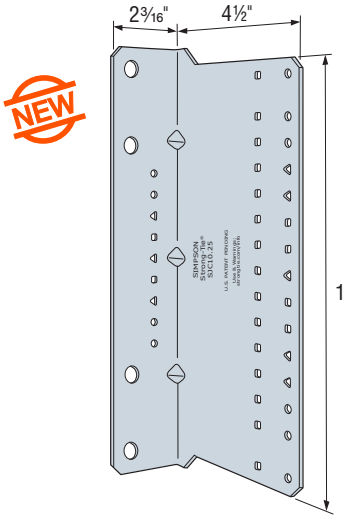
Finish: Galvanized (G90)

Installation:

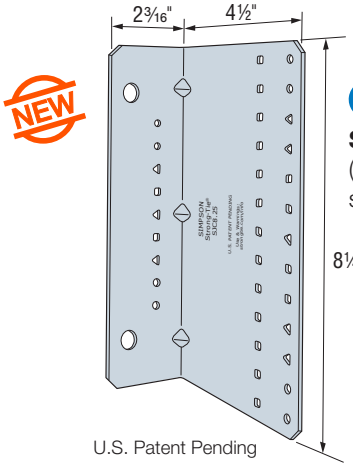
- Use all specified fasteners/anchors.

Codes: See page 11 for Code Report Reference Key Chart.

For detailed product dimensions, refer to page 51.



SJC10.25
(MSJC10.25 similar)

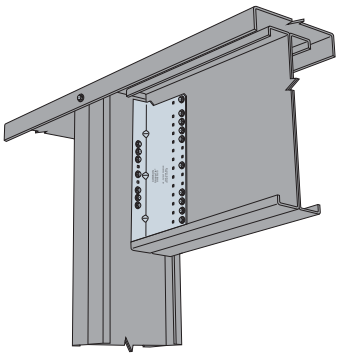


SJC8.25
(MSJC8.25 similar)

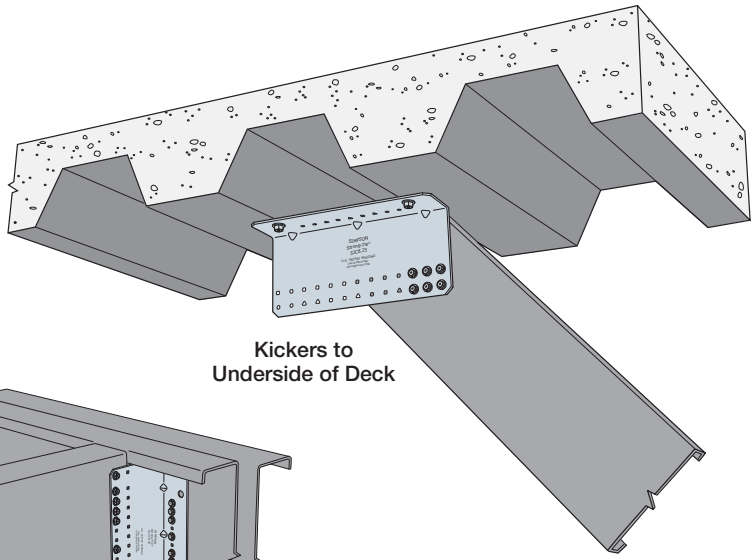
U.S. Patent Pending

Ordering Information

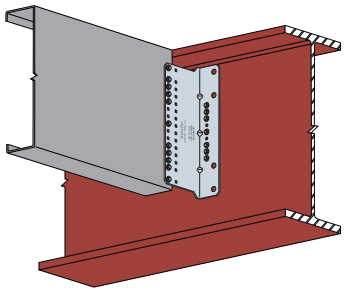
Model Number	Ordering SKU	Package Quantity
SJC8.25	SJC8.25-R15	Box of 15
MSJC8.25	MSJC8.25-R15	
SJC10.25	SJC10.25-R15	Box of 15
MSJC10.25	MSJC10.25-R15	



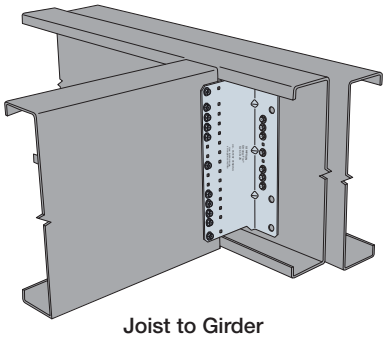
Header to Jamb



Kickers to Underside of Deck



Joists to I-Beam



Joist to Girder

NOTE: For 6" and 8" joists: SSC connectors are recommended.

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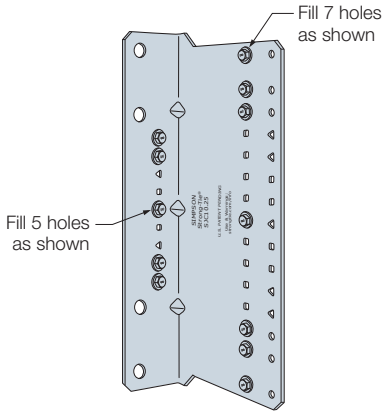
SJC Steel-Joist Connectors

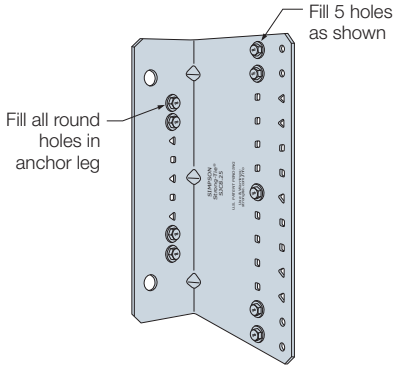
SJC Connectors: Steel-to-Steel Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Framing Member Depth[4] (in.)	Fasteners[5]			Allowable F_4 Loads (lbs.)[2]			Code Ref.
				Pattern[1]	Carried Member	Carrying Member	Minimum Member Thickness		Maximum Connector Load[3]	
							54 mil (16 ga.)	68 mil (14 ga.)		
SJC8.25	68 (14)	8¼	10	Min.	4 - #10	4 - #10	980	980	2930	160
				Max.	9 - #10	7 - #10	1005	1490		
				Inner	5 - #10	4 - #10	1345	2005		
MSJC8.25	97 (12)	8¼	10	Min.	4 - #10	4 - #10	1005	1710	2930	
				Max.	9 - #10	7 - #10	1135	1765		
				Inner	5 - #10	4 - #10	1535	2220		
SJC10.25	68 (14)	10¼	12	Min.	6 - #10	4 - #10	1170	1625	3935	
				Max.	11 - #10	7 - #10	1265	1625		
				Inner	7 - #10	5 - #10	1620	2170		
MSJC10.25	97 (12)	10¼	12	Min.	6 - #10	4 - #10	1200	2045	3935	
				Max.	11 - #10	7 - #10	1265	2045		
				Inner	7 - #10	5 - #10	1730	2635		

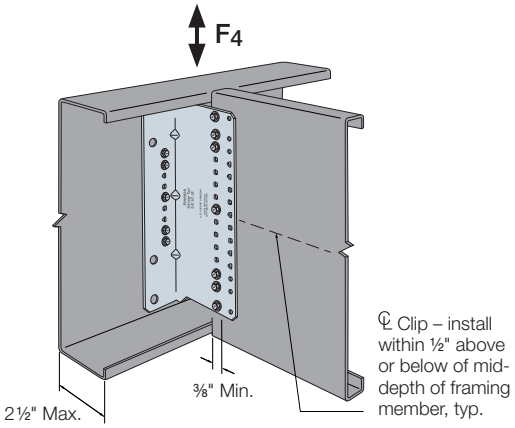
1. Min. fastener quantity and load values—fill all round holes; Max. fastener quantity and load values—fill all round and triangular holes; Inner fastener quantity and load values—see illustrations for fastener placement.
2. Allowable loads are based on bracing of the members located within 12" of the connection.
3. Maximum allowable load for connector that may not be exceeded when designing custom installations. Designer is responsible for member and fastener design.
4. For 6" and 8" joists, SSC connectors are recommended.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



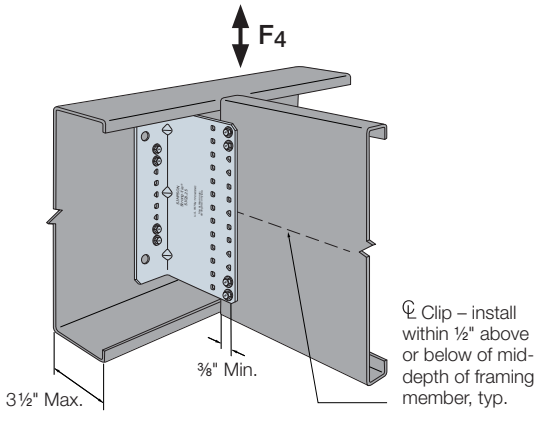
SJC10.25-Inner Fastener Pattern
(MSJC10.25 Similar)



SJC8.25-Inner Fastener Pattern
(MSJC8.25 Similar)



SJC Installation with Carried Member Fasteners in Inner Row



SJC Installation with Carried Member Fasteners in Outer Row
(For Min./Max. Load Values)

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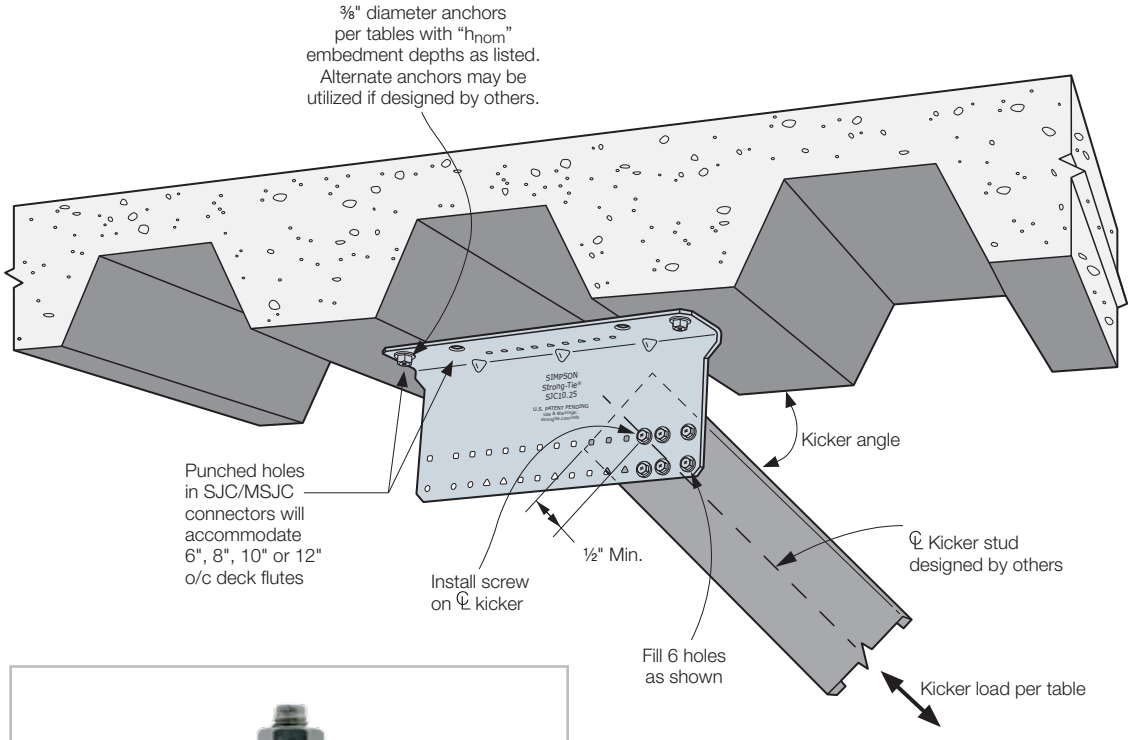
SJC Steel-Joist Connectors

SJC Connectors: Kicker Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Fasteners to Kicker[4]	Kicker Angle[2]	Maximum Kicker Load (lbs.)	Anchor Tension at Maximum Load[3] (lbs.)	Code Ref.
SJC8.25	68 (14)	8¼	6 - #10	30°	490	345	160
				45°	535	570	
SJC10.25	68 (14)	10¼	6 - #10	30°	625	475	
				45°	530	440	
MSJC10.25	97 (12)	10¼	6 - #10	30°	950	675	
				45°	780	680	

1. Loads apply to connectors installed perpendicular or parallel to metal-deck flutes, with minimum 33 mil (20 ga.) kicker.
2. Kicker angle is the acute angle measured relative to the horizontal plane of the metal deck.
3. The tabulated value for anchor tension is per anchor. Anchors must be designed for combined shear and tension. Simpson Strong-Tie anchorage solutions are tabulated on pages 46 and 47. Alternate anchors may be utilized if designed by others.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical SJC Installation (MSJC Similar)

Titen HD® Screw Anchor | Strong-Bolt® 2 Wedge Anchor | AT-XP® Adhesive

See pages 46-47 or pages 87-113 for Simpson Strong-Tie anchor solutions for this application.

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SJC Steel-Joist Connectors

SJC and MSJC Kicker Anchorage Solutions

Uncracked Concrete, Wind and Seismic in SDC A & B					
Minimum 2.5" Slab (3000 psi concrete min.) Over Metal Deck					
Model No.	**Kicker Angle**	**⅜" Diameter Simpson Strong-Tie® Anchor Type**	**Nominal Embedment Depth (h_{nom})**	**Anchor Tension at Max. Load**	**Reduced Max. Kicker Load (If Applicable)**
SJC8.25	30°	STB2	2½"	345	—
		Titen HD	2¼"	345	—
	45°	STB2	2½"	570	—
		Titen HD	2½"	570	—
SJC10.25	30°	STB2	2½"	475	—
		Titen HD	2¼"	475	—
	45°	STB2	2½"	440	—
		Titen HD	2¼"	440	—
MSJC10.25	30°	STB2	2¾"	675	—
		Titen HD	2½"	575	805
	45°	STB2	2½"	680	—
		Titen HD	2½"	650	745

Cracked Concrete, Wind and Seismic in SDC A & B					
Minimum 2.5" Slab (3000 psi concrete min.) Over Metal Deck					
Model No.	**Kicker Angle**	**⅜" Diameter Simpson Strong-Tie® Anchor Type**	**Nominal Embedment Depth (h_{nom})**	**Anchor Tension at Max. Load**	**Reduced Max. Kicker Load (If Applicable)**
SJC8.25	30°	STB2	2¾"	345	—
		Titen HD	2½"	320	455
	45°	STB2	2¾"	570	—
		Titen HD	2½"	340	320
SJC10.25	30°	STB2	2¾"	475	—
		Titen HD	2½"	330	435
	45°	STB2	2¾"	440	—
		Titen HD	2½"	340	410
MSJC10.25	30°	STB2	3⅜"	675	—
		Titen HD	2½"	325	460
	45°	STB2	2¾"	680	—
		Titen HD	2½"	340	390

1. Allowable loads have been determined using ACI 318-11 Appendix D anchorage calculations with the minimum concrete compressive strength, f'_c and slab thickness listed.
2. STB2 = ⅜" diameter Strong-Bolt® 2 carbon steel anchor, THD = ⅜" diameter Titen HD® screw anchor.
3. Concrete over metal deck may be Normal Weight or Sand-Lightweight with f'_c of 3000 psi minimum and 2.5" minimum slab height above upper flute.
4. Minimum deck flute height is 1.5" (distance from top flute to bottom flute). All other anchor installation requirements shall follow ICC-ES ESR-3037 and ICC-ES ESR-2713.
5. Minimum Spacing, Edge and End distances for bottom of metal deck assemblies shall comply with those required in ICC-ES ESR-3037 and ICC-ES ESR-2713.
6. Load values are based on ACI 318-11, condition B, load factors from ACI 318 Section 9.2, no supplemental edge reinforcement for uncracked concrete, $\psi_{c,v}$ = 1.0 for cracked concrete, and periodic special inspection. Reference ICC-ES ESR-3037 and ICC-ES ESR-2713 for further information.
7. Allowable Stress Design (ASD) values have been determined by multiplying Load Resistance Factor Design (LRFD) values by a conversion factor, Alpha (α), of 0.7 for seismic loads and 0.6 for wind loads. ASD values for other types or load combinations may be determined using alternate conversion factors.

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SJC Steel-Joist Connectors

SJC and MSJC Kicker Anchorage Solutions

Cracked Concrete, Seismic in SDC C through F							
Minimum 2.5" Slab (3000 psi concrete min.) Over Metal Deck							
Model No.	Kicker Angle	⅜" Diameter Simpson Strong-Tie® Anchor Type	Nominal Embedment Depth (h_{nom})	Ω = 1.5		Ω = 2.5	
				Anchor Tension at Max. Load	Reduced Max. Kicker Load	Anchor Tension at Max. Load	Reduced Max. Kicker Load
SJC8.25	30°	STB2	3⅜"	345	—	310	435
		Titen HD	2½"	180	255	110	155
	45°	STB2	3⅜"	570	—	355	330
		Titen HD	2½"	200	185	120	110
SJC10.25	30°	STB2	3⅜"	475	—	320	420
		Titen HD	2½"	185	245	110	145
	45°	STB2	3⅜"	440	—	340	410
		Titen HD	2½"	195	235	120	140
MSJC10.25	30°	STB2	3⅜"	525	740	315	445
		Titen HD	2½"	185	260	110	155
	45°	STB2	3⅜"	575	660	345	395
		Titen HD	2½"	200	225	120	135

1. Allowable Loads have been determined using ACI 318-11 Appendix D anchorage calculations with the minimum concrete compressive strength, f'_c and slab thickness listed.
2. STB2 = ⅜" diameter Strong-Bolt® 2 carbon steel anchor, THD = ⅜" diameter Titen HD® screw anchor.
3. Concrete over metal deck may be Normal Weight or Sand-Lightweight with f'_c of 3000 psi minimum and 2.5" minimum slab height above upper flute.
4. Minimum deck flute height is 1.5" (distance from top flute to bottom flute). All other anchor installation requirements shall follow ICC-ES ESR-3037 and ICC-ES ESR-2713.
5. Minimum Spacing, Edge and End distances for bottom of metal deck assemblies shall comply with those required in ICC-ES ESR-3037 and ICC-ES ESR-2713.
6. Load values are based on ACI 318-11, condition B, load factors from ACI 318 Section 9.2, no supplemental edge reinforcement for uncracked concrete, $\psi_{c,v}$ = 1.0 for cracked concrete, and periodic special inspection. Reference ICC-ES ESR-3037 and ICC-ES ESR-2713 for further information.
7. Allowable Stress Design (ASD) values have been determined by multiplying Load Resistance Factor Design (LRFD) values by a conversion factor, Alpha (α), of 0.7 for seismic loads and 0.6 for wind loads. ASD values for other types or load combinations may be determined using alternate conversion factors.
8. Allowable anchor loads have been divided by an Omega (Ω) seismic factor of 1.5 or 2.5 for brittle failure as required by ACI 318-11 Appendix D.

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SFC Steel Framing Connectors

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

SFC connectors are a low-cost, multi-use utility clips for light to moderate loading conditions in CFS stud-to-stud and stud-to-structure applications where long leg lengths are not required.

Features:

- Reduced number of screws reduces installation cost
- Pre-punched holes reduce installation cost by eliminating predrilling
- Intuitive fastener hole positions ensure accurate clip installation in accordance with design, support a wide range of design and application requirements and provide installation flexibility
- In soft-side stud installations, SFC will not interfere with stud lips up to ¾" long*
- Also suitable for U-channel bridging

Material: LSFC – 43 mil (33 ksi); SFC – 54 mil (50 ksi)

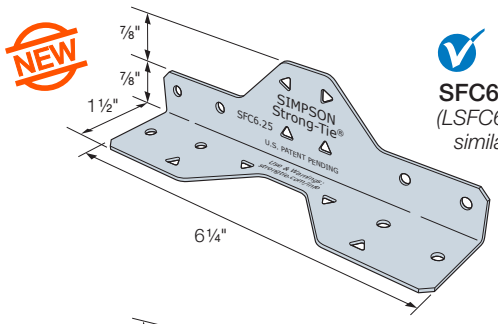
Finish: Galvanized (G90)

Installation:

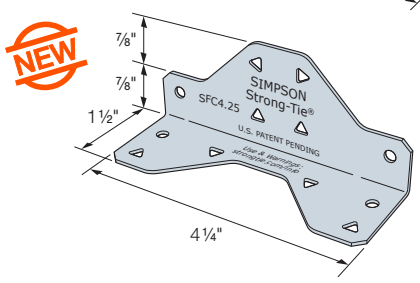
- Use all specified fasteners/anchors.

Codes: See page 11 for Code Report Reference Key Chart.

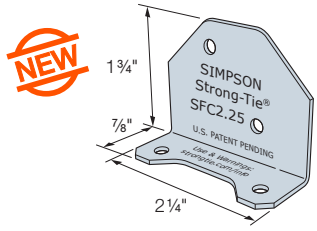
For detailed product dimensions, refer to page 50.



SFC6.25
(LSFC6.25 similar)



SFC4.25
(LSFC4.25 similar)

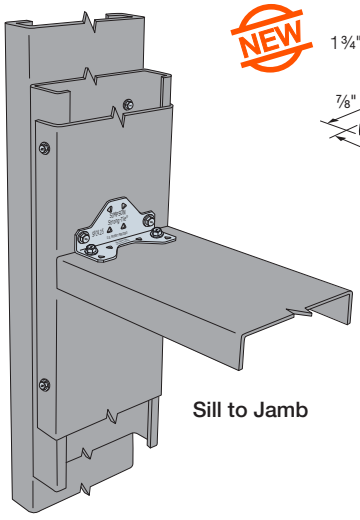


SFC2.25
(LSFC2.25 similar)

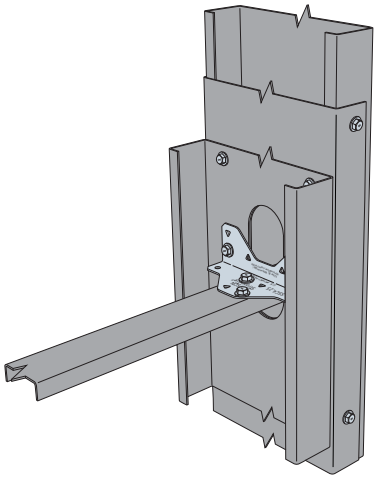
U.S. Patent Pending

Ordering Information

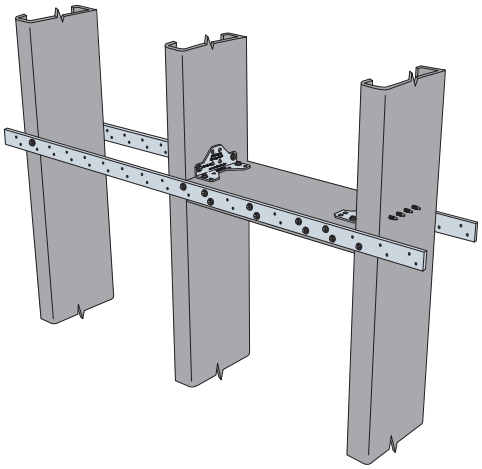
Model Number	Ordering SKU	Package Quantity
SFC2.25	SFC2.25-R300	Bucket of 300
LSFC2.25	LSFC2.25-R300	
SFC4.25	SFC4.25-R175	Bucket of 175
LSFC4.25	LSFC4.25-R175	
SFC6.25	SFC6.25-R125	Bucket of 125
LSFC6.25	LSFC6.25-R100	Bucket of 100



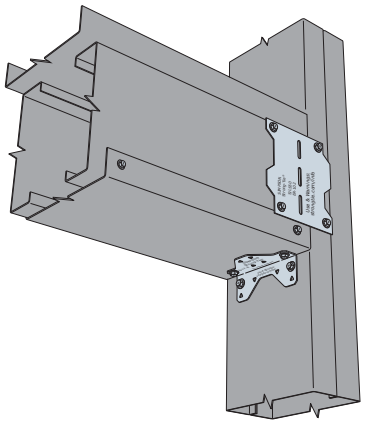
Sill to Jamb



U-Channel to Jamb



Stud Blocking with CS Coiled Strap



Box Headers to Jambs with S/LS Angles

*SFC2.25 clips will accommodate ⅝" long stiffener clips

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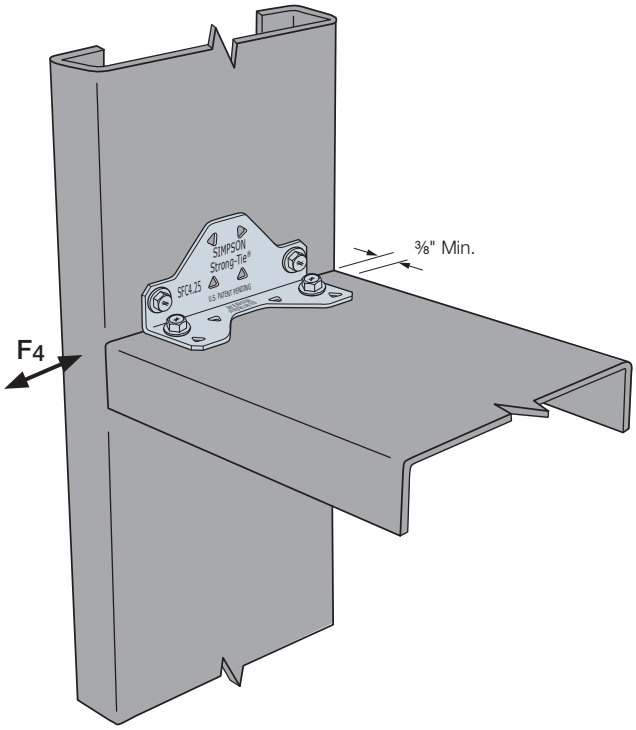
SFC Steel Framing Connectors

SFC Connectors: Steel-to-Steel Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Framing Member Depth (in.)	Fasteners[4]			Allowable F_4 Loads (lbs.)[2]				Code Ref.
				Pattern[1]	Carried Member	Carrying Member	Minimum Member Thickness			Maximum Connector Load[3]	
							33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)		
LSFC2.25	43 (18)	2¼	3⅝	Min.	2 - #10	2 - #10	295	310	475	630	160
SFC2.25	54 (16)	2¼	3⅝	Min.	2 - #10	2 - #10	295	355	630	630	
LSFC4.25	43 (18)	4¼	6	Min.	2 - #10	2 - #10	355	525	525	1750	
				Max.	6 - #10	6 - #10	440	865	1320		
SFC4.25	54 (16)	4¼	6	Min.	2 - #10	2 - #10	355	525	745	1750	
				Max.	6 - #10	6 - #10	575	985	1750		
LSFC6.25	43 (18)	6¼	8	Min.	4 - #10	4 - #10	490	920	1050	2640	
				Max.	8 - #10	8 - #10	510	980	1495		
SFC6.25	54 (16)	6¼	8	Min.	4 - #10	4 - #10	590	1035	1840	2640	
				Max.	8 - #10	8 - #10	590	1055	1880		

1. Min. fastener quantity and load values—fill all round holes; Max. fastener quantity and load values—fill all round and triangular holes.
2. Allowable loads are based on bracing of the members located within 12" of the connection.
3. Maximum allowable load for connector that may not be exceeded when designing custom installations. Designer is responsible for member and fastener design.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical SFC Installation

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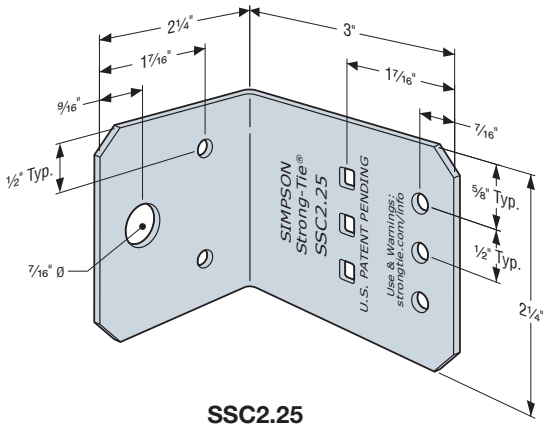
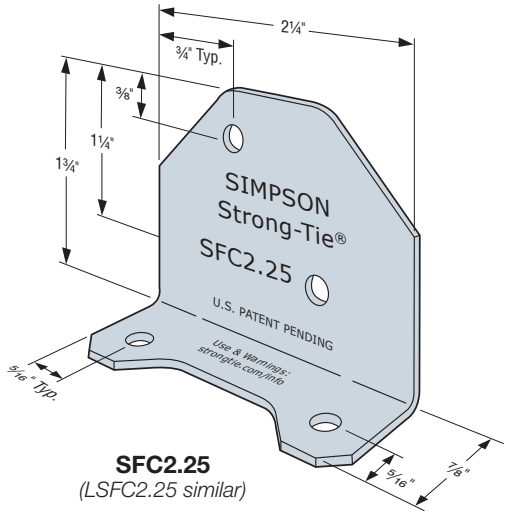
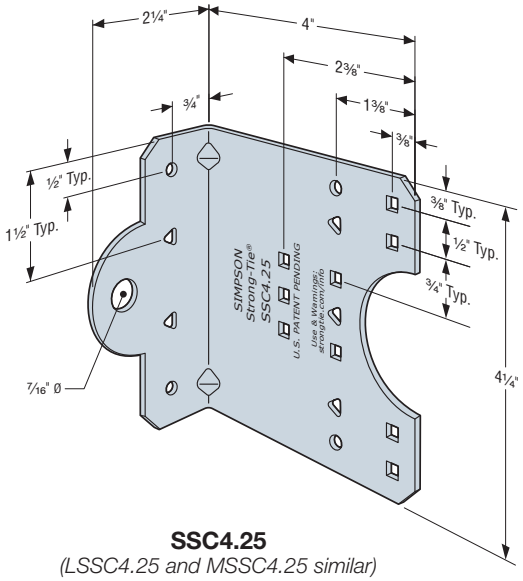
Utility Clip Dimensions



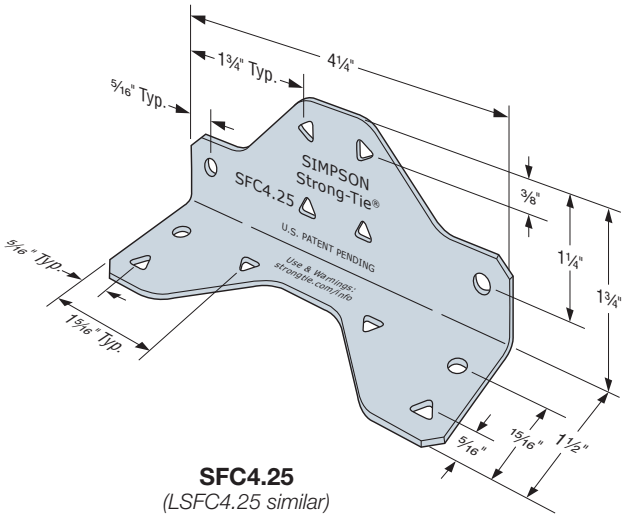
SSC2.25
(MSSC2.25 similar)



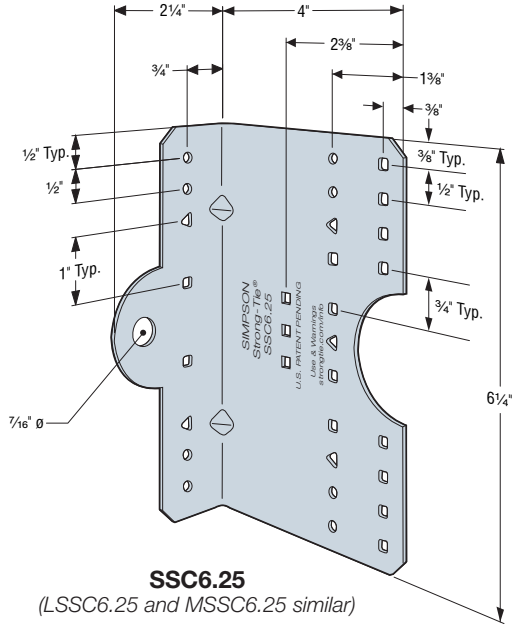
SFC2.25
(LSFC2.25 similar)



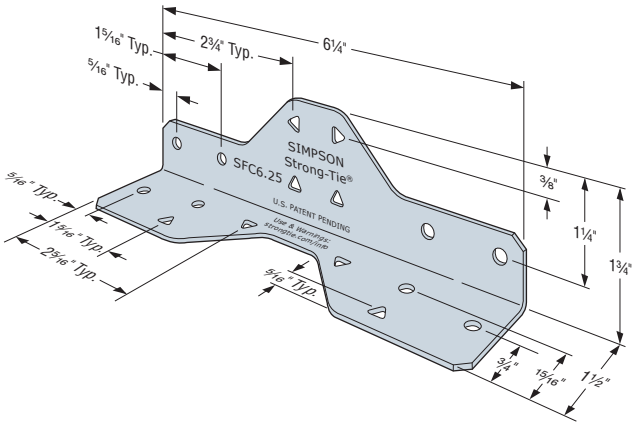
SSC4.25
(LSSC4.25 and MSSC4.25 similar)



SFC4.25
(LSFC4.25 similar)



SSC6.25
(LSSC6.25 and MSSC6.25 similar)



SFC6.25
(LSFC6.25 similar)

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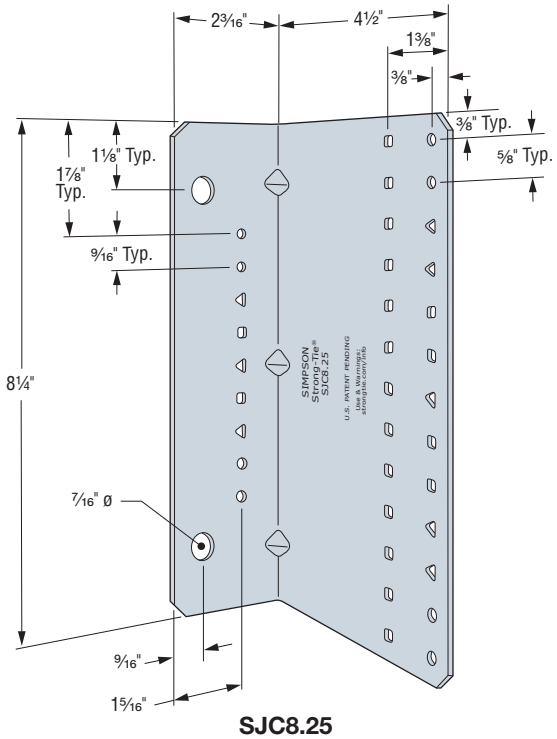
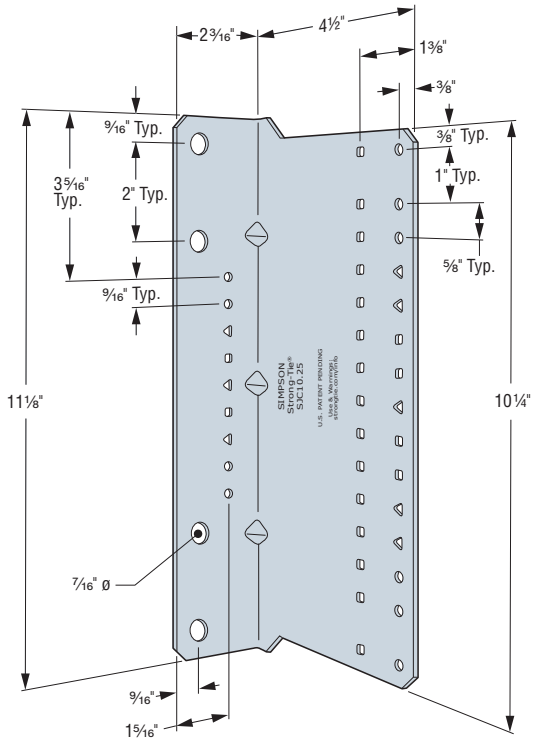
Utility Clip Dimensions



SJC8.25
(MSJC8.25 similar)



SJC10.25
(MSJC10.25 similar)

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L, LS and S/LS Utility Clips and Skewable Angles

L, LS and S/LS angles are load rated and provide the correct thickness and number of fasteners the specifier is looking for compared with field fabricated clip angles. These angles also have well-defined fastener locations, and testing ensures that the tabulated load values account for connection eccentricities. The connectors are general utility reinforcing angles with multiple uses. LS and S/LS connectors are skewable and can be used to attach members intersecting at angles.

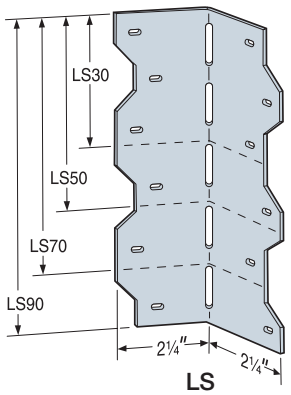
Material: L – 54 mil (16 ga.); LS – 43 mil (18 ga.); S/LS – 43 mil (18 ga.)

Finish: Galvanized (G90)

Installation:

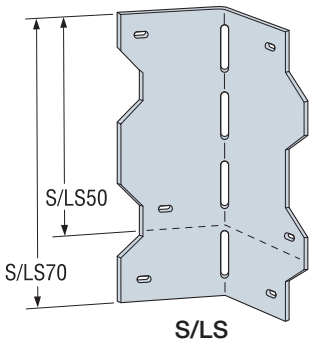
- Use all specified fasteners.
- S/LS—field-skewable; bend one time only.
- CFS framing must be constrained against rotation when using a single S/LS per connection.

Codes: See page 11 for Code Report Reference Key Chart.



LS

U.S. Patent 4,230,416

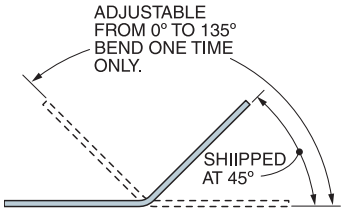


S/LS

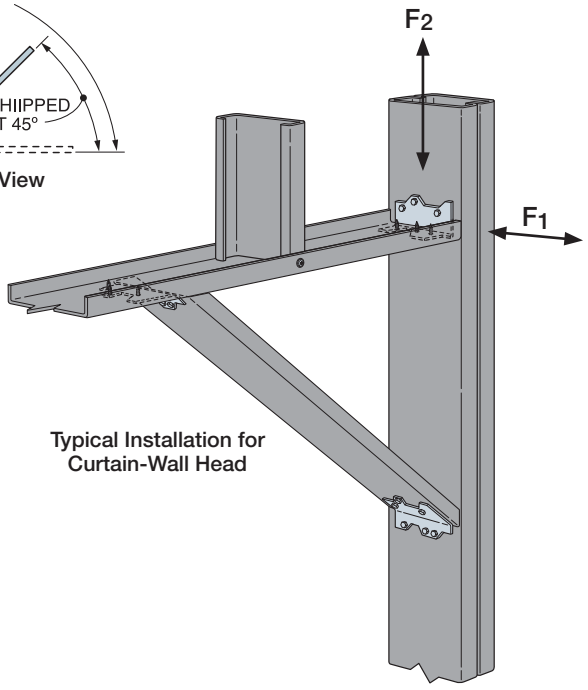
U.S. Patent 4,230,416

Model No.	Length (in.)	Fasteners[2]	Allowable Loads (lbs.)						Code Ref.
			33 mil (20 ga.)		43 mil (18 ga.)		54 mil (16 ga.)		
			F_1	F_2	F_1	F_2	F_1	F_2	
L30	3	4-#10	200	60	315	85	610	—	160
L50	5	6-#10	475	—	675	90	750	110	
L70	7	8-#10	705	—	760	110	1100	110	
L90	9	10-#10	795	—	945	110	1740	110	
LS30	3⅜	6-#10	200	—	370	—	500	—	
S/LS50	4⅞	4-#10	200	—	370	—	500	—	
S/LS70	6⅜	6-#10	465	—	575	—	715	—	
LS90	7⅞	12-#10	465	—	895	—	915	—	

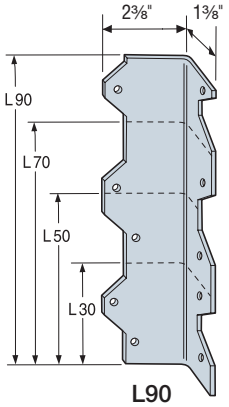
1. Loads are for one part only.
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



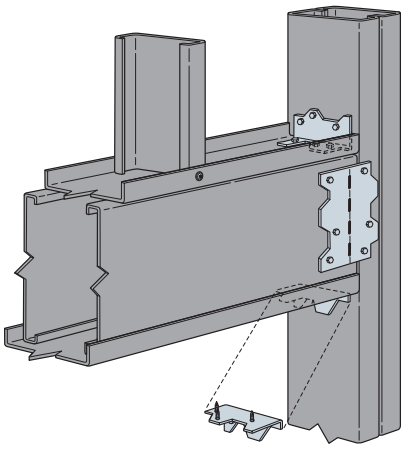
LS and S/LS Top View



Typical Installation for Curtain-Wall Head



L90



Typical Installation for Gravity Headers

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SUBH Bridging Connectors

Simplified Design and Installation Through Innovation

Simpson Strong-Tie® SUBH and MSUBH wall stud bridging connectors for cold-formed steel (CFS) framing offer a compact profile that allows standard 1⅝" studs to be sistered directly against adjacent studs. The LSUBH connector provides the same installation benefits of the SUBH/MSUBH connectors, and is suitable for many wind- and load-bearing situations where the load demand is light to moderate. Many applications require only one screw, greatly reducing labor costs and increasing productivity.

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

Features:

- Tested to include stud-web strength and stiffness in the tabulated design values
- Design values ensure compliance with AISI S100 Sections D3.2.1 and D3.3 for axially and laterally loaded studs
- Flexible design solutions for web thicknesses of 33 mil (20 ga.) through 97 mil (12 ga.) and stud sizes from 3⅝" to 8"
- MSUBH accommodates back-to-back built-up members ranging from 33 mil (20 ga.) to 54 mil (16 ga.)

Material: LSUBH3.25 – 33 mil (20 ga.); SUBH3.25 – 43 mil (18 ga.); MSUBH3.25 – 68 mil (14 ga.)

Finish: Galvanized (G90)

Installation:

- See pages 54 through 56.

Codes: See page 11 for Code Report Reference Key Chart.

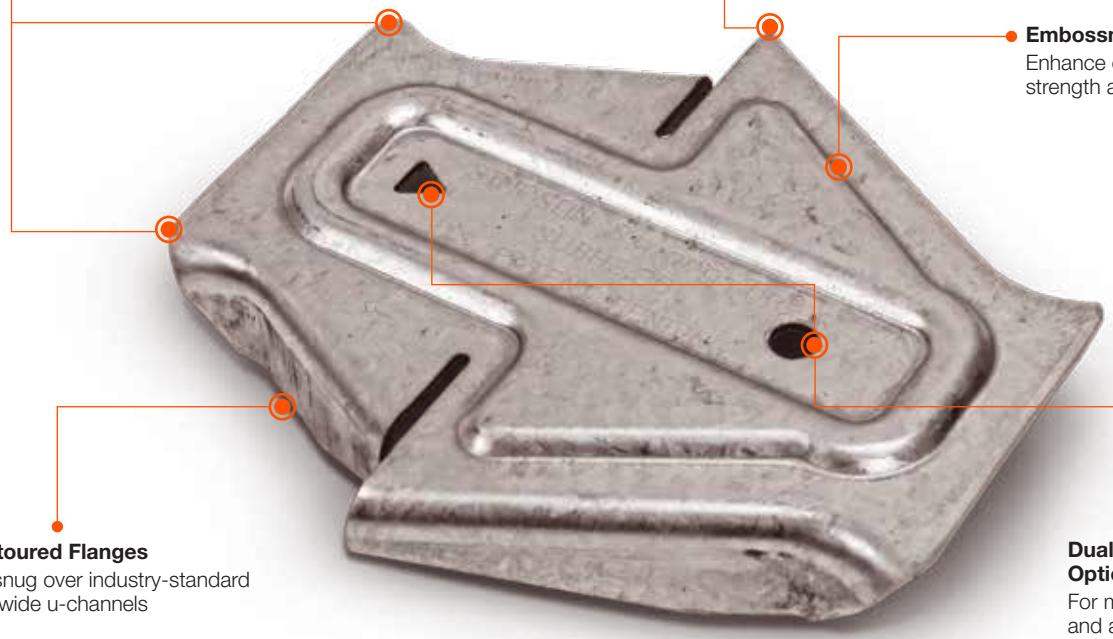
Ordering Information:

LSUBH3.25 and SUBH3.25-R150 (Bucket of 150), MSUBH3.25-R100 (Bucket of 100)

Compact Geometry
Facilitates efficient installation in industry-standard 1.5" web knockouts

Web Slots
Offers strong rotational resistance without the use of screws

Embossments
Enhance connector strength and stiffness



Contoured Flanges
Fits snug over industry-standard 1.5" wide u-channels

Dual Installation Options
For maximum design and application flexibility

SUBH3.25
(LSUBH3.25 and MSUBH3.25 Similar)
U.S. Patent 8,813,456

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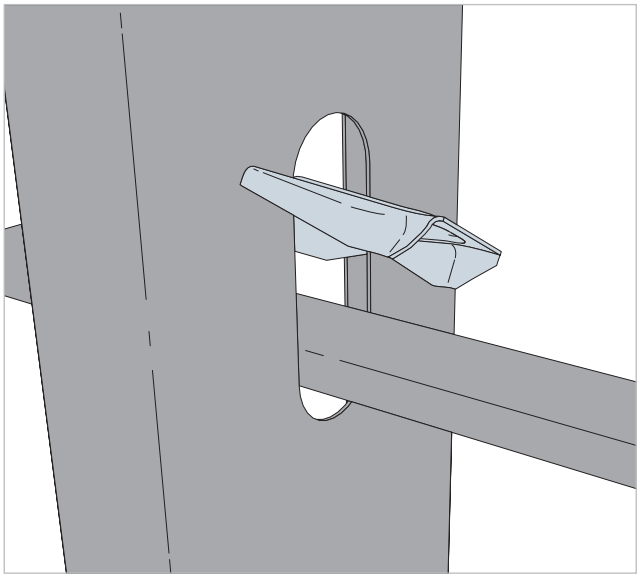
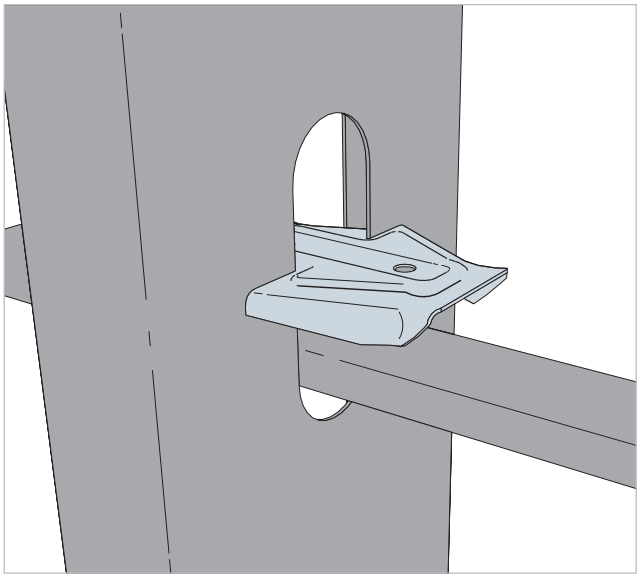
SUBH Bridging Connectors

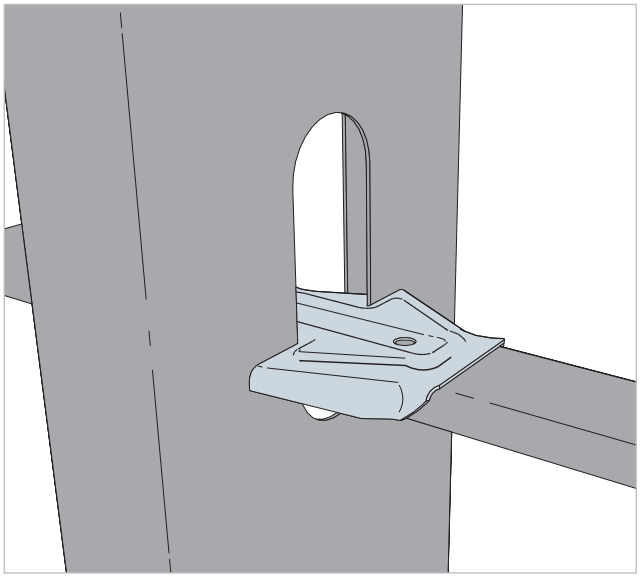
Installation Instructions



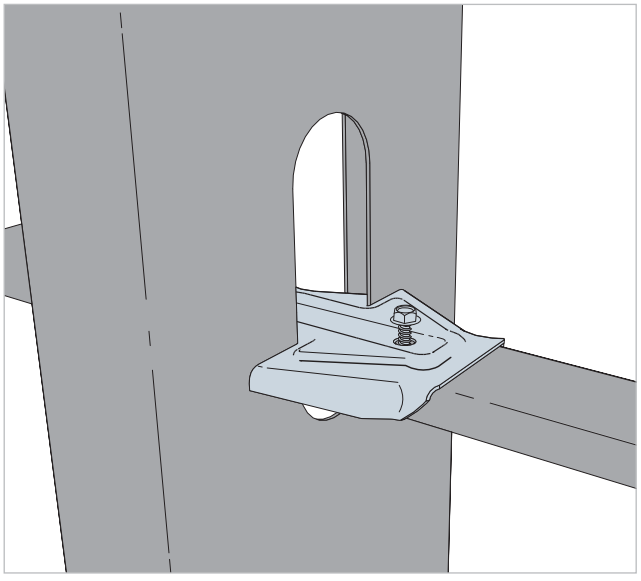
Step 1: With the u-channel in a stable, horizontal position, insert either end of the SUBH into the web knockout at approximately 45°.



Step 2: Rotate the SUBH into a horizontal position aligned with the u-channel so the slots engage the stud web.



Step 3: Slide the SUBH down over the u-channel flanges, ensuring that the connector and u-channel are fully seated. (Note: For installations at slip track, the connector may be installed inverted — see page 55).



Step 4: Install the specified type and number of screws through the holes of the SUBH into the u-channel.

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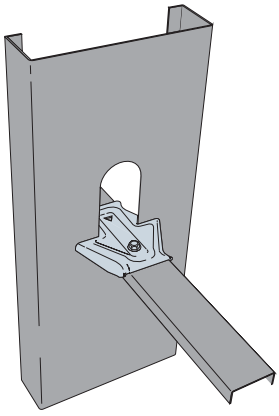
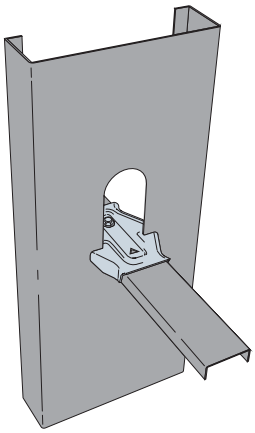
SUBH Bridging Connectors

Installation Details

Typical Orientations

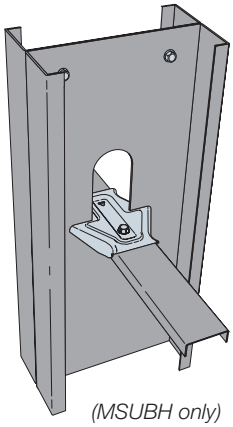


1 Round hole near side

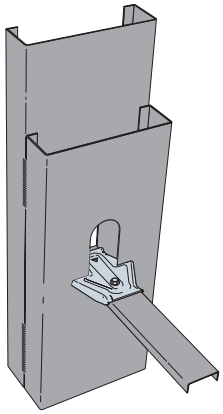


2 Round hole far side

Recommended Details at Built-Up Studs



1 *(MSUBH only)*



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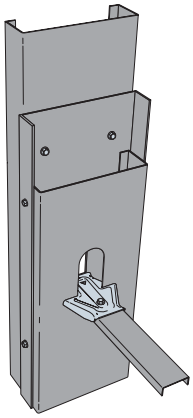
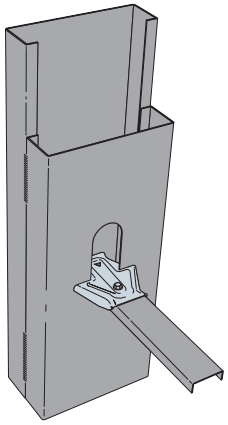
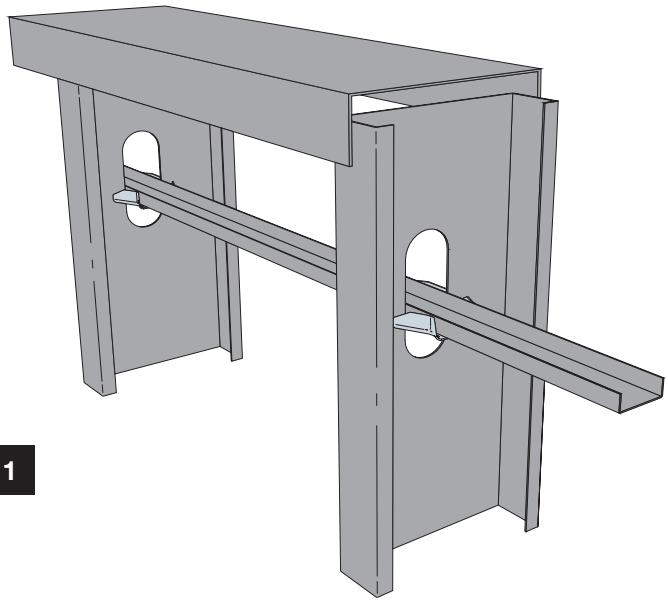


2



4

Recommended Detail at Slip Track



1

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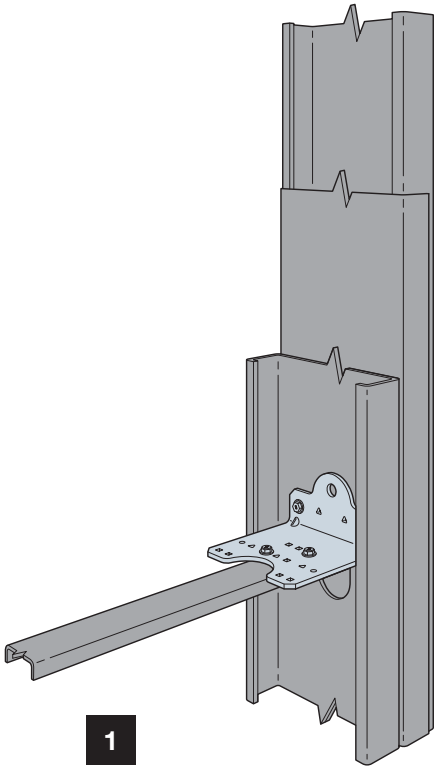
Alternate and Optional U-Channel Bridging Installation Details

Recommended details where knockout access is restricted, or where additional U-channel restraint is needed for load path considerations.



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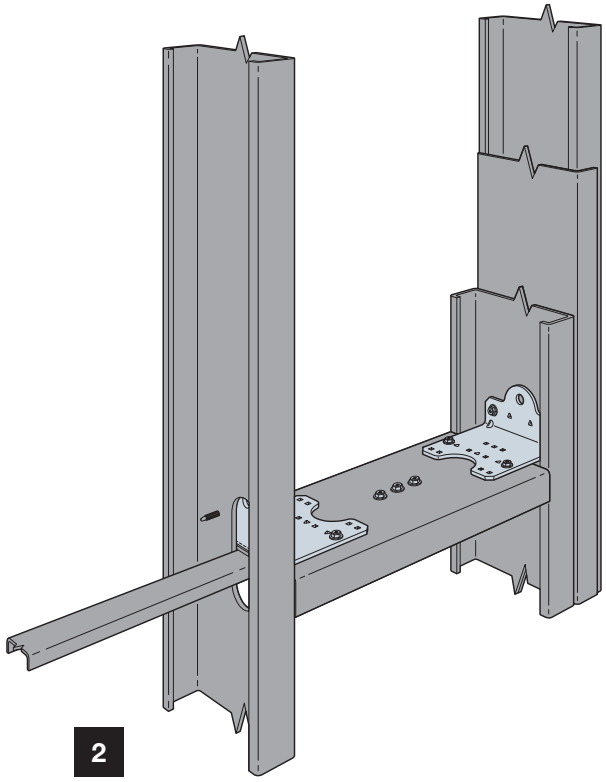
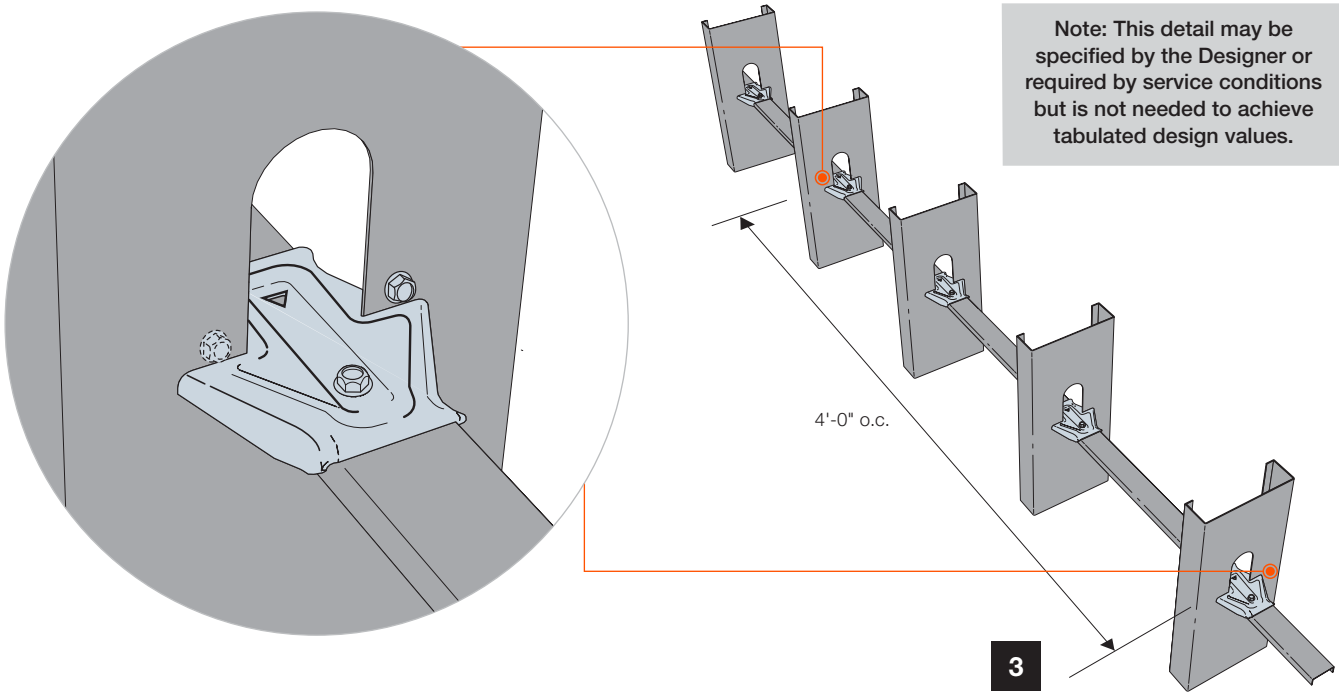


2

To restrict vertical movement and rotation of bridging, use (1) #10 screw on alternate sides of the stud knockout at 4'-0" o.c. max spacing (optional).



3

Note: This detail may be specified by the Designer or required by service conditions but is not needed to achieve tabulated design values.

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How to Use Bridging Connector Allowable Load Table

The tabulated strength and stiffness values are for use with Sections D3.2.1 and D3.3 of the 2007 edition of AISI North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100-2007) as follows:

Bracing Design for Laterally Loaded C-Studs

Step 1: Calculate required bracing force for each flange using equation D3.2.1-3

Step 2: Multiply result by stud depth to obtain torsional moment

Step 3: Select connector with tabulated allowable torsional moment that exceeds torsional moment from Step 2 for the stud depth and gauge required

Bracing Design for Axially Loaded C-Studs

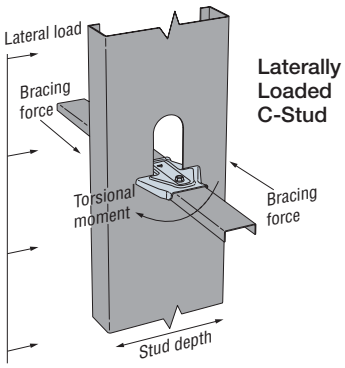
Step 1: Calculate required LRFD brace strength using equation D3.3-1

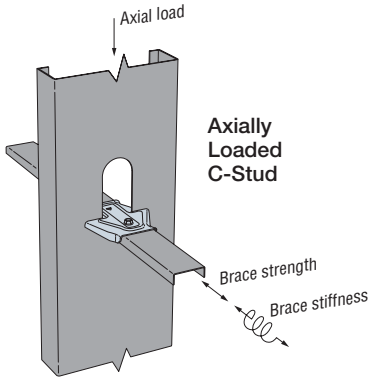
Step 2: Divide result by 1.5 for ASD design[1]

Step 3: Calculate required brace stiffness using equation D3.3-2

Step 4: Select connector with tabulated allowable brace strength that exceeds strength from Step 2 and tabulated brace stiffness that exceeds stiffness from Step 3 for the stud depth and gauge required

1. Page III-54 of the 2008 edition of the AISI Cold-Formed Steel Design Manual states that equation D3.3-1 is applicable to LRFD design, and recommends dividing the result by 1.5 for ASD design.





SUBH Bridge Clip Connector – Strength and Stiffness

Model No.	Stud Depth	Stud Thickness mils (ga.)	Laterally Loaded C-Stud		Axially Loaded C-Stud				Code Ref.
			Allowable Torsional Moment[1] (in.-lbs.)		Allowable Brace Strength[1,2] (lbs.)		Brace Stiffness[3] (lbs./in.)		
			Min	Max	Min	Max	Min	Max	
NEW LSUBH3.25	3.625	33 (20)	215	330	155	275	2300	2685	160
		43 (18)	230	370	175	310	5075	7585	
		54 (16)	225	370	195	345	5075	8100	
SUBH3.25	3.625	33 (20)	320	345	230	370	1450	1985	IP1, L2
		43 (18)	355	430	255	420	2780	4035	
		54 (16)	420	455	290	475	2925	3975	
MSUBH3.25	3.625	54 (16)	550	800	435	630	3440	4015	
		68 (14)	640	860	485	695	4040	6145	
		97 (12)	670	860	515	770	6860	14265	
NEW LSUBH3.25	6.00	33 (20)	225	330	120	140	670	730	160
		43 (18)	250	395	155	285	1010	2075	
		54 (16)	265	395	180	330	1025	2565	
SUBH3.25	6.00	33 (20)	275	385	110	110	605	605	IP1, L2
		43 (18)	295	525	230	250	1050	1205	
		54 (16)	350	550	275	415	1130	1700	
MSUBH3.25	6.00	54 (16)	565	895	385	430	1630	1695	
		68 (14)	655	925	455	620	1860	2655	
		97 (12)	690	960	505	765	4070	4090	
NEW LSUBH3.25	8.00	43 (18)	235	375	135	135	815	815	160
		54 (16)	250	375	180	260	1130	1130	
SUBH3.25	8.00	43 (18)	255	570	190	190	505	535	IP1, L2
		54 (16)	325	605	250	300	895	1025	
MSUBH3.25	8.00	54 (16)	545	890	270	270	1025	1045	
		68 (14)	635	925	435	455	1400	1400	
		97 (12)	665	955	545	545	2465	2465	

1. Allowable loads are for use when utilizing Allowable Stress Design methology. For LRFD loads multiply the ASD tabulated values by 1.6.
2. Allowable brace strengths are based on ultimate test load divided by a safety factor. Serviceability limit is not considered, as brace stiffness requirements are given in section D3.3 of AISI S100-2007. Contact Simpson Strong-Tie if nominal brace strength is required.
3. Tabulated stiffness values apply toboth ASD and LRFD designs.
4. Allowable loads consider bridging connection only. It is responsibility of the Designer to verify the strength and serviceability of the framing members.
5. Min. fastener quantity and tabulated values – fill round hole (1 screw total); Max. fastener quantity and tabulated values – fill round and triangle holes (2 screws total).

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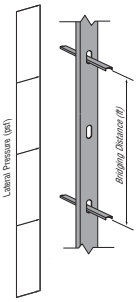
SUBH Design Tables

Lateral Pressure SUBH Bridging Requirements for Studs at 16" o.c.

Stud Section	Stud Thickness mils (ga.)	Model No.	Lateral Pressure and Bracing Distance																							
			5 psf to 20 psf					25 psf					30 psf					35 psf					40 psf					50 psf				
			4'	5'	6'	7'	8'	4'	5'	6'	7'	8'	4'	5'	6'	7'	8'	4'	5'	6'	7'	8'	4'	5'	6'	7'	8'	4'	5'	6'	7'	8'
362S162	33 (20)	LSUBH3.25	Min			Max		Min		Max			Min		Max			Min		Max			Max					Max				
	43 (18)																														
	54 (16)						Max																								
	33 (20)	SUBH3.25	Min					Min					Min			Max		Min			Max		Min					Min				
	43 (18)																Max				Max										
	54 (16)																					Max			Max						
	54 (16)	MSUBH3.25	Min					Min					Min					Min					Min					Min				Max
	68 (14)																														
	97 (12)																														
362S200	33 (20)	LSUBH3.25	Min			Max		Min		Max			Max					Max					Max									
	43 (18)												Min																		
	54 (16)																														
	33 (20)	SUBH3.25	Min				Max	Min				Max	Min			Max		Min		Max			Max	Max				Max				
	43 (18)																						Min					Min				
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min				Max	Min			Max		Min			Max	
	68 (14)																														
	97 (12)																														
362S250	33 (20)	LSUBH3.25	Min		Max			Max					Max					Max														
	43 (18)																														
	54 (16)																														
	33 (20)	SUBH3.25	Min			Max		Min		Max			Min	Max				Max					Max									
	43 (18)																	Min	Max				Min								
	54 (16)										Max				Max																
	54 (16)	MSUBH3.25	Min					Min					Min				Max					Max			Max			Min		Max		
	68 (14)																	Min			Max										
	97 (12)																														
600S162	33 (20)	LSUBH3.25	Min					Min				Max	Min			Max		Min			Max		Min		Max			Max				
	43 (18)																											Min				
	54 (16)																														
	33 (20)	SUBH3.25	Min					Min					Min				Max	Min			Max		Min		Max			Min		Max		
	43 (18)																														
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min					Min					Min				
	68 (14)																														
	97 (12)																														
600S200	33 (20)	LSUBH3.25	Min			Max		Min		Max			Min		Max			Min		Max			Max					Max				
	43 (18)																														
	54 (16)																														
	33 (20)	SUBH3.25	Min			Max		Min		Max			Min		Max			Min		Max			Min		Max			Max				
	43 (18)																														
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min					Min				Max	Min				Max
	68 (14)																														
	97 (12)																														
600S250	33 (20)	LSUBH3.25	Min			Max		Min		Max			Min		Max			Max					Max									
	43 (18)																														
	54 (16)																														
	33 (20)	SUBH3.25	Min			Max		Min		Max			Min		Max			Min		Max			Max					Max				
	43 (18)																														
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min				Max	Min			Max		Min			Max	
	68 (14)																														
	97 (12)																														
800S162	43 (18)	LSUBH3.25	Min					Min					Min				Max	Min			Max		Min		Max			Min		Max		
	54 (16)																														
	43 (18)	SUBH3.25	Min					Min					Min				Max	Min			Max		Min		Max			Min		Max		
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min					Min					Min				
	68 (14)																														
	97 (12)																														
800S200	43 (18)	LSUBH3.25	Min				Max	Min			Max		Min		Max			Min		Max			Max					Max				
	54 (16)																						Min								
	43 (18)	SUBH3.25	Min				Max	Min			Max		Min		Max			Min		Max			Min		Max			Min		Max		
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min					Min					Min				Max
	68 (14)																														
	97 (12)																														
800S250	43 (18)	LSUBH3.25	Min			Max		Min		Max			Min	Max				Max					Max									
	54 (16)																														
	43 (18)	SUBH3.25	Min			Max		Min			Max		Min		Max			Min		Max			Max					Max				
	54 (16)																														
	54 (16)	MSUBH3.25	Min					Min					Min					Min				Max	Min			Max		Min			Max	
	68 (14)																														
	97 (12)																														

1. See General Notes on pages 12-16.
2. Tabulated solutions are for ASD lateral pressure. Contact Simpson Strong-Tie for LRFD solutions.
3. Lateral pressure shall be determined based on load combinations of the applicable code. For designs in accordance with the 2009 IBC and earlier, wind pressures are at working stress level and may be used directly. For designs in accordance with the 2012 IBC, wind pressures are at strength level and must be multiplied by 0.6 for ASD load combinations.
4. "Min" designates a solution with the minimum number of fasteners ((1) #10 screw installed in round hole). "Max" designates a solution requiring the maximum number of fasteners ((2) #10 screws; fill both round and triangle holes). Blank areas designate conditions where the SUBH does not offer a solution.



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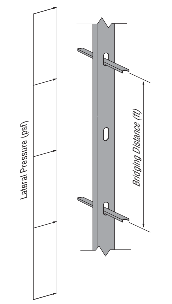
SUBH Design Tables

Lateral Pressure SUBH Bridging Requirements for Studs at 24" o.c.

Stud Section	Stud Thickness mils (ga.)	Model No.	Lateral Pressure and Bracing Distance: 5 psf to 15 psf (4' 5' 6' 7' 8')	20 psf (4' 5' 6' 7' 8')	25 psf (4' 5' 6' 7' 8')	30 psf (4' 5' 6' 7' 8')	35 psf (4' 5' 6' 7' 8')	40 psf (4' 5' 6' 7' 8')	50 psf (4' 5' 6' 7' 8')
362S162	33 (20), 43 (18), 54 (16)	LSUBH3.25	Min, Max	Min, Max	Max, Min	Max	Max	Max	
	33 (20), 43 (18), 54 (16)	SUBH3.25	Min	Max, Min, Max	Min, Max	Min, Max	Max, Max, Min	Max, Min	
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min	Min, Max	Min, Max	Min, Max	Min, Max
362S200	33 (20), 43 (18), 54 (16)	LSUBH3.25	Min, Max	Max, Min	Max	Max			
	33 (20), 43 (18), 54 (16)	SUBH3.25	Max, Min, Max	Min, Max	Max, Min	Max, Min	Max		
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min, Max	Min, Max	Min, Max	Min, Max	Min, Max
362S250	33 (20), 43 (18), 54 (16)	LSUBH3.25	Min, Max	Max					
	33 (20), 43 (18), 54 (16)	SUBH3.25	Max, Max, Max	Min, Max, Max	Max, Min	Max			
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min, Max	Min, Max	Max, Min	Min, Max	Min, Max	Max
600S162	33 (20), 43 (18), 54 (16)	LSUBH3.25	Min, Max	Min, Max	Min, Max	Min, Max	Max, Min	Max	
	33 (20), 43 (18), 54 (16)	SUBH3.25	Min	Min, Max	Min, Max	Min, Max	Max, Min	Max, Min	Max
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min	Min	Min	Min, Max	Min, Max
600S200	33 (20), 43 (18), 54 (16)	LSUBH3.25	Max, Min	Min, Max	Max, Min	Max	Max		
	33 (20), 43 (18), 54 (16)	SUBH3.25	Max, Min	Min, Max	Min, Max	Max, Min	Max	Max	Max
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min	Max, Min	Min, Max	Min, Max	Min, Max
600S250	33 (20), 43 (18), 54 (16)	LSUBH3.25	Min, Max	Max, Min	Max				
	33 (20), 43 (18), 54 (16)	SUBH3.25	Min, Max	Min, Max	Max, Min	Max	Max	Max	
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min, Max	Min, Max	Min, Max	Min, Max	Max, Min
800S162	43 (18), 54 (16)	LSUBH3.25	Min	Min, Max	Min, Max	Min, Max	Min, Max	Max	Max
	43 (18), 54 (16)	SUBH3.25	Min	Min, Max	Min, Max	Min, Max	Min, Max	Min, Max	Max
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min	Min	Min	Max, Min	Min, Max
800S200	43 (18), 54 (16)	LSUBH3.25	Min, Max	Min, Max	Min, Max	Max	Max		
	43 (18), 54 (16)	SUBH3.25	Min, Max	Min, Max	Min, Max	Min, Max	Max	Max	Max
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min	Min, Max	Min, Max	Min, Max	Min, Max
800S250	43 (18), 54 (16)	LSUBH3.25	Min, Max	Min, Max	Max	Max			
	43 (18), 54 (16)	SUBH3.25	Min, Max	Min, Max	Min, Max	Max	Max	Max	
	54 (16), 68 (14), 97 (12)	MSUBH3.25	Min	Min	Min, Max	Min, Max	Min, Max	Min, Max	Min, Max

1. See General Notes on pages 12-16.
2. Tabulated solutions are for ASD lateral pressure. Contact Simpson Strong-Tie for LRFD solutions.
3. Lateral pressure shall be determined based on load combinations of the applicable code. For designs in accordance with the 2009 IBC and earlier, wind pressures are at working stress level and may be used directly. For designs in accordance with the 2012 IBC, wind pressures are at strength level and must be multiplied by 0.6 for ASD load combinations.
4. "Min" designates a solution with the minimum number of fasteners ((1) #10 screw installed in round hole). "Max" designates a solution requiring the maximum number of fasteners ((2) #10 screws; fill both round and triangle holes). Blank areas designate conditions where the SUBH does not offer a solution.



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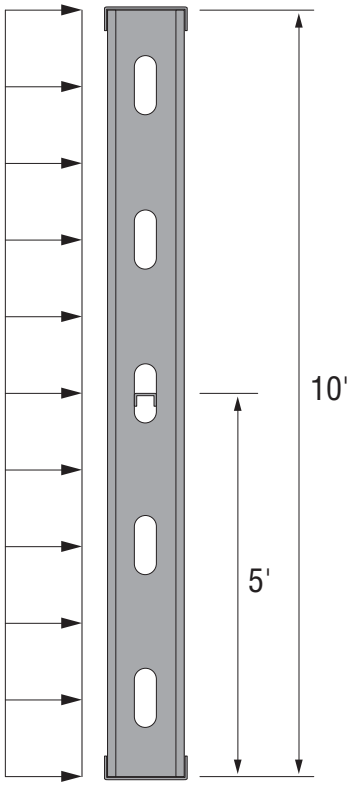
Example #1: Curtain-Wall Stud



Given

- 2012 IBC (ASCE 7-10 & AISI S100-2007 with Supplement)
- 600S162–43 (33 ksi) studs at 24" o.c.
- 10 ft. tall studs with mid-point bracing (5' o.c.)
- Wind design pressure = 41 psf

Select Connector Using Design Table (page 59)

ASD wind pressure:

p = (0.6)(41 psf) = 24.6 psf

Note: 2012 IBC load combinations for ASD include a factor of 0.6 for wind loads.

For 600S162-43 stud with SUBH3.25 connector, and 25 psf wind pressure with 5 ft. bracing distance:

➡ SUBH3.25 with Min. fasteners **OK**

Notes

1. Only lateral load has been included for clarity. Design of curtain wall studs should consider load combinations with vertical load in accordance with the applicable building code (see Example #2).
2. Bridging connector may also be designed using Allowable Loads table on page 57 (see Example #2).

Example #2: Exterior Bearing-Wall Stud

Given

- 2012 IBC (ASCE 7-10 & AISI S100-2007 with Supplement)
- 600S162–54 (50 ksi) studs at 24" o.c., 10 ft. tall
  Mid-point bracing (5' o.c.)
  Nominal axial stud strength, P_n = 8060 lbs. (2008 AISI Manual, Table III-8)
  Distance from shear center to mid-plane of web, m = 0.663 in. (2008 AISI Manual, Table I-2)
- Wind design pressure = 34 psf

Axially-Loaded Stud Design

Required brace strength (AISI S100 Eq. D3.3-1):

$P_{br,1}$ = 0.01Pn = (0.01)(8060 lbs.) = 80.6 lbs.

For ASD, divide by 1.5 (2008 AISI Cold-Formed Steel Design Manual, pg. III-54):

(80.6 lbs.)/(1.5) = 54 lbs.

Required brace stiffness (AISI S100 Eq. D3.3-2):

$ß_{br,1}$ = 2[4 – (2/n)]Pn/Lb = 2[4 – (2/1)](8060 lbs.)/(60 in.) = 537 lbs./in.

From Allowable Loads table (page 57) for 6" deep 54 mil stud:

➡ Select SUBH3.25 with Min. fasteners
Allowable brace strength = 275 lbs. > 54 lbs. **OK**
Brace stiffness = 1130 lbs./in. > 537 lbs./in. **OK**

Laterally-Loaded Stud Design

Design load tributary to brace:

W = (0.6)(34 psf)(2 ft.)(5 ft.) = 204 lbs.

Note: 2012 IBC load combinations for ASD include a factor of 0.6 for wind loads.

Required flange force (AISI S100 Eq. D3.2.1-3):

$P_{L1} = -P_{L2}$ = 1.5(m/d)W = (1.5)(0.663 in./6 in.)(204 lbs.) = 33.8 lbs.

Torsional moment:

$M_Z = P_{L1}d = -P_{L2}d$ = (33.8 lbs.)(6 in.) = 203 in.-lbs.

From Allowable Loads table (page 57) for 6" deep 54 mil stud:

➡ Select SUBH3.25 with Min. fasteners
Allowable torsional moment = 350 in.-lbs. > 203 in.-lbs. **OK**

Combined-Loading Check

($P_{br,1}$/Allowable brace strength) + (M_Z/Allowable torsional moment) = (54 lbs./275 lbs.) + (203 in.-lbs./350 in.-lbs.) = 0.78 < 1.0 **OK**

Note: Since bracing design for axially loaded studs depends on the nominal axial stud strength and not the axial design loads, load combinations with maximum wind are critical for interaction check.

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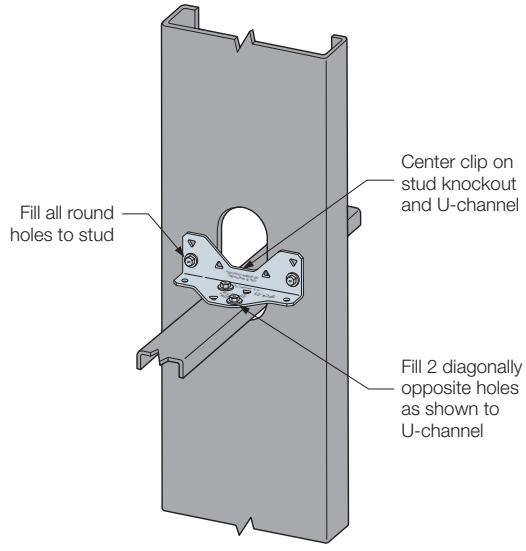
SFC Steel Framing Connectors / **SSC** Steel-Stud Connectors

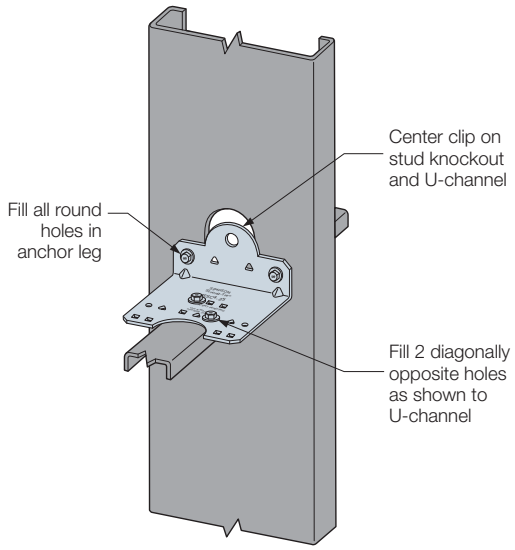
SFC/SSC Connectors – U-Channel Bridging Allowable Loads

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Stud Depth (in.)	Stud Thickness mil (ga.)	Fasteners[1,5]		Laterally Loaded C-Stud	Axially Loaded C-Stud	
					Stud	Bridging	Allowable Torsional Moment[2] (in.-lbs.)	Allowable Brace Strength[2, 3] (lbs.)	Brace Stiffness[4] (lbs./in.)
SFC4.25	54 (16)	4¼	6	33 (20)	2 - #10	2 - #10	275	125	860
				43 (18)	2 - #10	2 - #10	510	190	1220
				54 (16)	2 - #10	2 - #10	645	280	2045
SSC4.25	68 (14)	4¼	6	54 (16)	2 - #10	2 - #10	655	280	2045
				68 (14)	2 - #10	2 - #10	805	335	2305
				97 (12)	2 - #10	2 - #10	920	660	4230

1. See illustrations for fastener placement.
2. Allowable loads are for use when utilizing Allowable Stress Design methodology. For LRFD loads, multiply the tabulated ASD values by 1.6.
3. Allowable brace strengths are based on ultimate test load divided by a safety factor. Serviceability limit is not considered, as brace stiffness requirements are given in Section D3.3 of AISI S100. Contact Simpson Strong-Tie if nominal brace strength is required.
4. Tabulated stiffness values apply to both ASD and LRFD designs.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical SFC4.25 Installation



Typical SSC4.25 Installation

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DBC Drywall Bridging Connector

Work smarter, not harder

Patented design allows for 1 or 2 screw installation of the DBC, significantly reducing labor and material cost. The first and only connector load rated for ¾" u-channel, the DBC joins the SUBH line of bridging connectors tested as a system, ensuring that published design capacities capture the influence of stud web depth and thickness.

Features:

- Most applications require only a single screw
- Designed for ¾" u-channel to fit smaller web knockouts common to drywall studs
- Compatible with drywall stud depths of 3⅝" and 6" with 1½" wide knockouts

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

NEW

DBC2.5
U.S. Patents
8,813,456 and 8,590,255

Material: 33 mil (20 ga.) carbon steel

Finish: Galvanized (G90)

Installation:

- With ¾" x 54 mil (16 ga.) u-channel installed through the stud web knockouts, insert the DBC2.5 through the knockout so that the DBC slots engage the stud web and the DBC flanges engage the u-channel as shown in the illustration.
- Use the specified number of #8 screws to fasten the DBC to the u-channel.

Codes: Tested in accordance with ICC-ES AC261; see page 11 for Code Report Reference Key Chart.

Ordering Information: DBC2.5-R200 (Bucket of 200)

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DBC Drywall Bridging Connector

DBC – Bridging Connector Strength Allowable Loads

Model No.	Stud Depth	Stud Thickness and Yield Strength			Fasteners		Laterally Loaded C-Stud Allowable Torsional Moment (in. - lbs.)	Code Ref.
		Mils	Gauge[3]	Fy (ksi)				
DBC2.5	3⅝	15	25 EQ.	50	Min.	1 - #8	65	160
		18	25	33				
		19	20 EQ.	65				
		20	20 EQ.	57				
		30	20 DW	33	Min.	1 - #8	85	
					Max.	2 - #8	125	
		33	20 STR	33	Min.	1 - #8	85	
					Max.	2 - #8	125	
	6	15	25 EQ.	50	Min.	1 - #8	65	
		18	25	33				
		19	20 EQ.	65				
		21	20 EQ.	57				
		30	20 DW	33	Min.	1 - #8	85	
					Max.	2 - #8	125	
		33	20 STR	33	Min.	1 - #8	85	
					Max.	2 - #8	125	

1. Allowable loads are for use when utilizing Allowable Stress Design methodology. For LRFD loads, multiply the ASD tabulated values by 1.6.
2. Min. fastener quantity and tabulated values—fill round hole (1 screw total); Max. fastener quantity and tabulated values—fill round and triangle holes (2 screws total).
3. EQ—equivalent, DW—drywall, STR—structural.

Design Example

Given

- 600S125–18 (33 ksi) studs at 24" o.c., 10 ft. tall
  Mid-point bracing (5' o.c.)
  Distance from shear center to mid-plane of web, m = 0.408 in.
  (SFIA Technical Guide Version 2012.101)
- Lateral load = 5 psf

Laterally-Loaded Stud Design

ASD Design load tributary to brace:

W = (5 psf)(2 ft.)(5 ft.) = 50 lbs.

Required bracing force (AISI S100 Eq. D3.2.1-3):

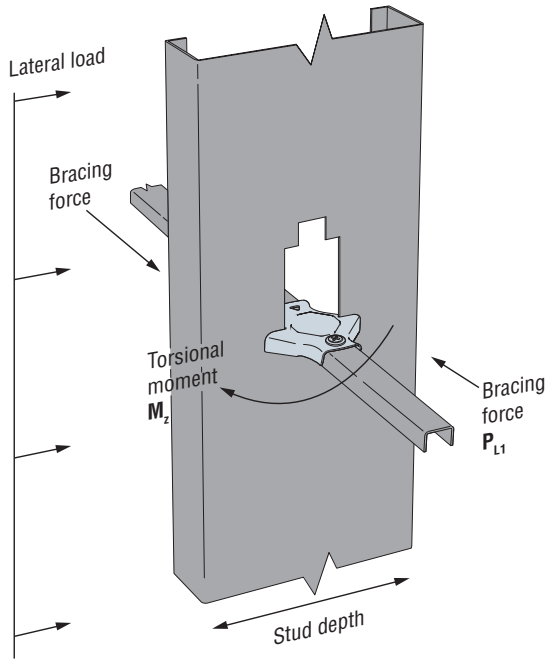
$P_{L1} = -P_{L2} = 1.5(m/d)W = (1.5)(0.408 \text{ in.}/6 \text{ in.})(50 \text{ lbs.}) = 5.1 \text{ lbs.}$

Torsional moment:

$M_Z = P_{L1}d = -P_{L2}d = (5.1 \text{ lbs.})(6 \text{ in.}) = 30.6 \text{ in.- lbs.}$

From Allowable Loads table above, for 6"-18 mil stud:

➡ Select DBC2.5 with Min. fasteners (1 - #8)
Allowable torsional moment = 65 in.- lbs. > 30.6 in.- lbs. **OK**



Laterally Loaded C-Stud

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CS Coiled Strap

CS coiled utility straps are an ideal solution when it is desired to brace wall studs via the flanges with strap. These products are packaged in lightweight (about 40 pounds) cartons and can be cut to length on the job site.

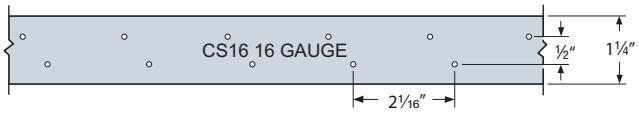
Materials: See table.

Finish: Galvanized (G90); ZMAX®

Installation:

- Use all specified fasteners. See General Notes.
- Refer to the applicable code for minimum edge and end distance.
- The table shows the maximum allowable loads and the screws required to obtain them. See footnote #1. Fewer screws may be used as given by footnote #3.

Codes: See page 11 for Code Report Reference Key Chart.



CS16 Hole Pattern
(All other CS straps similar)

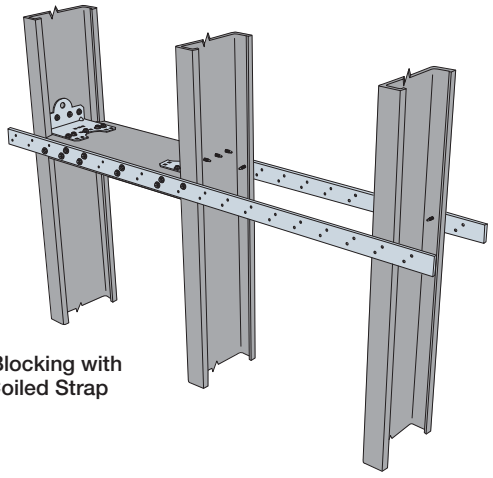
Model No.	Total Length (ft.)	Connector Material Thickness mil (ga.)	Width (in.)	Fasteners (At Blocking)[4] Framing Thickness mil (ga.)			Allowable Tension Loads (lbs.)	Code Ref.
				33 (20)	43 (18)	54 (16)		
CS16	150	54 (16)	1¼	9 - #10	6 - #10	4 - #10	1550	IP1, L2, F4
CS18	200	43 (18)	1¼	7 - #10	5 - #10	3 - #10	1235	
CS20	250	33 (20)	1¼	6 - #10	4 - #10	3 - #10	945	
CS22	300	27 (22)	1¼	5 - #10	3 - #10	3 - #10	775	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. In order to achieve the tabulated loads in the strap, attach each strap to the blocking with the tabulated number of screws.
2. Strap length at blocking to achieve tabulated load = number of tabulated screws + 1".
3. Calculate the strap value for a reduced number of screws to the blocking as follows:

$$\text{Allowable Load} = \frac{\text{No. of Screws Used}}{\text{No. of Screws in Table}} \times \text{Table Load.}$$

4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Stud Blocking with CS Coiled Strap

LTB Bridging

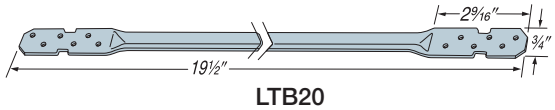
LTB bridging connectors are a cost-effective solution for bracing between non-load-bearing wall studs when compared with field fabricated blocking and clip angles.

Material: 27 mil (22 ga.)

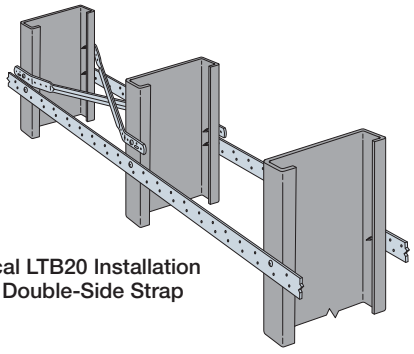
Finish: Galvanized (G90)

Installation:

- Use (2) #10 screws at each end.
- The LTB can be utilized with 3⅝", 6", 8", and 10" studs at 16" o.c.
- LTB works only in tension, so must be used in cross pairs.
- Install bridging tightly; loose installation may allow stud movement.



LTB20



Typical LTB20 Installation for Double-Side Strap

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In the fastener marketplace, Simpson Strong-Tie stands apart from the rest.

Quality and reliability are our top priority. That's why we hire Ph.D.s, metallurgists, materials engineers and structural engineers to create the best possible fasteners. And why each production run goes through rigorous testing to ensure our products can handle higher loads, resist corrosion and make installation more efficient.

C-CFS-15 ©2015 SIMPSON STRONG-TIE COMPANY INC.

Strong-Drive® XE Exterior Structural Metal Screw

SIMPSON Strong-Tie®

Common Applications:

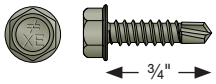
Cold-formed steel framing or connectors to cold-formed steel.

NEW

Features:

- 5⁄16" hex head
- 16 threads per inch
- Dual hardened heat treatment improves drilling efficiency, maximizes ductility and reduces the potential for hydrogen embrittlement
- Quik Guard® coated for corrosion protection
- Only fastener load rated for Simpson Strong-Tie® L70Z and LS70Z connectors for use with Trex® Elevations™ steel deck framing

Codes/Standards: ASTM C1513 compliant



Quik Guard® Coating

Length (in.)	Screw Size/ Nail Gauge	Shank Dia. (in.)	Head Dia. (in.)	Drive	Head Type	Threads	Drill Point Size	Point Size	Material/ Coating	Package Size	Model No.
¾	#10	0.19	0.4	5⁄16" Hex	Hex Washer Head	Machine Threads	#2	2	Quik Guard® Coating	100	XEQ34B1016C
¾	#10	0.19	0.4	5⁄16" Hex	Hex Washer Head	Machine Threads	#2	2	Quik Guard® Coating	1000	XEQ34B1016M

Single-Fastener Cold-Formed Steel Member Connection Load[1, 2, 3]

Model No.	Screw Size	Nominal Dia. (in.)	Washer Dia. (in.)	Load Description	Shear (lbs.)						Pull-Over (lbs.)						Pull-Out (lbs.)					
					Steel Thickness: mil (ga.)						Steel Thickness: mil (ga.)						Steel Thickness: mil (ga.)					
					27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
XEQ34B1016	#10 x ¾"	0.19	0.4	Allowable Strength (ASD)	172	220	355	515	515	515	335	455	570	785	785	785	72	97	139	220	305	450
				Design Strength (LRFD)	274	355	570	775	775	775	530	725	915	1180	1180	1180	115	155	222	350	490	720
				Nominal Strength	421	545	875	1370	1420	1420	815	1110	1400	1985	2040	2040	178	237	340	535	750	1215

1. Screws and their connections have been tested per AISI Standard Test Method S904-08 and S905-08.
2. Loads are based on cold-formed steel members with a minimum yield strength, F_y = 33 ksi and tensile strength, F_u = 45 ksi for 43 mils (18 ga.) and thinner, and a minimum yield strength, F_y = 50 ksi and tensile strength, F_u = 65 ksi for 54 mils (16 ga.) and thicker.
3. Screws shall extend through the connection with a minimum of 3 exposed threads per AISI General Provisions Standard Section D1.3.

Screw Strength (lbs.)

Screw Size	Nominal Strength		Design Strength (LRFD) $\phi = 0.5$		Allowable Strength (ASD) $\Omega = 3.0$	
	P_{ss}	P_{ts}	ϕP_{ss}	ϕP_{ts}	P_{ss}/Ω	P_{ts}/Ω
#10 x ¾	1545	2355	775	1180	515	785

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Self-Drilling E Metal Screw

SIMPSON Strong-Tie®

Common Application:

Cold-formed steel framing or connectors to cold-formed steel.

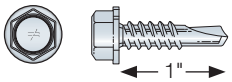
NEW

Features:

- Hex-washer head
- Clear zinc finish
- Recommended for use with certain Simpson Strong-Tie® connectors that require large diameter #14 screws
- Bit included in each box

Codes/Standards: ASTM C1513 compliant

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.



Clear Zinc Coating

Size	Length (in.)	Hex Head Size (in.)	Threads Per Inch	Head Diameter (in.)	Drill Point Size	Carton Quantity	Model No.
#14	1	⅜	14	0.5	#3	100	E1B1414R100
#14	1	⅜	14	0.5	#3	2500	E1B1414B

Screw Strength

Screw Size	Model No.	Nominal Strength (lbs.)		Design Strength (LRFD) (lbs.) $\phi = 0.5$		Allowable Strength (ASD) (lbs.) $\Omega = 3.0$	
		P_{ss}	P_{ts}	ϕP_{ss}	ϕP_{ts}	P_{ss}/Ω	P_{ts}/Ω
#14 x 1"	E1B1414	3130	5395	1565	2700	1045	1800

Cold-Formed Steel Member Connection Loads

Screw Size	Model No.	Nominal Dia. (in.)	Washer Dia. (in.)	Load Description	Shear (lbs.)					Pull-Over (lbs.)					Pull-Out (lbs.)				
					Steel Thickness: mil (ga.)					Steel Thickness: mil (ga.)					Steel Thickness: mil (ga.)				
					33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
#14 x 1"	E1B1414	0.242	0.5	ASD	200	295	605	850	1045	390	505	920	1160	1655	105	140	250	320	455
				LRFD	300	445	905	1280	1565	585	760	1380	1740	2480	160	210	380	480	680
				Nominal Strength	600	890	1810	2555	3130	1170	1520	2760	3475	4960	320	415	755	955	1360

1. Screws shall extend through the connection with a minimum of 3 exposed threads per AISI S200-07 General Provisions Standard Section D1.3.
2. Tabulated loads are based on calculations per AISI S100-07 using the thinner steel member in the connection. A safety factor of $\Omega = 3.0$ and resistance factor $\phi = 0.5$ were used to determine the ASD and LRFD strength values.
3. Loads are based on cold-formed steel members with a minimum yield strength, F_y, of 33 ksi and tensile strength, F_u, of 45 ksi for 43 mils (18 ga.) and thinner, and a minimum yield strength of 50 ksi and tensile strength of 65 ksi for 54 mils (16 ga.) and thicker.
4. For other pertinent information, please refer to the Important Information and General Notes on pages 12-16 of this catalog.

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Strong-Drive® FPHSD Metal Screw

SIMPSON Strong-Tie®

Common Applications:

Cold-formed steel sheet, framing or connectors to cold-formed steel.

Features:

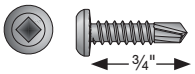
- Flat pan head
- #3 square drive (Driver bit in each box; replacement bit model BIT3S-2)
- Clear zinc finish
- Self-drilling
- This screw is also available collated for the Quik Drive® system.

Simpson Strong-Tie *Fastening Systems* catalog C-F-14 denotes this screw as FPHSD Framing-to-CFS Screw.

Codes/Standards: ASTM C1513 compliant; ICC-ES ESR-3006; City of L.A. RR 25670

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.

Clear Zinc Coating



Size	Length (in.)	Thread Per Inch	Head Diameter (in.)	Drill Point Size	Approx. Count per lb.	1 lb. Model No.	Bulk	
							Carton Quantity	Model No.
#10	¾	16	0.365	#3	165	FPHSD34B1016	5000	FPHSD34B1016-5K
#12	¾	14	0.365	#3	147	FPHSD34B1214	5000	FPHSD34B1214-5K

Cold-Formed Steel Member Connection Loads

Model No.	Size	Nominal Dia. (in.)	Load Description	Shear (lbs.)						Pull-Over (lbs.)						Pull-Out (lbs.)					
				Steel Thickness: mil (ga.)						Steel Thickness: mil (ga.)						Steel Thickness: mil (ga.)					
				27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
FPHSD34S1016	#10-16 x ¾"	0.190	ASD Load	175	235	380	570	570	570	280	365	485	695	740	740	78	105	156	240	340	505
			LRFD Load	280	375	605	855	855	855	445	585	775	1110	1110	1110	126	168	250	380	545	805
			Nominal Strength	395	535	860	1305	1305	1305	685	895	1190	1705	2215	2215	205	260	385	585	840	1235
FPHSD34S1214	#12-14 x ¾"	0.216	ASD Load	205	260	410	610	610	610	240	330	430	630	840	1125	76	95	159	240	345	530
			LRFD Load	330	420	650	975	975	975	390	530	685	1005	1340	1690	123	151	255	385	550	855
			Nominal Strength	485	610	930	1385	1385	1385	595	815	1050	1540	2060	2065	189	230	390	590	845	1295

1. Screws and connections have been tested per AISI Standard Test Method S904-08 and S905-08.
2. The tabulated ASD and LRFD allowable loads for cold-formed steel (CFS) members are based on the lower of the screw strength or the strength of the screw in the connected members per AISI S100-07 Section E4. Values are based on CFS members with a minimum yield strength of F_y = 33 ksi and tensile strength of F_u = 45 ksi for 43 mil (18 ga) to 27 mil (22 ga), minimum yield strength of F_y = 50 ksi and F_u = 65 ksi for 54 mil (16 ga) to 97 mil (12 ga).
3. For design purposes, steel sheet thicknesses are 0.0283" for 27 mil, 0.0346" for 33 mil, 0.0451" for 43 mil, 0.0566" for 54 mil, 0.0713" for 68 mil, and 0.1017" for 97 mil. The actual sheet thickness shall not be less than 95% of these design thicknesses as specified in AISI S100-07 Section A2.4.
4. Screw diameters per AISI S200-07 General Provision Commentary Table D1.1.
5. Minimum required screw length is the lesser of ¾" or the minimum length required for the screw to extend through the steel connection a minimum of 3 exposed threads per AISI S200-07 General Provisions Standard Section D1.3.
6. Screw head dw for #10 and #12 screws is 0.357".
7. The allowable load (ASD) values shown are not permitted to be increased for short-duration loads such as wind or earthquake loads.
8. The lower of the pull-over and pull-out allowable loads should be used for tension design.
9. The tabulated shear values are based on the thinner steel member in connection. Steel thickness for both members must be in the range of 12-22 gauge.

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Strong-Drive® FPHSD Metal Screw

FPHSD (#10) Screw – (Sheet Steel Sheathing to CFS)
Nominal Shear Strength (R_n) for Wind (W) and Seismic (S) for Shear Walls[1] (lbs./ft.)

Assembly Description	Max. Aspect Ratio (h/w)	Fastener Spacing at Panel Edges[2] (in.)				Designation Thickness[5] of Stud, Track and Blocking[7] (mils)
		6	4	3	2	
0.018" sheet steel, one side	2:1	485 (W) 390 (S)	—	—	—	33 (min.)
0.027" sheet steel, one side	4:1	—	1000	1085	1170	43 (min.)
	2:1[3]	647	710	778	845	33 (min.)
0.018" sheet steel, both sides	2:1	970 (W) 780 (S)	—	—	—	33 (min.)
0.027" sheet steel, both sides	4:1	—	2000	2170	2340	43 (min.)
	2:1[3]	1294	1420	1556	1690	33 (min.)

1. Nominal strength shall be multiplied by the resistance factor (ϕ = 0.6, LRFD Seismic, ϕ = 0.65, LRFD Wind) to determine design strength or divided by the safety factor (Ω = 2.5, ASD Seismic, Ω = 2.0, ASD Wind) to determine allowable strength.
2. Screws in the field of the panel shall be installed 12" (305 mm) on center (o.c.).
3. Shear wall height to width aspect ratio (h/w) greater than 2:1, but not exceeding 4:1, shall be permitted provided the nominal strength values are multiplied by 2w/h.
4. Wall studs and track shall be of ASTM A1003 Stuctural Grade 33 (Grade 230) Type H steel for members with a designation thickness of 33 and 43 mils.
5. In lieu of blocking, panel edges shall be permitted to be overlapped and attached to each other with screw spacing as required for panel edges. Where such a connection is used, tabulated design values shall be reduced 30%.
6. Maximum stud spacing 24" o.c.
7. Blocking, if applicable, shall be a minimum 33 mil 1½" width.
8. Table based on Table C2.1-1 AISI Standard *"North American Standard for Cold-Form Steel Framing-Lateral Design 2007 Edition with Supplement No. 1 and Commentary"*.

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Self-Drilling X Metal Screw

SIMPSON Strong-Tie®

Common Applications:

1. Steel decking or other cold-formed steel framing or connectors to structural steel, up to ⅜" thick.
2. Side-lap (stitching) for steel decking.
3. Cold-formed steel framing or connectors to cold-formed steel.

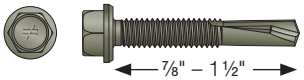
Features:

- 5⁄16" hex head
- Drill point
- Hex washer head
- This screw is also available collated fort the Quik Drive® system.

Codes/Standards: ICC-ES ESR-3006, City of LA RR 25670 and RR25917, ASTM C1513 compliant, FM Approval #3045651 and #3050714, SDI DDM03, Appendix VII; IAPMO UES ER-326

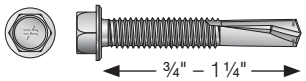
WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.

Quik Guard® Coating



Shank Size	Length (in.)	Threads per Inch	Drill Point Size	Suitable Material Thickness (in.)	Finish	Carton Quantity	Model No.	Application(s)
10	1	16	#3	0.110 – 0.175	Quik Guard	4000	XQ1B1016-4K	2, 3
12	1	14	#3	0.110 – 0.210	Quik Guard	3500	XQ1B1214-3.5K	2, 3
12	⅞	24	#4	0.110 – 0.250	Quik Guard	3000	XQ78B1224-3K	1, 3
12	1¼	24	#5	0.125 – 0.500	Quik Guard	2500	XQ114B1224-2.5K	1, 3
12	1½	24	#5	0.125 – 0.500	Quik Guard	2000	XQ112B1224-2K	1, 3

Clear-Zinc Coating



Shank Size	Length (in.)	Threads per Inch	Drill Point Size	Suitable Material Thickness[1] (in.)	Finish	Carton Quantity	Model No.	Application(s)
10	¾	16	#1	0.030 – 0.110	Clear Zinc	5000	XU34B1016-5K	2, 3
10	¾	16	#3	0.110 – 0.175	Clear Zinc	5000	X34B1016-5K	2, 3
10	1	16	#3	0.110 – 0.175	Clear Zinc	4000	X1B1016-4K	2, 3
12	1	14	#3	0.110 – 0.210	Clear Zinc	3500	X1B1214-3.5K	2, 3
12	1¼	24	#5	0.125 – 0.500	Clear Zinc	2500	X114B1224-2.5K	1, 3

1. Suitable material thickness includes all material layers and gaps between layers.

Screw Strength

Model	Size	Model Numbers	Nominal Diameter (in.)	Washer Diameter (in.)	Nominal	
					Shear (lbs.)	Tension (lbs.)
					P_{ss}	P_{ts}
Self-Drilling X Metal Screw	#12 x 1¼"	XQ114S1224, XQ114B1224-2.5K, X114S1224	0.216	0.415	3110	4985
Self-Drilling X Metal Screw	#12 x 1½"	XQ112S1224, XQ112B1224-2K	0.216	0.415		
Self-Drilling X Metal Screw	#12 x ⅞"	XQ78S1224, XQ78B1224-3K	0.216	0.415		
Self-Drilling X Metal Screw	#10 x ¾"	X34B1016-5K	0.190	0.415	1625	—
Self-Drilling X Metal Screw	#10 x 1"	X1S1016, XQ1S1016, X1B1016-4K, XQ1B1016-4K	0.190	0.415	1625	—
Self-Drilling X Metal Screw (undersized drillpoint)	#10 x ¾"	XU34B1016-5K	0.190	0.475	1735	—

1. P_{ss} and P_{ts} are nominal shear strength and nominal tension strength for the screw itself, respectively, and are the average (ultimate) value of all tests determined by independent laboratory testing.
2. The ASD and LRFD loads for tension are calculated using a safety factor $\Omega = 3.0$ and the resistance factor $\phi = 0.5$ respectively.

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Self-Drilling X Metal Screw

SIMPSON Strong-Tie®

Cold-Formed Steel Connection Loads

Model No.	Size	Nominal Dia. (in.)[8]	Load Description	Shear (lbs.)								Pull-Over (lbs.)						Pull-Out (lbs.)								
				Steel Thickness: mil (ga.)								Steel Thickness: mil (ga.)						Steel Thickness: mil (ga.)								
				27	33	43	54	68	97	1/8"[12]	1/4"[12]	27	33	43	54	68	97	27	33	43	54	68	97	3/16"	1/4"	1/2"[12]
				(22)	(20)	(18)	(16)	(14)	(12)			(22)	(20)	(18)	(16)	(14)	(12)	(22)	(20)	(18)	(16)	(14)	(12)			
XQ1S1016 X1S1016	#10-16x1"	0.190	ASD	194	240	360	540	540	540	—	—	330	400	475	645	925	975	71	87	129	200	270	445	—	—	—
			LRFD	310	385	570	810	810	810	—	—	525	640	755	1035	1475	1465	114	139	205	320	430	715	—	—	—
			Nominal Strength	440	550	815	1290	1290	1290	—	—	805	990	1160	1585	2260	2695	174	215	315	490	660	1095	—	—	—
XQ1S1214 X1S1214	#12-14x1"	0.216	ASD	176	235	385	595	840	840	—	—	295	375	525	785	1045	1210	74	96	147	215	325	500	—	—	—
			LRFD	280	375	610	950	1265	1265	—	—	470	600	835	1255	1675	1930	117	154	235	340	520	795	—	—	—
			Nominal Strength	400	535	870	1350	2135	2135	—	—	720	920	1285	1925	2565	2965	180	235	360	520	800	1220	—	—	—
XQ78S1224	#12-24x7/8"	0.216	ASD	140	230	350	640	740	935	935	935	265	290	400	720	790	1390	78	80	115	200	260	460	730	1375	1420
			LRFD	210	365	560	1025	1175	1355	1355	1355	395	440	640	1155	1260	2160	117	125	185	320	415	735	1170	2135	2160
XQ114S1224	#12-24x1 1/4"		Nominal Strength	420	550	920	1455	1675	2675	2675	2675	795	875	985	1770	1930	3400	235	205	280	505	640	1130	1990	3370	4260
XQ112S1224	#12-24x1 1/2"																									

1. Screws and screw connections have been tested per AISI Standard Test Method S904-08 and S905-08 with the exception of 22-gauge values which are based on calculations of the AISI S100-07 Section E4.
2. The tabulated ASD and LRFD allowable loads for cold-formed steel (CFS) members are based on the lower of the screw strength or the strength of the screw in the connected members per AISI S100-07.
3. The safety factor Ω and resistance factor ϕ used to determine the ASD and LRFD strength are based on AISI S100-2007 Section F.
4. The nominal strength values listed are achieved under laboratory conditions and should not be used for design loads.
5. Values are based on CFS members with a minimum yield strength of F_y = 33 ksi and tensile strength of F_u = 45 ksi for 43 mil (18 ga) to 27 mil (22 ga), minimum yield strength of F_y = 50 ksi and F_u = 65 ksi for 54 mil (16 ga) to 97 mil (12 ga), and a minimum yield strength of F_y = 36 ksi and F_u = 58 ksi for 1/8" and thicker.
6. For design purposes, steel sheet thicknesses are 0.0283" for 27 mil, 0.0346" for 33 mil, 0.0451" for 43 mil, 0.0566" for 54 mil, 0.0713" for 68 mil, and 0.1017" for 97 mil. The actual sheet thickness shall not be less than 95% of these design thickness as specified in AISI S100-7 Section A2.4.
7. Screw diameters per AISI S200-07 General Provisions Commentary Table D1-1.
8. Minimum required screw length is the lesser of ¾" or the minimum length required for the screw to extend through the steel connection a minimum of 3 exposed threads per 2004 AISI General Provisions Standard Section D1.3.
9. Screw head or washer diameter, dw for #10 and #12 screws is 0.398".
10. The allowable load (ASD) values showing are not permitted to be increased for short duration loads such as wind or earthquake loads.
11. The lower of the pull-over and pull-out allowable loads should be used for tension design.
12. Not applicable for XQ78S1224.
13. The tabulated shear values are based on the thinner steel member in connection. Steel thickness for both members must be in the range of 1/2" - 22 gauge.
14. The XQ-S1224 screws are recommended for 16-gauge and thicker steel.

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Strong-Drive® XL Large-Head Metal Screw

The Only Screw Solution with Equal Loads and Spacing to P.A.T. Pins

Strong-Drive® XL Large-Head Metal Screws have been engineered as a 1-for-1 screw replacement option for pins in steel decking. This means you can keep the same spacing and easily substitute screws for pins. These screws are available in bulk and collated for the Quik Drive® system.

Simpson Strong-Tie provides a full offering of FM, SDI, IAPMO-UES, and ICC-ES listed fasteners for your next steel decking job.

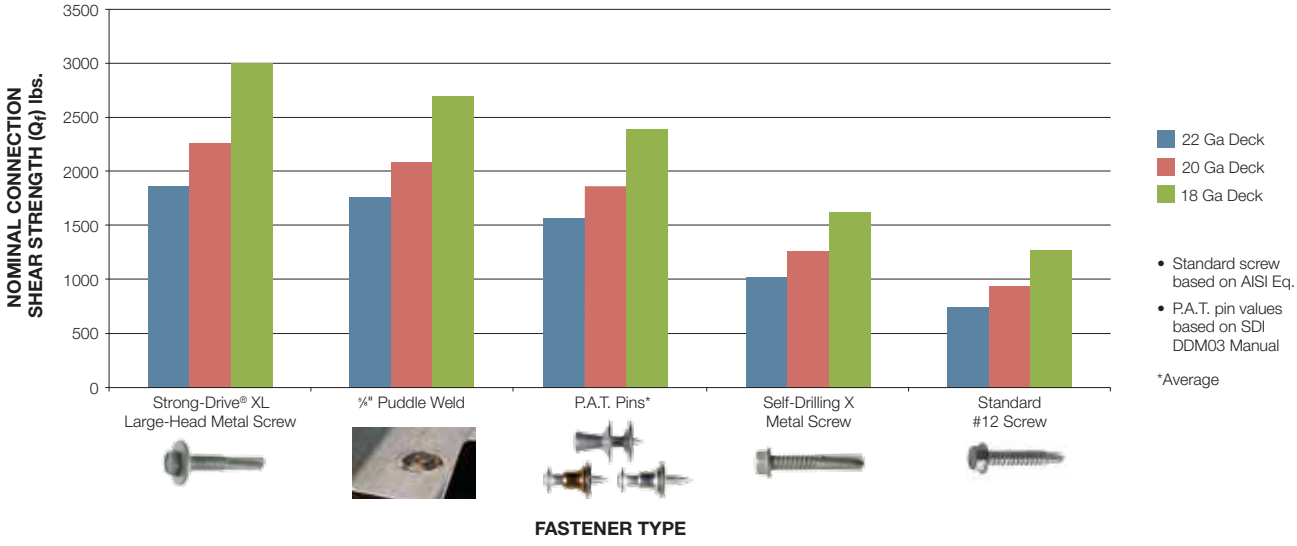
DDM03 APPENDIX VII

IAPMO UES ER-326

FM APPROVAL #3050714, #3045651

ICC-ES ESR-3006

Strength in Numbers



- Standard screw based on AISI Eq.
- P.A.T. pin values based on SDI DDM03 Manual

*Average

Steel Deck Diaphragm Calculator

Steel Deck Design Made Easier

Generate diaphragm shear tables for various roof and floor decks attached using Simpson Strong-Tie® fasteners. Create shear strength tables in Nominal, ASD or LRFD for various deck spans. The tables are calculated based on Steel Deck Institute (SDI) Diaphragm Design Manual, Third Edition (DDM03). The factors of safety are based on Table D5 of AISI S100, North American Specification for the Design of Cold-formed Steel Structural Members.

- Requires minimal input to generate the tables
- Generate tables for any Simpson Strong-Tie® support or side-lap fastener combination
- Create custom tables for roof or floor deck with any support fastener pattern chosen
- Accounts for wind uplift demand
- Choose the first deck span in the table; total of 10 deck spans are shown in increments of 6 in. from the minimum span chosen.
- Produce custom tables for floor decks with any typical fill type
- Generate tables in Nominal, LRFD Wind, or LRFD EQ or ASD EQ, ASD Wind

strongtie.com/diaphragmcalc

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Strong-Drive® XL Large-Head Metal Screw

SIMPSON Strong-Tie®

Common Applications:

Steel decking or other cold-formed steel framing or connectors to structural steel supports up to ⅜" in thickness where high shear and pullover values are needed.

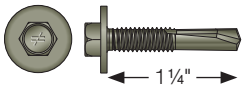
NEW

Features:

- 5⁄16" hex drive (driver part #BITHEXLB516)
- #5 drill point
- Quik Guard® coating
- ⅝" diameter hex washer head
- Available collated. See **www.strongtie.com/steeldeck**.

Codes/Standards: IAPMO UES ER-326, FM Approval #3050714, Patent Pending

Quik Guard® Coating



Size	Length (in.)	Hex Head Size (in.)	Washer (in.)	Threads Per Inch	Drill Point Size	Suitable Material Thickness (in.)*	Carton Qty.	Model No.
#12	1¼	5⁄16	0.625	24	#5	0.125 - 0.500	2000	XLQ114B1224-2K

*Maximum material thickness includes all material layers and gaps between layers

Cold-Formed Steel Connection Loads

Model No.	Size	Nominal Dia. (in.)	Washer Dia. (in.)	Load Description	Shear (lbs.)						Pull-Over (lbs.)						Pull-Out (lbs.)
					Steel Thickness mil (ga.)						Steel Thickness mil (ga.)						Support Thickness (in.)
					27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	3⁄16"
XLQ114T1224, XLQ114B1224-2K	#12- 24 x 1¼"	0.216	0.625	ASD	605	725	1015	1035	1035	1035	525	690	990	1220	1220	1220	575
				LRFD	970	1160	1555	1555	1555	1555	840	1100	1585	1950	1950	1950	860
				Nominal Strength	1400	1670	2340	3110	3110	3110	1295	1705	2430	2995	2995	2995	1720

1. Screws and screw connections have been tested per AISI Standard Test Method S904-08 and S905-08.
2. The tabulated ASD and LRFD allowable loads for cold-formed steel (CFS) members are based on the lower of the screw strength or the strength of the screw in connected members per AISI S100.
3. The safety factor Ω and resistance factor ϕ used to determine the ASD and LRFD strengths are based on AISI S100, Section F.
4. The nominal strength values listed are achieved under laboratory conditions and should not be used for design loads.
5. Values are based on CFS members with a minimum yield strength of F_y = 33 ksi and tensile strength of F_u = 45 ksi for 43 mil (18 ga) to 27 mil (22 ga), minimum yield strength of F_y = 50 ksi and F_u = 65 ksi for 54 mil (16 ga) to 97 mil (12 ga) and a support member of 3⁄16" thickness with a minimum yield strength of F_y = 36 ksi and tensile strength of F_u = 50 ksi.
6. For design purposes, steel sheet thickness are 0.0283" for 27 mil, 0.0346" for 33 mil, 0.0451" for 43 mil, 0.0566" for 54 mil, 0.0713" for 68 mil, and 0.1017" for 97 mil. The actual sheet thickness shall not be less than 95% of these design thicknesses as specified in AISI S100-07 Section A2.4.
7. Screw diameters are per AISI S200-07 General Provisions Commentary Table D1-1.
8. Minimum required screw length is the lesser of ¾" or the minimum length required for the screw to extend through the steel connection a minimum of 3 exposed threads per 2004 AISI General Provisions Standard Section D1.3.
9. The tabulated values are based on a minimum support thickness of 3⁄16".

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CBSDQ Sheathing-to-CFS Screw

SIMPSON Strong-Tie®

Common Applications:

Sheathing to cold-formed steel. (Recommended thicknesses: 16 and 18 ga.)

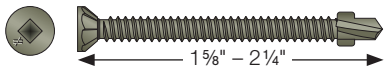
Features:

- Ribbed flat head with nibs for easy countersinking
- #2 undersized square drive (driver bit in each box; replacement bit model BIT2SU)
- #2 drill point with wings
- Quik Guard® coating
- Curved collation

Codes/Standards: ASTM C1513 compliant, #8 screws meet minimum head diameter requirement per AISI S213-07, Lateral Design Standard; City of L.A. RR 25670

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.

Quik Guard® Coating



Length (in.)	Shank Size	Threads Per Inch	Drill Point Size	Carton Quantity	Min. Head Dia. (in.)	Model No.	PRO 200S	PRO 250	PRO 300S
1⅝	#8	18	#2	1500	0.322	CBSDQ158S	✓	✓	✓
2¼	#10	16	#2	1000	0.322	CBSDQ214S		✓	✓

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated woods. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 17-20 for additional important information before selecting a fastener for a specific application.

CBSDQ/PPSD Screws[10] – Nominal Shear Strength (R_n) for Wind and Other In-Plane Loads for Shear Walls[1,4,6] (lbs./ft.)

Assemble Description	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges (in.)			
		6	4	3	2
15/32" structural 1 sheathing (4-ply), one side	2:1	1065[3]	—	—	—
7/16" rated sheathing (OSB), one side	2:1	910[3]	1410	1735	1910
7/16" rated sheathing (OSB), one side oriented perpendicular to framing	2:1	1020	—	—	—
7/16" rated sheathing (OSB), one side	2:1[5]	—	1025	1425	1825

1. Nominal strength shall be multiplied by the resistance factor (ϕ = 0.65) to determine the design strength or divided by the safety factor (Ω = 2.0) to determine the allowable strength.
2. Screws in the field of the panel shall be installed 12" (305 mm) on center (o.c.).
3. Where fully blocked gypsum board is applied to the opposite side of this assembly, per Table C2.1-2 AISI S-213 Lateral Standard, with screw spacing at 7" (178 mm) o.c. edge and 7" (178 mm) o.c. field, these nominal strengths are permitted to be increased by 30%.
4. For walls with material of the same type and nominal strength applied to opposite faces of the same wall, the available strength of material of same capacity is cumulative. Where the material nominal strengths are not equal, the available strength shall be either two times the available strength of the material with the smaller value or shall be taken as the value of the stronger side, whichever is greater. Summing the available strengths of dissimilar material applied to opposite faces or to the same wall line is not allowed.
5. Shear wall height to width aspect ratio (h/w) greater than 2:1, but not exceeding 4:1, shall be permitted provided the nominal shear strength is multiplied by 2w/h.
6. For wood structural panel sheathed shear walls, tabulated Rn values shall be applicable for short-term load duration (wind loads). For other in-plane lateral loads of normal or permanent load duration as defined by the AWC NDS, the values in the table above for wood structural panel sheathed shear walls shall be multiplied by 0.63 (normal) or 0.56 (permanent).
7. Maximum stud spacing 24" o.c.
8. All sheathing edges shall be attached to framing or 1½" width 33 mil blocking.
9. Table based on Table C2.1-1 AISI S-213 Lateral Standard.
10. #8 screws – CBSDQ and PPSD.
11. Stud, track and blocking (if applicable) shall be a minimum of 33 mils.

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CBSDQ Sheathing-to-CFS Screw

CBSDQ/PPSD Screws[11] – Nominal Shear Strength (R_n) for Seismic and Other In-Plane Loads for Shear Walls[1,4,7] (lbs./ft.)

Assemble Description	Maximum Aspect Ratio (h/w)	Fastener Spacing at Panel Edges[2] (in.)				Designation Thickness[5,6] of Stud, track and Blocking (mils)	Required Sheathing Screw Size
		6	4	3	2		
15⁄32" structural 1 sheathing (4-ply), one side	2:1[3]	780	990	—	—	33 or 43	8
	2:1	890	1330	1775	2190	43 or 54	8
						68	10
7⁄16" rated sheathing (OSB), one side	2:1[3]	700	915	—	—	33	8
	2:1[3]	825	1235	1545	2060	43 or 54	8
	2:1	940	1410	1760	2350	54	8
	2:1	1232	1848	2310	3080	68	10

1. Nominal strength shall be multiplied by the resistance factor ($\phi = 0.60$) to determine the design strength or divided by the safety factor ($\Omega = 2.5$) to determine the allowable strength.
2. Screws in the field of the panel shall be installed 12" (305 mm) on center (o.c.).
3. Shear wall height to width aspect ratio (h/w) greater than 2:1, but not exceeding 4:1, shall be permitted provided the nominal shear strength is multiplied by 2w/h.
4. For walls with material of the same type and nominal strength applied to opposite faces of the same wall, the available strength of material of same capacity is cumulative. Where the material nominal strengths are not equal, the available strength shall be either two times the available strength of the material with the smaller value or shall be taken as the value of the stronger side, whichever is greater. Summing the available strengths of dissimilar material applied to opposite faces or to the same wall line is not allowed.
5. Substitution of a stud or track of a different designation thickness is not permitted.
6. Wall studs and track shall be of ASTM A1003 Structural Grade 33 (Grade 230) Type H steel for members with a designation thickness of 33 and 43 mils, and A1003 Structural Grade 50 (Grade 340) Type H steel for members with a designation thickness equal to greater than 54 mils.
7. For wood structural panel sheathed shear walls, tabulated Rn values shall be applicable for short-term load duration (seismic loads). For other in-plane lateral loads of normal or permanent load duration as defined by the AF&PA NDS, the values in the table above for wood structural panel sheathed shear walls shall be multiplied by 0.63 (normal) or 0.56 (permanent).
8. Maximum stud spacing 24" o.c.
9. All sheathing edges shall be attached to framing or 1½" width 33 mil blocking.
10. Table based on Table C2.1-3 AISI S-213 Lateral Standard.
11. #8 screws – CBSDQ and PPSD.

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Strong-Drive® PPSD Sheathing-to-CFS Screw

SIMPSON Strong-Tie®

Common Application:

- Subfloor/sheathing to cold-formed steel. (#8 – maximum thickness: 54 mils/16 ga.; #10 and #12 – maximum thickness: 97 mils/12 ga.)
- Shearwall applications (see load tables on pages 74 and 75)

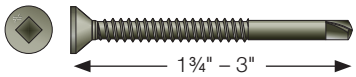
Features:

- Flat head with nibs for easier countersinking
- #3 square drive (replacement bit BIT3SU-2 for Quik Guard® and BIT3S-2 for yellow-zinc coating)
- Fine threads
- Pilot point
- Head diameter meets AISI S-213 Lateral Standard
- This screw is also available collated for the Quik Drive® system.

Codes/Standards: ASTM C1513 compliant; ICC-ES ESR-3006; City of L.A. RR 25670

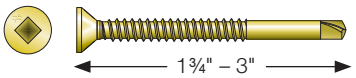
WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.

Quik Guard® Coating



Shank Size	Length (in.)	Head Diameter (in.)	Drill Point Size	Threads Per Inch	Carton Quantity	Model No.
#8	1 15/16	0.323	#2	18	4000	PPSDQ11516B-4K
#10	1¾	0.333	#3	16	4000	PPSDQ134B1016-4K
#12	1¾	0.333	#3	16	4000	PPSDQ134B1214-4K*
#10	3	0.333	#3	16	2000	PPSDQ3B1016-2K
#12	3	0.333	#3	16	2000	PPSDQ3B1214-2K*

Yellow Zinc Coating



Shank Size	Length (in.)	Head Diameter (in.)	Drill Point Size	Threads Per Inch	Carton Quantity	Model No.
#8	1 15/16	0.323	#2	18	4000	PPSD11516B-4K
#10	1¾	0.333	#3	16	4000	PPSD134B1016-4K
#12	1¾	0.333	#3	16	4000	PPSD134B1214-4K*
#10	3	0.333	#3	16	2000	PPSD3B1016-2K
#12	3	0.333	#3	16	2000	PPSD3B1214-2K*

* Has underhead nibs

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Strong-Drive® PPSD Sheathing-to-CFS Screw

PPSD – Pull-Out Loads – Steel Connections

Model No.	Screw Size	Load Description	Pull-out Loads (lbs.)					
			Steel Thickness: mil (ga.)					
			27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
PPSD11516S0818 PPSDQ11516S0818	#8	ASD	63	87	119	183	—	—
		LRFD	100	139	190	295	—	—
		Nominal Strength	154	215	290	450	—	—
PPSD134S1016 PPSDQ134S1016	#10	ASD	80	128	194	315	425	480
		LRFD	128	205	310	500	680	765
		Nominal Strength	225	325	480	765	1045	1205
PPSD3S1016 PPSDQ3S1016	#10	ASD	80	128	194	315	425	480
		LRFD	128	205	310	500	680	765
		Nominal Strength	225	325	480	765	1045	1205

1. Screws and connections have been tested per AISI Standard Methods S904-08 and S905-08.
2. Values are based on cold-formed steel (CFS) members with a minimum yield strength, F_y of 33 ksi and minimum tensile strength, F_u of 45 ksi for 43 mil (18 ga) to 27 mil (22 ga), and a minimum yield strength, F_y of 50 ksi and minimum tensile strength, F_u of 65 ksi for 54 mils (16 ga) to 97 mils (12 ga).
3. For design purposes, steel sheet thicknesses are 0.0283" for 27 mil (22 ga), 0.0346" for 33 mil (20 ga), 0.0451" for 43 mil (18 ga), 0.0566" for 54 mil (16 ga), 0.0713" for 68 mil (14 ga) and 0.1017" for 97 mil (12 ga). The actual sheet thickness shall not be less than 95% of these design thicknesses as specified in AISI S100, Section A2.4.
4. A minimum of three exposed screw threads is required to achieve the loads in the Table.

PPSD – Pull-Through Loads – Rated Sheathing Panels

Model No.	Screw Size	Load Description	Reference Pull-Through Loads (lbs.)					
			Minimum Nominal Panel Thickness (in.)					
			Plywood			OSB		
			15/32	19/32	23/32	15/32	19/32	23/32
PPSD11516S0818 PPSDQ11516S0818	#8	ASD	83	84	116	49	109	117
		LRFD	179	181	250	106	235	255
		Nominal Strength	415	420	580	245	545	585
PPSD134S1016 PPSDQ134S1016	#10	ASD	75	85	118	52	111	114
		LRFD	162	184	255	112	240	245
		Nominal Strength	375	425	590	260	555	570
PPSD3S1016 PPSDQ3S1016	#10	ASD	75	85	118	52	111	114
		LRFD	162	184	255	112	240	245
		Nominal Strength	375	425	590	260	555	570

1. The tabulated values are based on testing per AC233.
2. ASD pull-through loads based on a factor of safety of 5 applied to the nominal strength value (C_D = 1.0, increases to C_D = 1.6 allowed where applicable).
3. LRFD load based on adjustment of ASD load per NDS 2012, Appendix N using K_f = 3.32, ϕ = 0.65, and λ =1.0.

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PCSD Metal Screw

SIMPSON Strong-Tie®

Common Applications:

Cold-formed steel framing or connectors to cold-formed steel.

Features:

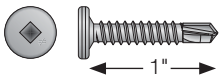
- Pancake head
- #2 square drive (replacement bit BIT2SU-2 for Quik Guard®; BIT2S-2 for Type 410 stainless steel and clear-zinc coating)
- Type 410 stainless steel is coated for additional corrosion protection
- This screw is also available collated for the Quik Drive® system.

Simpson Strong-Tie *Fastening Systems* catalog C-F-14 denotes this screw as PCSD Standing-Seam Roofing Panel Clip Screw.

Codes/Standards: ASTM C1513 compliant

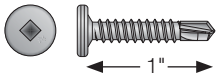
WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry, interior and noncorrosive environments only.

Type 410 Stainless Steel



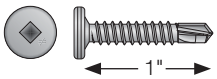
Size	Length (in.)	Thread Per Inch	Drill Point Size	Head Diameter (in.)	Carton Quantity	Model No.
#10	1	16	#3	0.405	5000	SSPCSD1B1016-5K

Quik Guard® Coating



Size	Length (in.)	Thread Per Inch	Drill Point Size	Head Diameter (in.)	Carton Quantity	Model No.
#10	1	16	#3	0.405	5000	PCSDQ1B1016-5K
#12	1	14	#3	0.405	4000	PCSDQ1B1214-4K

Clear Zinc Coating



Size	Length (in.)	Thread Per Inch	Drill Point Size	Head Diameter (in.)	Carton Quantity	Model No.
#10	1	16	#3	0.405	5000	PCSD1B1016-5K
#12	1	14	#3	0.405	4000	PCSD1B1214-4K

Cold-Formed Steel (CFS) Member Connection Loads

Model	Model No.	Size	Nominal Dia.[7] (in.)	Load Description	Shear (lbs.)						Pull-Over (lbs.)						Pull-Out (lbs.)						
					Steel Thickness: mil (ga.)[6]						Steel Thickness: mil (ga.)[6]						Steel Thickness: mil (ga.)[6]						
					27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)	22 (24)	27 (22)	33 (20)	43 (18)	54 (16)	68 (14)	97 (12)
PCSD	PCSD1S1016	#10-16x1"	0.190	ASD[2]	168	250	385	570	570	570	172	255	430	—	—	—	67	68	95	138	255	310	—
				Nominal Load[4]	420	570	875	1475	1645	1690	420	735	1220				171	166	235	340	630	760	
PCSD	PCSD1S1214	#12-14x1"	0.216	ASD[2]	156	295	420	585	585	585	210	320	505	—	—	—	66	66	88	129	255	320	—
				Nominal Load[4]	400	695	955	1640	1890	2290	520	780	1245				170	162	240	315	625	785	

1. Screws and screw connections have been tested per AISI Standard Test Method S904-08 and S905-08.
2. The tabulated ASD loads for cold-formed steel (CFS) members are based on the lower of the screw strength or the strength of the screw in the connected members per AISI S100-07 Section E4.
3. The safety factor is based on AISI S100-07 Chapter F for tested connections.
4. The nominal load values listed are achieved under laboratory conditions and should not be used for design loads.
5. Values are based on CFS members with a minimum yield strength of F_y = 33 ksi and tensile strength of F_u = 45 ksi for 43 mil (18 ga) to 27 mil (22 ga), minimum yield strength of F_y = 50 ksi and tensile strength of F_u = 65 ksi for 22 mil (24 ga), and a minimum yield strength of F_y = 50 ksi and F_u = 65 ksi for 54 mil (16 ga) and thicker.
6. For design purposes, steel sheet thicknesses are 0.0227" for 22 mil, 0.0283" for 27 mil, 0.0346" for 33 mil, 0.0451" for 43 mil, 0.0566" for 54 mil, 0.0713" for 68 mil, and 0.1017" for 97 mil. The actual sheet thickness shall not be less than 95% of these design thickness as specified in AISI S100-07 Section A2.4.
7. Screw diameters per AISI S200-07 General Provision Commentary Table D1.1.
8. Minimum required screw length is the lesser of ¾" or the minimum length required for the screw to extend through the steel connection a minimum of 3 exposed threads per AISI S200-07 General Provisions Standard Section D1.3.
9. Larger of screw head or washer diameter, d_w, for #10 and #12 screws is 0.375".
10. The allowable load (ASD) values shown are not permitted to be increased for short-duration loads such as wind or earthquake loads.
11. The lower of the Pull-Over and Pull-Out allowable loads should be used for tension design.
12. The tabulated shear values are based on the thinner steel member in connection. Steel thickness for both members must be in the range of 12-22 gauge.

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DWFSD Drywall-to-CFS Screw

Common Applications:

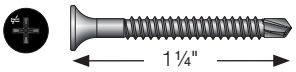
Drywall to cold-formed steel. (Recommended max. steel thicknesses: 54 and 43 mils/16 and 18 ga.)

Features:

- Bugle head
- #2 Phillips (driver bit in each box; replacement bit model BIT2P)
- Fine threads
- Curved collation

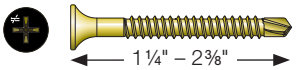
Codes/Standards: ASTM C954 compliant; City of L.A. RR 25670

Mechanically Galvanized – Class 55



Length (in.)	Shank Size	Threads Per Inch	Drill Point Size	Box Quantity	Model No.
1¼	#6	20	#2	2500	DWFSDG114PS

Yellow-Zinc Coating



Length (in.)	Shank Size	Threads Per Inch	Drill Point Size	Box Quantity	Model No.
1¼	#6	20	#2	2500	DWFSD114PS
1⅝	#6	20	#2	2500	DWFSD158PS
1⅞	#6	20	#2	2000	DWFSD178PS
2⅜	#8	20	#2	1500	DWFSD238PS

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated woods. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 17-20 for additional important information before selecting a fastener for a specific application.

DWF Drywall-to-CFS Screw

Common Applications:

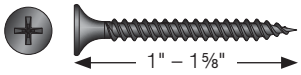
Drywall to cold-formed steel. (Recommended thicknesses: 33, 27 and 18 mils; 20, 22 and 25 ga.)

Features:

- Bugle head
- #2 Phillips (driver bit in each box; replacement bit model BIT2P)
- Fine threads
- Sharp point
- Gray-phosphate coating
- Curved collation

Codes/Standards: ASTM C1002-04 Type S compliant; City of L.A. RR 25670

Gray-Phosphate Coating



Length (in.)	Shank Size	Carton Quantity	Model No.
1	#6	2500	DWF1PS
1¼	#6	2500	DWF114PS
1⅝	#6	2500	DWF158PS

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Quik Drive® Systems

SIMPSON Strong-Tie®

Quik Drive® Systems

PROLDH Underlayment/Backerboard System

Applications: Cement board and fiber-cement board underlayment/ backerboard to wood or steel

PRO200 Drywall System

Applications: Drywall to wood or steel

PRO250 Subfloor System

Applications: Subfloor to wood or steel

PROPP150 Metal Roofing System

Applications: Panel clips for standing-seam roofing, steel decking to structural steel members, panel flanges for snap-and-seam metal roofing

BSD200 Structural Steel-Decking System

Applications: Steel decking to structural steel members and stitching of steel panels at the edges (“side lap” stitching)

PROSD150 Steel-Decking Attachment

Applications: Steel decking to structural steel members

PROPH Cold-Formed Steel Framing Attachment

Applications: Fasten cold-formed steel framing

PROHX516 Steel-to-Steel Fastening Attachment

Applications: Cold-formed steel framing, steel decking to structural steel members

PRO200S Multi-Purpose Attachment

Applications: Subfloor to wood or steel, wall plates, stair treads, sheathing, fiber cement siding to steel, gypsum panel to wood or steel

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ANCHORMATE® Anchor Bolt Holders

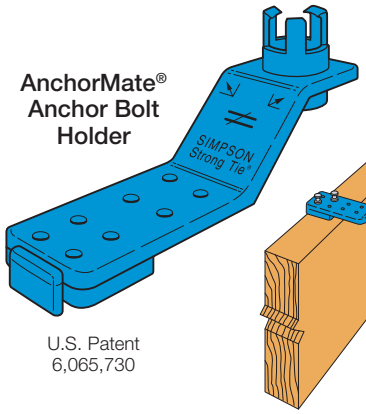
These reusable anchor bolt holders are designed to hold the anchor in place before the concrete pour, as required in some jurisdictions. The gripping section secures the bolt in place without a nut for quicker set up and tear down. It also protects the threads from wet concrete and simplifies trowel finishing.

- Built-in 2x4 and 2x6 stops eliminate measuring.
- Color-coded for easy size identification.
- Use the ⅝" and ⅞" AnchorMate to secure the SSTB® to the formboard before the concrete pour. Alignment arrows (left or right) match the SSTB bolt head arrow.

Material: Nylon

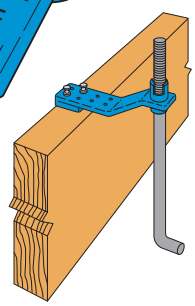
Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Diameter	Color	Code Ref.
AM½	½	Yellow	180
AM⅝	⅝	Blue	
AM¾	¾	Red	
AM⅞	⅞	Green	
AM1	1	Black	

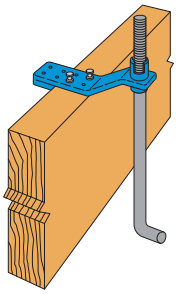


AnchorMate® Anchor Bolt Holder

U.S. Patent 6,065,730



Typical AnchorMate Installation for a 2x6 Mudsill



Typical AnchorMate Installation for a 2x4 Mudsill

ABS Anchor Bolt Stabilizer

The ABS stabilizes the anchor bolt to prevent it from being pushed against the form during the concrete pour.

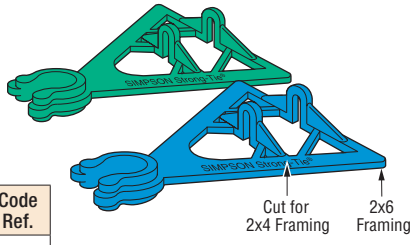
Features:

- Supports the bolt approximately 8" below the top of the concrete.
- Model ABS⅝ is for the ⅝" SSTB and ABS⅞ is for the ⅞" SSTB.
- Thin section limits the effect of a cold joint.
- Sized for 2x4 and 2x6 mudsills.

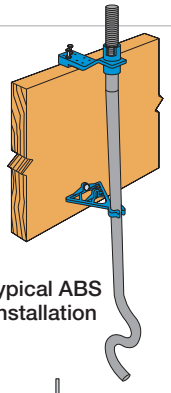
Material: Engineered Composite Plastic.

Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Dia.	Color	Code Ref.
ABS⅝	⅝	Blue	180
ABS⅞	⅞	Green	



ABS Anchor Bolt Stabilizer



Typical ABS Installation

STRAPMATE® Strap Holder

The StrapMate is designed to keep the STHD and LSTHD straps vertically aligned during the concrete pour to minimize possibility of spalling. The friction fit allows for quick and easy installation.

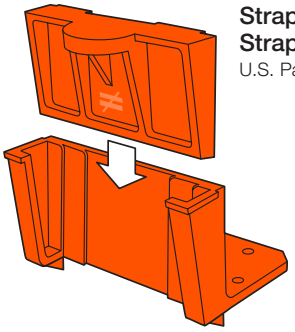
- The StrapMate is reusable.
- Works with STHD, LSTHD (see pages 118-119)

Material: Engineered Composite Plastic.

- Designed to fit ¾" plywood forms up to 1¾" LVL forms and larger.
- The strap is positioned off the front edge of the formboard.

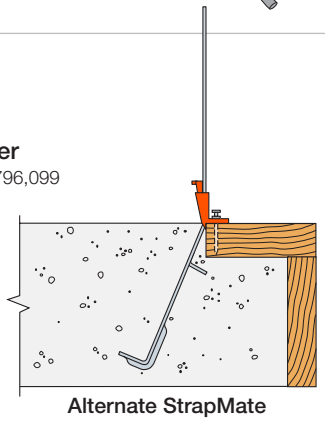
Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Nails	Code Ref.
SM1	2-8d Duplex	180



StrapMate Strap Holder

U.S. Patent 6,796,099



Alternate StrapMate Installation for Brick Ledges

ABL Anchor Bolt Locator

The ABL enables the accurate and secure placement of anchor bolts on concrete-deck forms prior to concrete placement. The structural heavy-hex nut is attached to a pre-formed steel "chair", which eliminates the need for an additional nut on the bottom of the anchor bolt. Electro-galvanized versions available for HDG anchor bolts. Order ABL-OST when using HDG anchor bolts.

Features:

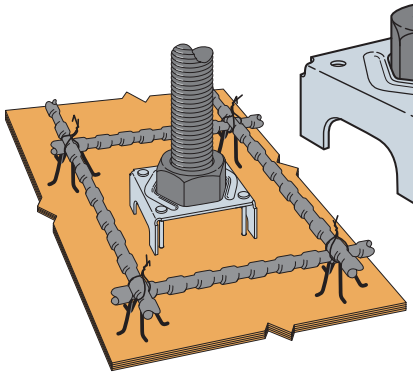
- Designed for optimum concrete flow
- Installed with nails or screws
- Meets code requirement for 1" stand off. Also available with 1½" standoff. Order ABLXX-1.5.
- PAB anchors are not designed for use with the ABL. Contact Simpson Strong-Tie for pre-assembled anchor solutions to be used with ABL.

Material: Nut—Heavy hex, Chair—Steel

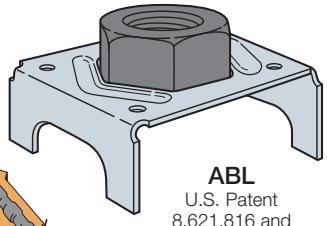
Finish: Nut—None or Electro-galvanized; Chair—G90; ABL-OST—HDG

Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Anchor Bolt Dia.	Code Ref.
ABL4-1	½"	180
ABL5-1	⅝"	
ABL6-1	¾"	
ABL7-1	⅞"	
ABL8-1	1"	
ABL9-1	1⅛"	
ABL10-1	1¼"	



Typical ABL Installation



ABL

U.S. Patent 8,621,816 and 8,381,482

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BP/LBP Bearing Plates

Bearing plates give greater bearing surface than standard cut washers, and help distribute the load at these critical connections.

The BP½-3 and BP⅝-3 are 3" x 3" bearing plates that meet the latest requirements of the IRC and IBC. These plate washers are available uncoated or with a hot-dip galvanized (HDG) coating.

The BPS and LBPS are bearing plates that offer increased flexibility. The slotted hole allows for adjustability to account for bolts that are not in the middle of the track-bottom plate.

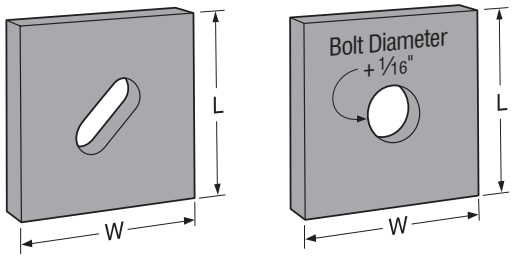
Material: See table

Finish: LBP, LBPS & BP⅝S—Galvanized; BP⅞-2 & BP⅝S—Zinc Plated; BPS, BP—None. BPs and BPSs may be ordered HDG; LBP and LBPS products may be ordered ZMAX®; contact Simpson Strong-Tie. Refer to pages 17-20 for Corrosion Information.

Installation:

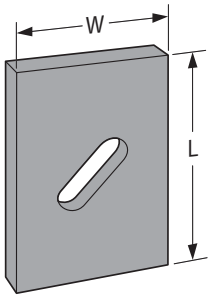
- See General Notes on pages 12-16.
- BP/BPS—For shearwall applications, position edge of plate washer within ½" of sheathed edge of track-bottom plate.

Codes: See page 11 for Code Report Reference Key Chart.

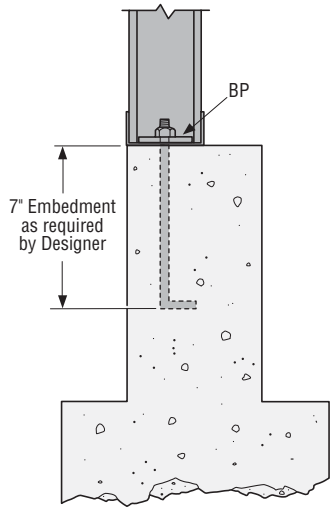


BPS *(LBPS similar)*

BP *(LBP similar)*



BPS½-6
(Other models similar)



Typical BP Installed with a Bottom Track Anchor Bolt

Bolt Dia. (in.)	Model No.	Thickness	Dimensions (in.)		Code Ref.
			W	L	
⅜	BP⅜-2	3/16	2	2	180
½	LBP½	9/64	2	2	180
½	LBPS½	9/64	3	3	180
½	BPS½-3	3ga	3	3	180
½	BPS½-6	3ga	3	4½	180
½	BP½	3/16	2	2	180
½	BP½-3	3ga	3	3	I1, F8
⅝	LBP⅝	9/64	2	2	180
⅝	LBPS⅝	9/64	3	3	180
⅝	BPS⅝-3	3ga	3	3	180
⅝	BPS⅝-6	3ga	3	4½	180
⅝	BP⅝-2	3/16	2	2	I1, F8
⅝	BP⅝	¼	2½	2½	180
⅝	BP⅝-3	3ga	3	3	I1, F8
¾	BP¾	5/16	2¾	2¾	I1, F8
¾	BP¾-3	3ga	3	3	I1, F8
¾	BPS¾-3	3ga	3	3	180
¾	BPS¾-6	3ga	3	4½	180
⅞	BP⅞-2	⅜	1 15/16	2¼	180
⅞	BP⅞	5/16	3	3	180
1	BP1	⅜	3½	3½	180

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Standard cut washer required with BPS½-3, BPS⅝-3, BPS¾-3, BPS½-6, BPS⅝-6 and BPS¾-6 (not provided) per the 2012 IRC and 2008 SPDWS.

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CNW Coupler Nuts

Simpson Strong-Tie® coupler nuts are a tested and load-rated method to join threaded rod and anchor bolts. "Witness" holes in the nut provide a means to verify when rods are properly installed. The positive stop feature helps ensure even threading into each end of the nut. CNWs meet and exceed the tensile capacity of corresponding ASTM A36 bolts and threaded rod. HSCNWs meet and exceed the tensile capacity of corresponding ASTM A449 bolts and threaded rod. Contact Simpson Strong-Tie for other coupler nut sizes.

Finish: Zinc Plated

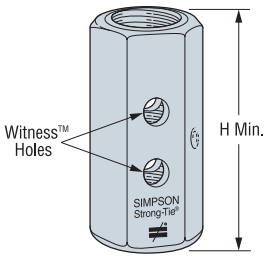
Installation:

- Tighten the two rods until each all-thread rod is visible in the witness hole.
- For non-hot-dip galvanized all-thread rod only.
- ⅝" and ⅞" diameter couplers available with oversized threads for installation to hot-dip galvanized bolts (order CNW⅝-⅝OST and CNW⅞-⅞OST). Note that only one side is oversized to accommodate HDG rods and bolts.

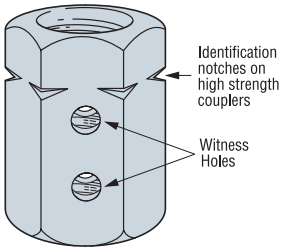
Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Rod Diameter	H Min	Allowable Tension Capacity (lbs.) (100)	Code Ref.
CNW½	0.500	1½	4265	I1, F8
CNW⅝	0.625	1⅞	6675	
CNW¾	0.750	2¼	9610	
CNW⅞	0.875	2½	13080	170
CNW1	1.000	2¾	17080	
CNW1¼	1.250	3	26690	
HSCNW¾	0.750	2¼	19880	
HSCNW1	1.000	2¾	35345	
Transition Couplers				
CNW⅝ -½	0.625 to 0.500	1½	4265	I1, F8
CNW¾ -⅝	0.750 to 0.625	1¾	6675	
CNW⅞ -⅝	0.875 to 0.625	2	6675	170
CNW1-⅞	1.000 to 0.875	2¼	13080	

1. Allowable loads shown are based on AISC 13th Edition A36 and A449 (HS) threaded rod capacities.

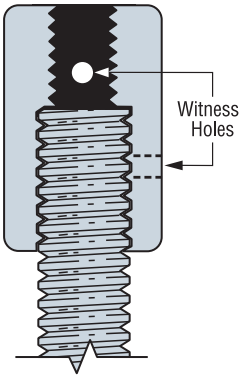


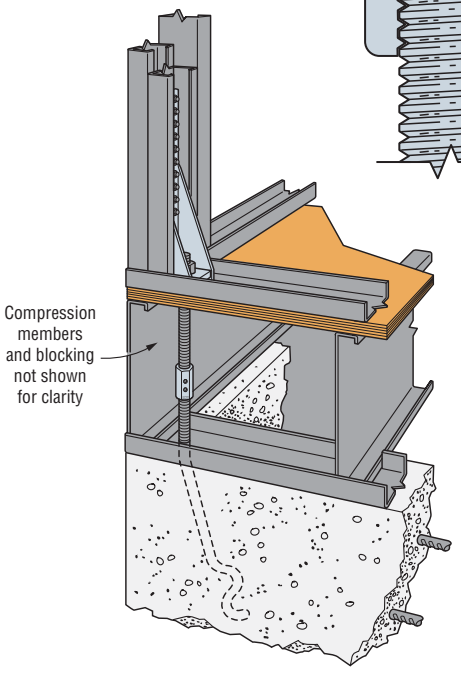
CNW
Allows fast visual check for correct all thread rod installation



HSCNW
High Strength Coupler Nut

CNW Transition Coupler Nut





Typical CNW Rim Joist Installation

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MASA/MASAP Mudsill Anchors

Mudsill anchors have always been a time-saving alternative to anchor bolts, and the MASA anchors provide even greater load-carrying capacity alternative. For ⅝" and ½" mudsill anchor bolts on bottom tracks, the MASA has load capacities that meet or exceed the parallel and perpendicular to plate shear capacity of other cast-in-place anchors. Two versions of the MASA are available – the standard MASA for installation on standard forms, and the MASAP for panelized forms.

The MASA and MASAP are code listed by ICC-ES under the 2006, 2009 and 2012 IBC® and IRC® and have been tested to meet the requirements of ICC-ES acceptance criteria AC-398 for cracked and uncracked concrete.

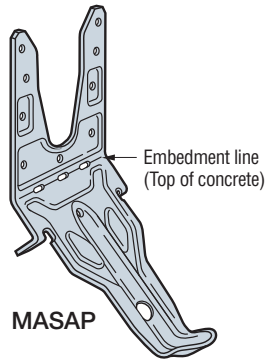
Material: 16 gauge

Finish: Galvanized, all available in ZMAX® coating. See Corrosion Information, pages 17-20.

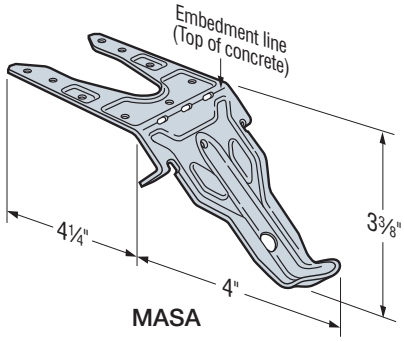
Installation:

- Use all specified fasteners. See General Notes.
- **MASA/MASAP**
  - Concrete shall have a minimum f'_C = 2500 psi.
  - Spalling—Full loads apply for spalls up to a maximum height of 1¼" and a maximum depth of ⅞". Any exposed portion of the mudsill anchor must be protected against possible corrosion.
  - Minimum MASA end distance is 4" and minimum center-to-center spacing is 8" for a full load.
  - For continuous load path, MASA should be installed on the same side of the wall as uplift connectors.

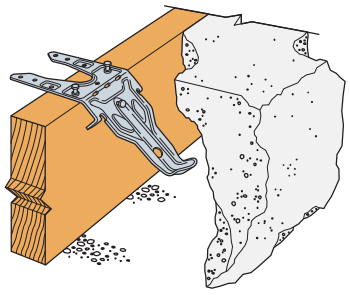
Codes: See page 11 for Code Report Reference Key Chart.



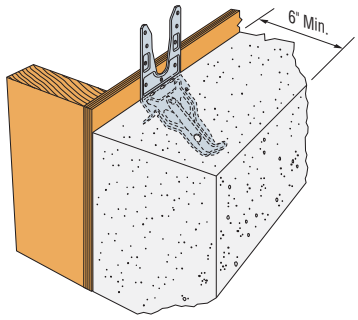
MASAP



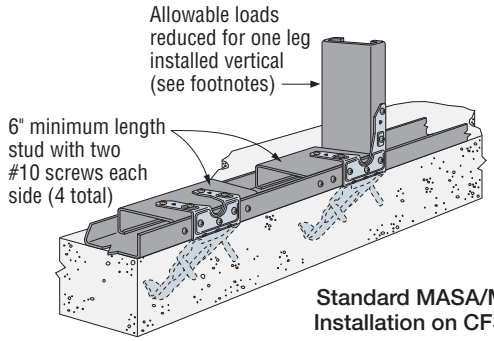
MASA



Standard MASA
Installation in Concrete



Standard MASAP
Installation in Concrete



Standard MASA/MASAP
Installation on CFS Track

Allowable Loads for MASA/MASAP Cast-in-Place Mudsill Anchor on CFS Sill

Model No.	Fasteners[8]		Allowable Loads (lbs)[1,2,3,4,5] 43 mil (18 ga.) CFS						Code Ref.
			STANDARD INSTALLATION						
			Wind & SDC A and B[6]			SDC C-F			
	Sides	Top of Track	Uplift	Parallel to Track[7]	Perpendicular to Track	Uplift	Parallel to Track[7]	Perpendicular to Track	
MASA or MASAP	3- #10	6- #10	Non Cracked						I4, L7, F2
			675	1205	895	565	1010	750	
			Cracked						
			510	1205	655	425	1010	550	

1. Allowable loads are governed by tests and may not be increased (C_D = 1.0).
2. The tabulated allowable (ASD) loads may be multiplied by 1.6 for designs for wind and in SDC A & B, and by 1.4 for designs in SDC C through F to obtain the LRFD loads.
3. Minimum concrete compression strength, f'_C is 2500 psi.
4. Allowable loads are based on a minimum stemwall width of 6".
5. For simultaneous loads in more than one direction, the connector must be evaluated using the Unity Equation.
6. Per Section 1613 of the 2009 and 2012 IBC, detached one- and two-family dwellings in SDC C may use the "Wind & SDC A&B" allowable loads.
7. Parallel to Track loads for One Leg Up Installation: SDC A-C = 1025 lbs, SDC C-F = 860 lbs.
8. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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LCB Column Base

LCB column bases use screws, which allows for fast installation, reduced reveal and high capacity, while maintaining the net section of the column.

Material: Strap—97 (12 ga) x2; Base—54 (16 ga)

Finish: LCB—galvanized.

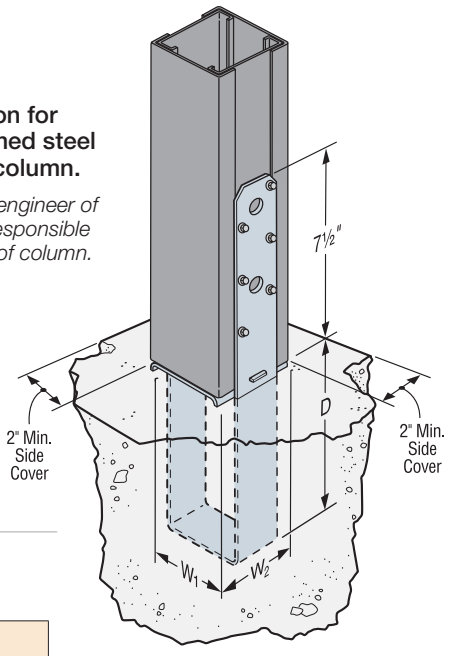
Installation:

- Use all specified fasteners. See General Notes.
- For full loads, minimum side cover required is 2" for LCB.
- Install all models with bottom of base plate flush with concrete.
- Post bases do not provide adequate resistance to prevent members from rotating about the base and therefore are not recommended for non top-supported installations (such as fences or unbraced carports).

Codes: See page 11 for Code Report Reference Key Chart.

Installation for cold-formed steel built-up column.

Note: The engineer of record is responsible for design of column.



LCB44
(LCB46 and LCB66 similar)

Allowable Loads for LCB Column Base

Model No.	Nominal Column Size	Dimensions			Column Fasteners[7]	Allowable Loads (lbs.)				Code Ref.
						Wind and SDC A & B		SDC C -F		
		W_1	W_2	D		Non-Cracked	Cracked	Non-Cracked	Cracked	
						Uplift	Uplift	Uplift	Uplift	
LCB44	3.5 x 3.5	3⅜	3½	6½	12- # 10	1170	820	985	690	170
LCB46	3.5 x 5.5	3⅜	5½	6½						
LCB66	5.5 x 5.5	5½	5½	5½						

1. Loads may not be increaed for short-term loading.
2. Concrete shall have a minimum compressive strength, f'_c = 2500 psi.
3. Multiply Seismic and Wind ASD load values by 1.4 or 1.6 respectively to obtain LRFD capacities.
4. In accordance with IBC Section 1613.1, detached one- and two- family dwellings in Seismic Design Category (SDC) C may use "Wind and SDC A&B" allowable loads.
5. Post bases do not provide adequate resistance to prevent members from rotating about the base and therefore are not recommended for non top-supported installations (such as fences or unbraced carports).
6. Designer is responsible for concrete foundation design.
7. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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Anchor Systems

Simpson Strong-Tie Anchor Systems manufactures a full array of anchoring and fastening products for concrete and masonry – including adhesives for anchoring threaded rod and rebar, mechanical anchors, powder- and gas-actuated fastening systems and accessories. These products offer unique solutions to applications in light-framed construction when used with and without Simpson Strong-Tie® connectors.

Mechanical Anchors

Anchoring Adhesives

Direct Fastening Systems

Software Tools to Help You Select the Right Products

Anchor Designer™

Adhesive Cartridge Estimator

For more information, visit **strongtie.com/software.**

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SET-XP® High-Strength Anchoring Adhesive

SET-XP® epoxy anchoring adhesive is a high-strength formula for anchoring and doweling in cracked and uncracked concrete applications and in masonry applications. It is a two-part system with the resin and hardener being simultaneously dispensed and mixed through the mixing nozzle.

Features:

- SET-XP has passed the demanding adverse-condition tests of ACI 355.4 and ICC-ES AC308 pertaining to elevated temperature and long-term sustained load
- Code-listed under the current IBC/IRC for cracked and uncracked concrete per ICC-ES ESR-2508
- Code-listed under the current IBC/IRC for masonry per IAPMO UES ER-265
- Suitable for use under static and seismic loading conditions in cracked and uncracked concrete and in masonry
- Cure times: 24 hours at 70°F, 72 hours at 50°F
- Easy hole-cleaning procedure – no power brushing required
- Suitable for use in holes drilled in dry or water-saturated concrete
- When properly mixed, adhesive will be a uniform teal color for easy post-installation identification
- Available in 8.5 oz., 22 oz., and 56 oz. cartridges for application versatility
- Made in the USA

Applications:

- Threaded rod anchoring and rebar doweling into concrete and masonry
- Suitable for horizontal, vertical and overhead applications
- Multiple DOT listings, refer to **www.strongtie.com/DOT** for current approvals

Codes/Standards: ICC-ES ESR-2508 (concrete); IAPMO UES ER-265 (masonry); City of L.A. RR 25744 (concrete); City of L.A. RR 25965 (masonry); Florida FL15730 (concrete), FL 16230 (masonry); ASTM C 881 (Type I and IV, Grade 3, Class C); NSF/ANSI Standard 61 (216 in^2/1000 gal).

Shelf Life: 24 months from date of manufacture in unopened side-by-side cartridge.

Storage Conditions: For best results, store between 45°F and 90°F. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

Suggested Specification: Anchoring adhesive shall be a two-component high-solids, epoxy-based system supplied in manufacturer's standard cartridge and dispensed through a static mixing nozzle supplied by the manufacturer. The adhesive anchor shall have been tested and qualified for performance in cracked and uncracked concrete per ICC-ES AC308. Adhesive shall be SET-XP adhesive from Simpson Strong-Tie, Pleasanton, CA. Anchors shall be installed per Simpson Strong-Tie instructions for SET-XP epoxy adhesive.

SET-XP® Adhesive

EMN22i

EDT22S

SET-XP Cartridge System

Model No.	Capacity (ounces)	Carton Quantity
SET-XP10	8.5	12
SET-XP22	22	10
SET-XP56	56	6

Cure Schedule

Base Material Temperature		Cure Time (hrs.)
°F	°C	
50	10	72
60	16	48
70	21	24
90	32	24
110	43	24

For water-saturated concrete the cure times must be doubled.

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SET-XP® High-Strength Anchoring Adhesive

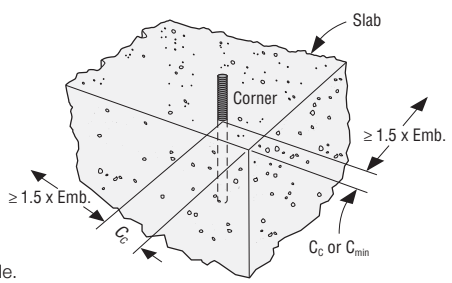
Tension Loads for Threaded Rod in Normal-Weight Concrete

Anchor Dia (in.)	Drill Bit (in.)	Emb. Depth (in.)	Tension Loads[6,13] (lbs.)										Tension Loads[10] F_u = 58 ksi Steel (lbs.)	
			Critical Edge (C_c) + Critical End (C_c)					Minimum Edge (C_{min}) + Critical End (C_c)						
			C_c	LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	C_{min}	LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	LRFD	ASD
½	⅝	4	6	2,085	2,780	1,490	1,740	1-¾	1,080	1,445	770	905	6,175	4,265
		7	8	4,745	6,175[9]	3,390	3,860	1-¾	2,325	3,105	1,660	1,940		
		10	8	6,175[9]	6,175[9]	4,410	3,860	1-¾	3,325	4,430	2,375	2,770		
⅝	¾	5	8	3,255	4,340	2,325	2,715	1-¾	1,520	2,025	1,085	1,265	9,830	6,675
		8½	8	6,040	8,055	4,315	5,035	1-¾	2,850	3,800	2,035	2,375		
		12	9	8,235	9,830[9]	5,880	6,145	1-¾	4,045	5,395	2,890	3,370		
¾	⅞	6	9	4,305	5,740	3,075	3,590	1-¾	1,965	2,615	1,405	1,635	14,530	9,615
		10½	12	8,090	10,785	5,780	6,740	1-¾	3,635	4,850	2,595	3,030		
		15	15	11,560	14,530[9]	8,255	9,080	1-¾	5,195	6,930	3,710	4,330		
⅞	1	8	10	5,080	8,465	3,630	5,290	1-¾	2,290	3,820	1,635	2,390	20,095	13,070
		12	12	7,965	13,275	5,690	8,295	1-¾	3,495	5,825	2,495	3,640		
		17½	14	11,615	19,360	8,295	12,100	1-¾	5,100	8,495	3,645	5,310		
1	1⅛	8	12	6,785	9,835	4,845	6,145	1-¾	2,930	4,250	2,095	2,655	26,360	17,075
		14	18	11,875	17,210	8,480	10,755	1-¾	5,130	7,435	3,665	4,645		
		20	23	16,965	24,585	12,120	15,365	1-¾	7,325	10,620	5,230	6,640		

Shear Loads for Threaded Rod in Normal-Weight Concrete

Anchor Dia (in.)	Drill Bit (in.)	Edge Distance (in.)	End Distance (in.)	Emb. Depth (in.)	Concrete Thickness (in.)	Spacing	Shear Loads[6] (lbs./ft.)						
							Concrete[4,13]				Cold Formed Steel (ASD)[5]		
							LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)
½	⅝	1¾	5	4	6½	0' - 8"	1,650	1,650	1,180	1,030	895	1,320	2,485
						1'- 0"	1,100	1,100	785	685	595	880	1,655
						1'- 4"	825	825	590	515	445	660	1,240
						2' - 0"	550	550	395	345	300	440	830
						2' - 8"	415	415	295	255	225	330	620
						4' - 0"	275	275	195	170	150	220	415
						6' - 0"	185	185	130	115	100	145	275
⅝	¾	1¾	5	5	8½	0' - 8"	2,035	2,035	1,455	1,270	960	1,490	2,995
						1'- 0"	1,355	1,355	970	845	640	995	2,000
						1'- 4"	1,015	1,015	725	635	480	745	1,500
						2' - 0"	680	680	485	425	320	495	1,000
						2' - 8"	510	510	365	315	240	375	750
						4' - 0"	340	340	245	210	160	250	500
						6' - 0"	225	225	160	140	105	165	335
¾	⅞	1¾	5	6	10	0' - 8"	2,190	2,190	1,565	1,370	965	1,600	3,320
						1'- 0"	1,460	1,460	1,045	915	640	1,065	2,215
						1'- 4"	1,095	1,095	780	685	480	800	1,660
						2' - 0"	730	730	520	455	320	535	1,110
						2' - 8"	550	550	395	345	240	400	830
						4' - 0"	365	365	260	230	160	265	555
						6' - 0"	245	245	175	155	105	180	370

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by dividing Load Resistance Factor Design (LRFD) capacities by 0.6 for seismic and 0.7 for wind.
3. Load values based on the following: minimum concrete strength of 2,500 psi, dry hole, maximum short-term temperature of 150°F, maximum long-term temperature of 110°F, and continuous special inspection. Reference ICC-ES ESR-2508 for further information.
4. Shear load is applied parallel to the edge of concrete. Anchor is considered as an individual anchor without influence from other anchors.
5. Cold-Formed Steel (CFS) shear values are based on AISI-S100, Eq. E3.3.1-1, m_f = 0.75, Ω = 2.5. Reference General Notes for CFS properties. To convert from ASD to LRFD, multiply value by 1.5.
6. Governing shear load is the lesser of concrete and CFS. Governing tension load is the lesser of concrete and steel.
7. For conditons not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **www.strongtie.com**.
8. Third- and fourth-edge distances must be ≥ 1.5 x Embedment Depth.
9. Failure mode governed by ductile steel rod (F1554 Grade 36).
10. LRFD steel strength based on ACI 318 Appendix D. ASD steel strength based on AISC Steel Construction Manual, 13th Edition, F_u = 58 ksi.
11. Wind design includes SDC A & B.
12. Minimum concrete thickness must be ≥ embedment depth + 5 x anchor diameter.
13. Designer shall consider the design requirements of ACI 318-11 Sections D.3.3.4.3 and D.3.3.5.3, where applicable.



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AT-XP® High-Strength, Fast-Cure, All-Weather Anchoring Adhesive

AT-XP® has been formulated for high-strength anchorage of threaded rod and rebar into concrete and masonry under a wide range of conditions. AT-XP dispenses easily in cold or warm environments with little to no odor, and when mixed properly is a dark teal color for easy post-installation identification.

Features:

- AT-XP has passed the demanding adverse-condition tests of ACI 355.4 and ICC-ES AC308 pertaining to reduced temperature, elevated temperature and long-term sustained load
- Code-listed under the current IBC/IRC for cracked and uncracked concrete per IAPMO UES ER-263
- Code-listed under the current IBC/IRC for masonry per IAPMO UES ER-281
- Suitable for use under static and seismic loading conditions in cracked and uncracked concrete and in masonry
- Cure times: 24 hours at 14°F, 1 hour at 68°F
- Easy hole-cleaning procedure – no power brushing required
- Suitable for use in holes drilled in dry or water-saturated concrete
- When properly mixed, adhesive will be a uniform dark teal color for easy post-installation identification
- Available in 9.4 oz., 12.5 oz., and 30 oz. cartridges for application versatility
- Made in the USA

Applications:

- Threaded rod anchoring and rebar doweling into concrete and masonry
- Suitable for horizontal, vertical and overhead applications

Codes/Standards: IAPMO UES ER-263 (concrete); IAPMO UES ER-281 (masonry); City of Los Angeles RR 25960 (concrete); City of Los Angeles RR 25966 (masonry) ; Florida FL 16230; NSF/ANSI Standard 61 (43. 2 in^2/1000 gal)

Shelf Life: 12 months from date of manufacture in unopened container.

Storage Conditions: For best results, store between 32°F and 80°F. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

Suggested Specification: Anchoring adhesive shall be a two-component high-solids, epoxy-based system supplied in manufacturer's standard cartridge and dispensed through a static mixing nozzle supplied by the manufacturer. The adhesive anchor shall have been tested and qualified for performance in cracked and uncracked concrete per ICC-ES AC308. Adhesive shall be AT-XP adhesive from Simpson Strong-Tie, Pleasanton, CA. Anchors shall be installed per Simpson Strong-Tie instructions for AT-XP adhesive.

Cracked Concrete CODE LISTED

AT-XP® Adhesive
1 mixing nozzle included

AMN19Q

ADT813S

AT-XP Cartridge Systems

Model No.	Capacity (ounces)	Carton Quantity
AT-XP10	9.4	12
AT-XP13	12.5	10
AT-XP30	30	5

Cure Schedule

Base Material Temperature		Cure Time (hrs.)
°F	°C	
14	-10	24
32	0	8
50	10	3
68	20	1
86	30	30 min.
100	38	20 min.

For water-saturated concrete, the cure times must be doubled.

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AT-XP® High-Strength, Fast-Cure, All-Weather Anchoring Adhesive

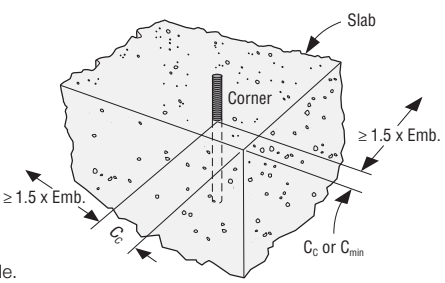
Tension Loads For Threaded Rod In Normal-Weight Concrete

Anchor Dia. (in.)	Drill Bit (in.)	Emb. Depth (in.)	Tension Loads[6,13] (lbs.)										Tension Loads[10] F_u = 58 ksi Steel (lbs.)	
			Critical Edge (C_c) + Critical End (C_c)					Minimum Edge (C_{min}) + Critical End (C_c)						
			C_c	LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	C_{min}	LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	LRFD	ASD
½	⅝	4	6	2,680	4,210	1,915	2,630	1¾	1,365	2,140	975	1,340	6,175	4,265
		7	8	4,715	6,175[9]	3,370[9]	3,860	1¾	2,395	3,760	1,710	2,350		
		10	8	6,175[9]	6,175[9]	4,410	3,860	1¾	3,425	5,370	2,445	3,355		
⅝	¾	5	8	3,790	5,940	2,705	3,715	1¾	1,780	2,790	1,270	1,745	9,830	6,675
		8½	8	6,040	8,055	4,315	5,035	1¾	3,185	4,695	2,275	2,935		
		12	9	8,235	9,830[9]	5,880	6,145	1¾	4,495	6,890	3,210	4,305		
¾	⅞	6	9	4,900	7,685	3,500	4,805	1¾	2,245	3,525	1,605	2,205	14,530	9,615
		10½	12	9,740	13,545	6,955	8,465	1¾	4,355	6,745	3,110	4,215		
		15	15	13,915	14,530[9]	9,940	9,080	1¾	6,220	9,755	4,445	6,095		
⅞	1	8	10	4,550	9,980	3,250	6,240	1¾	2,130	4,810	1,520	3,005	20,095	13,070
		12	12	7,735	14,355	5,525	8,970	1¾	3,350	7,565	2,395	4,730		
		17½	14	11,275	20,095[9]	8,055	12,560	1¾	4,885	11,035	3,490	6,895		
1	1⅛	8	12	6,705	10,515	4,790	6,570	1¾	2,870	4,505	2,050	2,815	26,360	17,075
		14	18	12,335	19,350	8,810	12,095	1¾	5,235	8,215	3,740	5,135		
		20	23	17,625	26,360[9]	12,590	16,475	1¾	7,480	11,735	5,345	7,335		

Shear Loads For Threaded Rod in Normal-Weight Concrete

Anchor Dia (in.)	Drill Bit (in.)	Edge Distance (in.)	End Distance (in.)	Emb. Depth (in.)	Concrete Thickness (in.)	Spacing	Shear Loads[6] (lbs./ft.)						
							Concrete[4,13]				Cold Formed Steel (ASD)[5]		
							LRFD[1] (Seismic)	LRFD[11] (Wind)	ASD[1,2] (Seismic)	ASD[2,11] (Wind)	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)
½	⅝	1¾	5	4	6½	0' - 8"	1,650	1,650	1,180	1,030	895	1,320	2,485
						1'- 0"	1,100	1,100	785	685	595	880	1,655
						1'- 4"	825	825	590	515	445	660	1,240
						2' - 0"	550	550	395	345	300	440	830
						2' - 8"	415	415	295	255	225	330	620
						4' - 0"	275	275	195	170	150	220	415
						6' - 0"	185	185	130	115	100	145	275
⅝	¾	1¾	5	5	8½	0' - 8"	2,035	2,035	1,455	1,270	960	1,490	2,995
						1'- 0"	1,355	1,355	970	845	640	995	2,000
						1'- 4"	1,015	1,015	725	635	480	745	1,500
						2' - 0"	680	680	485	425	320	495	1,000
						2' - 8"	510	510	365	315	240	375	750
						4' - 0"	340	340	245	210	160	250	500
						6' - 0"	225	225	160	140	105	165	335
¾	⅞	1¾	5	6	10	0' - 8"	2,190	2,190	1,565	1,370	965	1,600	3,320
						1'- 0"	1,460	1,460	1,045	915	640	1,065	2,215
						1'- 4"	1,095	1,095	780	685	480	800	1,660
						2' - 0"	730	730	520	455	320	535	1,110
						2' - 8"	550	550	395	345	240	400	830
						4' - 0"	365	365	260	230	160	265	555
						6' - 0"	245	245	175	155	105	180	370

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by dividing Load Resistance Factor Design (LRFD) capacities by 0.6 for seismic and 0.7 for wind.
3. Load values based on the following: minimum concrete strength of 2,500 psi, dry hole, maximum short-term temperature of 150°F, maximum long-term temperature of 110°F, and continuous special inspection. Reference ICC-ES ESR-2508 for further information.
4. Shear load is applied parallel to the edge of concrete. Anchor is considered as an individual anchor without influence from other anchors.
5. Cold-Formed Steel (CFS) shear values are based on AISI S-100, Eq. E3.3.1-1, mf = 0.75, Ω = 2.5. Reference General Notes for CFS properties. To convert from ASD to LRFD, multiply value by 1.5.
6. Governing shear load is the lesser of concrete and CFS. Governing tension load is the lesser of concrete and steel.
7. For conditons not covered by this table, use the Simpson Strong-Tie Anchor Designer™ software available at **www.strongtie.com**.
8. Third- and fourth-edge distances must be ≥ 1.5 x Embedment Depth.
9. Failure mode governed by ductile steel rod (A307 Grade C).
10. LRFD steel strength based on ACI 318 Appendix D. ASD steel strength based on AISC Steel Construction Manual, 13th Edition, Fu = 58 ksi.
11. Wind design includes SDC A & B.
12. Minimum concrete thickness must be ≥ embedment depth + 5 x anchor diameter.
13. Designer shall consider the design requirements of ACI 318-11 Sections D.3.3.4.3 and D.3.3.5.3, where applicable.



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Titen HD® Screw Anchor

The Titen HD® anchor is a patented, high-strength screw anchor for concrete and masonry. It is designed for optimum performance in both cracked and uncracked concrete, a requirement that the 2012 IBC places on post-installed anchors. The self-undercutting, non-expansion characteristics of the Titen HD anchor make it ideal for structural applications, even at reduced edge distances and spacings. Recommended for permanent dry, interior, non-corrosive environments or temporary outdoor applications.

Features:

- Qualified for static and seismic loading conditions in cracked and uncracked concrete
- Suitable for horizontal, vertical and overhead applications
- Installs with low installation torque for maximum efficiency
- Code-listed under IBC/IRC in accordance with ICC-ES AC193 for cracked and uncracked concrete per ICC-ES ESR-2713
- Code-listed under IBC/IRC in accordance with ICC-ES AC106 for masonry per ICC-ES ESR-1056

Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity. Use a Titen HD screw anchor one time only. Installing the anchor multiple times may result in excessive thread wear and reduced load capacity.

- Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus ½" minimum to allow the thread tapping dust to settle, and blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.
- Insert the anchor through the fixture and into the hole.
- Tighten the anchor into the base material until the hex washer head contacts the fixture.
- If the anchor will not install completely, remove the anchor and ensure that all dust has been evacuated or drill the hole deeper. Begin re-installation of the anchor by hand to prevent cross-threading.
- Do not use impact wrenches to install into hollow CMU.

Codes/Standards: ICC-ES ESR-2713 (concrete); ICC-ES ESR-1056 (masonry); City of Los Angeles RR 25741 (concrete), RR 25560 (masonry); Florida FL 15730; FM 3017082, 3035761 and 3043442

Material: Carbon steel, heat treated

Finish: Zinc-plated or mechanically galvanized

Suggested Specifications: Screw anchors shall have 360-degree contact with the base material and shall not require oversized holes for installation. Fasteners shall be manufactured from carbon steel and are heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633 or mechanically galvanized in accordance with ASTM B695. Anchors are not to be reused after initial installation. Screw anchors shall be Titen HD anchors from Simpson Strong-Tie, Pleasanton, CA. Anchors shall be installed per the Simpson Strong-Tie instructions for the Titen HD anchor.

*Some jurisdictions require an additional square-plate washer for sill-plate applications.

Titen HD®
Screw Anchor

U.S. Patent
5,674,035 & 6,623,228

Serrated teeth on the tip of the Titen HD® screw anchor facilitate cutting and reduce installation torque.

The Titen HD® screw anchor ¾" x 6" and ¾" x 7" (models THDT75600H and THD75700H) have a 1" section under the head that is unthreaded to allow installation into tilt-up wall braces.

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Titen HD® Screw Anchor

Tension Loads Attaching Cold-Formed Steel to Normal-Weight Concrete (lbs.)[6]

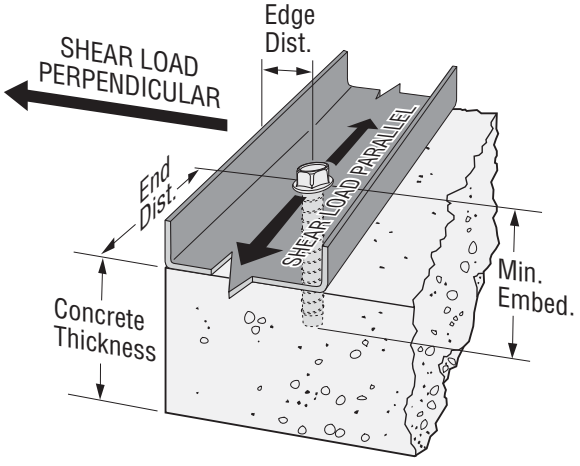
Anchor Size	Drill Bit (in.)	Edge Distance (in.)	End Distance (in.)	Min. Emb. Depth (in.)	Concrete Thickness (in.)	Spacing	Concrete[3,4] (Seismic)				Cold Formed Steel (ASD)[5]			
							LRFD[1] (Seismic)	LRFD[8] (Wind)	ASD[1,2] (Seismic)	ASD[2,8] (Wind)	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)	68 mil (14 ga)
⅜ x 3	⅜	1¾	3	2½	4	6	600	800	430	500	390	505	920	1,160
½ x 4	½	1¾	4	3¼	5	8	940	1,255	670	785	390	505	920	1,160
		3	4	3¼	5	8	1,320	1,760	945	1,100				
		4	4	3¼	5	8	1,490	1,985	1,065	1,240				

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by dividing Load Resistance Factor Design (LRFD) capacities by 0.6 for seismic and 0.7 for wind.
3. Shear load is applied parallel to the edge of concrete. Anchor is considered as an individual anchor without influence from other anchors
4. Concrete shall have a minimum f'_c of 2,500 psi. Reference ICC-ES ESR-2713 for further information.
5. Cold-Formed Steel (CFS) shear values are based on AISI S-100, Eq. E3.3.1-1, $m_f = 0.75$, $\Omega = 2.5$. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5.
6. Governing load is the lesser of Concrete and CFS.
7. For conditons not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **www.strongtie.com**.
8. Wind design includes SDC A & B.

Shear Loads Perpendicular to Edge in Normal-Weight Concrete (lbs.)[6]

Anchor Size	Drill Bit (in.)	Edge Distance (in.)	End Distance (in.)	Min. Emb. Depth (in.)	Concrete Thickness (in.)	Min. Spacing (in.)	Concrete[3,4] (Seismic)				Cold Formed Steel (ASD)[5]			
							LRFD[1,9] (Seismic)	LRFD[8] (Wind)	ASD[1,2,9] (Seismic)	ASD[2,8] (Wind)	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)	68 mil (14 ga)
⅜ x 3	⅜	1¾	7	2½	4	5¼	475	475	340	295	510	685	1,240	1,565
½ x 4	½	1¾	8	3¼	5	5¼	545	545	390	340	595	880	1,655	2,085
⅜ x 3	⅜	3	7	2½	4	9	1,000	1,000	715	625	510	685	1,240	1,565
½ x 4	½	3	8	3¼	5	9	1,225	1,225	875	765	595	880	1,655	2,085

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by dividing Load Resistance Factor Design (LRFD) capacities by 0.6 for seismic and 0.7 for wind.
3. Shear load is applied parallel to the edge of concrete. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum f'_c of 2,500 psi. Reference ICC-ES ESR-2713 for further information.
5. Cold-Formed Steel (CFS) shear values are based on AISI-S100, Eq. E3.3.1-1, $m_f = 0.75$, $\Omega = 2.5$ for shear and Eq. E4.4.2-1, $d_w = 0.5"$, $\Omega = 3.0$ for tension. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5.
6. Governing load is the lesser of Concrete and CFS.
7. For conditons not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **www.strongtie.com**.
8. Wind design includes SDC A & B.



Edge and end distances for Titen HD in concrete slab corner condition

U.S. Patent 5,674,035

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Titen HD® Screw Anchor

SIMPSON Strong-Tie®

Shear Loads Parallel to Edge in Normal-Weight Concrete (lbs./ft.)[6]

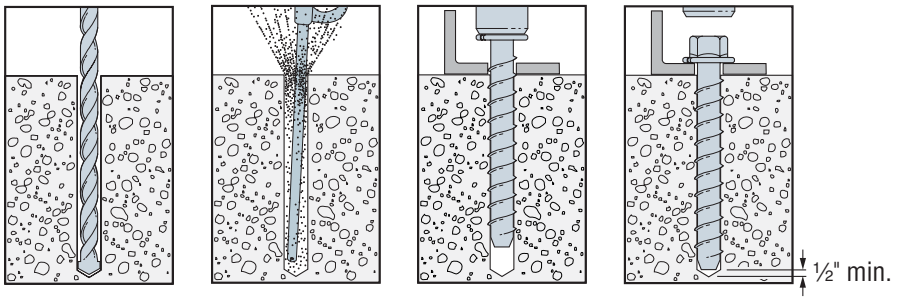
Anchor Size	Drill Bit (in.)	Edge Distance (in.)	End Distance (in.)	Min. Emb. Depth (in.)	Concrete Thickness (in.)	Spacing	Concrete[3,4] (seismic)				Cold Formed Steel (ASD)[5]			
							LRFD[1] (Seismic)	LRFD[8] (Wind)	ASD[1,2] (Seismic)	ASD[2,8] (Wind)	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)	68 mil (14 ga)
⅜ x 3	⅜	1¾	7	2½	4	0' - 8"	1,425	1,425	1,020	885	765	1,030	1,860	2,350
						1'- 0"	950	950	680	590	510	685	1,240	1,565
						1'- 4"	715	715	510	445	385	515	930	1,175
						2' - 0"	475	475	340	295	255	340	620	780
						2' - 8"	355	355	255	220	190	255	465	585
						4' - 0"	240	240	170	150	130	170	310	390
						6' - 0"	160	160	115	100	85	115	205	260
½ x 4	½	1¾	8	3¼	5	0' - 8"	1,645	1,645	1,175	1,030	895	1,320	2,485	3,130
						1'- 0"	1,095	1,095	780	685	595	880	1,655	2,085
						1'- 4"	820	820	585	515	445	660	1,240	1,565
						2' - 0"	550	550	395	345	300	440	830	1,045
						2' - 8"	410	410	295	255	220	330	620	780
						4' - 0"	275	275	195	170	150	220	415	520
						6' - 0"	185	185	130	115	100	145	275	350
⅜ x 3	⅜	3	7	2½	4	0' - 8"	1,770	1,770	1,270	1,110	765	1,030	1,860	2,350
						1'- 0"	1,180	1,180	845	740	510	685	1,240	1,565
						1'- 4"	885	885	635	555	385	515	930	1,175
						2' - 0"	590	590	425	370	255	340	620	780
						2' - 8"	445	445	315	280	190	255	465	585
						4' - 0"	295	295	210	185	130	170	310	390
						6' - 0"	195	195	140	125	85	115	205	260
½ x 4	½	3	8	3¼	5	0' - 8"	2,505	2,505	1,795	1,570	895	1,320	2,485	3,130
						1'- 0"	1,670	1,670	1,195	1,045	595	880	1,655	2,085
						1'- 4"	1,255	1,255	895	785	445	660	1,240	1,565
						2' - 0"	835	835	600	525	300	440	830	1,045
						2' - 8"	625	625	450	390	220	330	620	780
						4' - 0"	420	420	300	260	150	220	415	520
						6' - 0"	280	280	200	175	100	145	275	350

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by dividing Load Resistance Factor Design (LRFD) capacities by 0.6 for seismic and 0.7 for wind.
3. Shear load is applied parallel to the edge of concrete. Anchor is considered as an individual anchor without influence from other anchors
4. Concrete shall have a minimum f'_c of 2,500 psi. Reference ICC-ES ESR-2713 for further information.
5. Cold-Formed Steel (CFS) shear values are based on AISI-S100, Eq. E3.3.1-1, $m_f = 0.75$, $\Omega = 2.5$. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5.
6. Governing load is the lesser of Concrete and CFS.
7. For conditons not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **www.strongtie.com**.
8. Wind design includes SDC A & B.

Hole Dimensions

Titen HD Diameter (in.)	Wrench Size (in.)	Recommended Fixture Hole Size (in.)
⅜	9⁄16	½ to 9⁄16
½	¾	5⁄8 to 11⁄16
5⁄8	15⁄16	¾ to 13⁄16
¾	1 1⁄8	7⁄8 to 15⁄16

Installation Sequence



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Strong-Bolt® 2 Wedge Anchor

SIMPSON Strong-Tie®

Cracked Concrete CODE LISTED

The Strong-Bolt® 2 wedge anchor is a wedge-style expansion anchor designed to offer optimum performance in concrete and masonry. Carbon-steel anchors available in ¼" through 1" diameters; type 316 stainless steel anchors available in ¼" through ¾" diameters.

Features:

- Qualified for static and seismic loading conditions, including cracked and uncracked concrete
- Qualified for minimum concrete thickness of 3¼", including lightweight concrete-over-metal decking
- Code-listed under the current IBC/IRC in accordance with ACI 355.2 and AC193 for cracked and uncracked concrete applications per ICC-ES ESR-3037
- Code-listed under the current IBC/IRC in accordance with AC01 for masonry applications per IAPMO UES ER-240
- Tri-segmented clip with follow-up expansion should the hole-size increase as a result of a crack
- Standard (ANSI) fractional sizes: fits standard fixtures and installs with common drill bit and tool sizes

Codes: ICC-ES ESR-3037 (concrete); IAPMO UES ER-240 (carbon steel in CMU); City of Los Angeles RR25891 (concrete), RR25936 (carbon steel in CMU); Florida FL 15731; UL File Ex3605; FM 3043442 and 3047639; meets requirements of Federal Specifications A-A-1923A, Type 4

Installation: Do not use an impact wrench to set or tighten the Strong-Bolt 2 anchor.

Caution: Oversized holes in the base material will make it difficult to set the anchor and will reduce the anchor's load capacity.

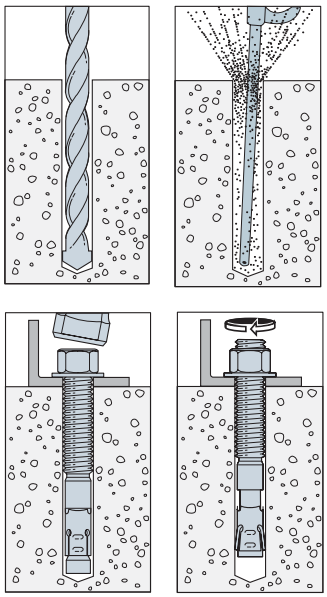
- Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified minimum hole depth and blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling.
- Assemble the anchor with nut and washer so that the top of the nut is flush with the top of the anchor. Place the anchor in the fixture and drive into the hole until washer and nut are tight against the fixture.
- Tighten to the required installation torque.

Strong-Bolt® 2 Wedge Anchor

Head Stamp

The head is stamped with the length identification letter, bracketed top and bottom by horizontal lines.

Installation Sequence



Carbon Steel Strong-Bolt® 2 Wedge Anchor Installation Information[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter – Carbon Steel							
			⅜ inch		½ inch		⅝ inch		¾ inch	
Installation Information										
Nominal Diameter	d_a[3]	in.	⅜		½		⅝		¾	
Drill Bit Diameter	d	in.	⅜		½		⅝		¾	
Baseplate Clearance Hole Diameter[2]	d_c	in.	7⁄16		9⁄16		11⁄16		⅞	
Installation Torque	T_{inst}	ft-lbf	30		60		90		150	
Nominal Embedment Depth	h_{nom}	in.	1⅞	2⅞	2¾	3⅞	3⅜	5⅛	4⅛	5¾
Effective Embedment Depth	h_{ef}	in.	1½	2½	2¼	3⅜	2¾	4½	3⅜	5
Minimum Hole Depth	h_{hole}	in.	2	3	3	4⅛	3⅝	5⅜	4⅜	6
Minimum Overall Anchor Length	ℓ_{anch}	in.	2¾	3½	3¾	5½	4½	6	5½	7
Critical Edge Distance	c_{ac}	in.	6½	6	6½	6½	7½	7½	9	9	8
Minimum Edge Distance	c_{min}	in.	6		7	4	4	6½		6½	
	for $s \geq$	in.	—		—	—	—	—		8	
Minimum Spacing	s_{min}	in.	3		7	4	4	5		7	
	for $c \geq$	in.	—		—	—	—	—		8	
Minimum Concrete Thickness	h_{min}	in.	3¼	4½	4½	5½	6	5½	7⅞	6¾	8¾
Additional Data										
Yield Strength	f_{ya}	psi	92,000		85,000				70,000	
Tensile Strength	f_{uta}[4]	psi	115,000						110,000	
Minimum Tensile and Shear Stress Area	A_{se}	in²	0.0514		0.105		0.166		0.270	
Axial Stiffness in Service Load Range – Cracked and Uncracked Concrete	β	lb./in	34,820		63,570		91,370		118,840	

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D.
2. The clearance must comply with applicable code requirements for the connected element.
3. For the 2006 IBC, d_o replaces d_a.
4. For the 2003 IBC, f_{ut} replaces f_{uta}.
5. See **www.strongtie.com** for additional information and options for ¼" and 1" diameter and stainless steel.

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Titen HD® Mini Screw Anchor

Sharing the same features as the larger Titen HD® screw anchor, the Titen HD® Mini anchor provides an easy solution for jobs that call for smaller anchors. The self-undercutting, non-expansion characteristics are ideal for situations where minimum edge distance and reduced spacing are a concern. The patented cutting teeth and thread design enable the Titen HD Mini anchor to be installed quickly and with less effort than many other screw-type anchors. Since there are no secondary setting steps involved, the Titen HD Mini screw anchor can be installed much more quickly than traditional expansion anchors.

Features:

- Full-length threads undercut the concrete and effectively transfer loads into the base material
- Specialized heat-treating process creates high hardness at the tip to facilitate cutting while the body remains ductile
- Less spacing and edge distance required since the anchor does not exert expansion forces
- No special installation tools required. Holes can be drilled with rotary hammer or hammer drill with ANSI size bit. Anchors are installed with standard size sockets.
- Less installation time translates to lower installed cost
- Removable, ideal for temporary anchorage

Material: Carbon steel, heat-treated

Finish: Zinc-plated

Test Criteria: The Titen HD Mini anchor has been tested in accordance with ASTM E488 standard test methods for tension and shear.

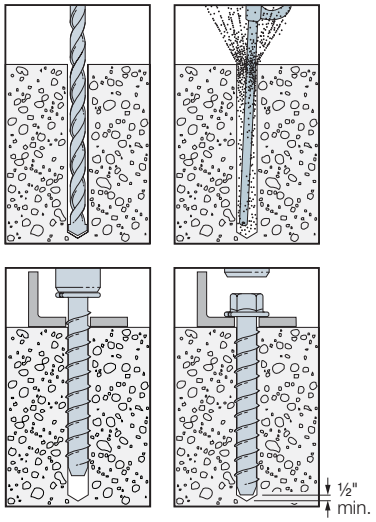
Installation:

Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with base material and will reduce the anchor's load capacity. Use a Titen HD Mini screw anchor one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

- Drill a hole using the specified diameter carbide bit into the base material to a depth of at least ½" deeper than the required embedment depth.
- Blow the hole clean of dust and debris using compressed air.
- Insert the anchor through the fixture and into the hole.
- **Important:** In normal-weight concrete, install with an applied torque of 15 ft-lbs for the ¼" Titen HD Mini and 25 ft-lbs for the ⅜" Titen HD Mini using a torque wrench, driver drill, hammer drill or cordless ¼" impact driver with a maximum permitted torque rating of 100 ft-lbs. In hollow CMU, do not use impact tools to install and use a manual applied torque of 10 ft-lbs.

U.S. Patent
5,674,035 & 6,623,228

Installation Sequence



Titen HD® Mini Anchor Product Data

Size	Model No.	Drill Bit Dia. (in.)	Wrench Size (in.)	Recommended Fixture Hole Size (in.)	Quantity	
					Box	Ctn.
¼" x 1¾"	THD25134H	¼	⅜	5⁄16 – ⅜	100	500
¼" x 2¼"	THD25214H	¼	⅜	5⁄16 – ⅜	50	250
¼" x 3"	THD25300H	¼	⅜	5⁄16 – ⅜	50	250
⅜" x 1¾"	THD37134H	⅜	9⁄16	½ – 9⁄16	50	250
⅜" x 2½"	THD37212H	⅜	9⁄16	½ – 9⁄16	50	200

Tension Loads in Normal-Weight Concrete

Size in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Min. Spacing in. (mm)	Min. Edge Dist. in. (mm)	Tension Load			
					$f'_c \geq 2000$ psi Concrete		$f'_c \geq 4000$ psi Concrete	
					Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
¼ (6.4)	¼	1 (25)	4 (102)	4 (102)	624 (2.8)	155 (0.7)	1,037 (4.6)	260 (1.2)
		1¾ (44)			1,768 (7.9)	440 (2.0)	2,255 (10.0)	565 (2.5)
⅜ (9.5)	⅜	1½ (38)	4 (102)	6 (152)	2,070 (9.2)	520 (2.3)	2,974 (13.2)	745 (3.3)

1. The allowable loads are based on a safety factor of 4.0.
2. The minimum concrete thickness is 1½ times the embedment depth.
3. Tension and Shear loads may be combined using the straight line interaction equation (n = 1).

Shear Loads in Normal-Weight Concrete

Size in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Min. Spacing in. (mm)	Min. Edge Dist. in. (mm)	Shear Load			
					$f'_c \geq 2000$ psi Concrete		$f'_c \geq 4000$ psi Concrete	
					Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
¼ (6.4)	¼	1 (25)	4 (102)	4 (102)	1,104 (4.9)	275 (1.2)	2,135 (9.5)	535 (2.4)
		1¾ (44)			2,443 (10.9)	610 (2.7)	—	610 (2.7)
⅜ (9.5)	⅜	1½ (38)	4 (102)	6 (152)	2,912 (13.0)	730 (3.2)	3,668 (16.3)	915 (4.1)

Tension and Shear Loads in 8-inch Lightweight, Medium-Weight and Normal-Weight Hollow CMU

Size in. (mm)	Drill Bit Dia. in.	Embed. Depth[4] in. (mm)	Min. Edge Dist. in. (mm)	Min. End Dist. in. (mm)	8-inch Hollow CMU Loads Based on CMU Strength			
					Tension Load		Shear Load	
					Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
Anchor Installed in Face Shell (See Figure 1)								
¼ (6.4)	¼	1½ (38)	4 (102)	4⅝ (117)	520 (2.3)	105 (0.5)	1,240 (5.5)	250 (1.1)
⅜ (9.5)	⅜	1½ (38)	4 (102)	4⅝ (117)	720 (3.2)	145 (0.6)	1,240 (5.5)	250 (1.1)

1. The tabulated allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC.
2. Values for 8-inch wide, lightweight, medium-weight, and normal-weight CMU.
3. The minimum specified compressive strength of masonry, f'_c, at 28 days is 1,500 psi.
4. Embedment depth is measured from the outside face of the concrete masonry unit and is based on the anchor being embedded an additional ¼" through the 1¼" thick face shell.
5. Allowable loads may not be increased for short-term loading due to wind or seismic forces. CMU wall design must satisfy applicable design standards and be capable of withstanding applied loads.
6. Set drill to rotation-only mode when drilling into hollow CMU.
7. Do not use impact wrenches to install in hollow CMU.

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Titen® Concrete and Masonry Screws

Titen® screws are 3⁄16" and 1⁄4" diameter masonry screws for attaching all types of components to masonry. Carbon-steel Titen screws are available in hex and phillips head designs in blue, white or silver colors. Use with appropriately sized Titen drill bits included with each box.

Codes: FL 2355.1 (Carbon-steel Titen)

Titen Screws, Carbon Steel – Shear and Tension Loads

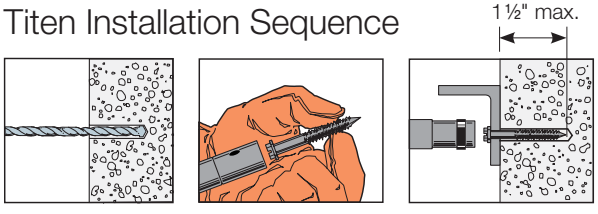
Anchor Dia. (in.)	Embed Depth (in.)	Edge Distance (in.)	Spacing	Normal-Weight Concrete[1]		CMU[1]	Cold-Formed Steel[2]	
				2,000 psi	4,000 psi		33 mil (20 ga)	43 mil (18 ga)
(ASD) Allowable Shear Load[3,4] (lbs./ft)								
3⁄16	1	1 1⁄8	0'-4"	765	—	615	795	1020
			0'-6"	510	—	410	530	680
			1'-0"	255	—	205	265	340
			1'-6"	170	—	135	175	225
			2'-0"	130	—	100	135	170
			3'-0"	85	—	70	90	115
	1 1⁄2	1 1⁄8	0'-4"	1200	—	—	795	1020
			0'-6"	800	—	—	530	680
			1'-0"	400	—	—	265	340
			1'-6"	265	—	—	175	225
			2'-0"	200	—	—	135	170
			3'-0"	135	—	—	90	115
1⁄4	1	1 1⁄2	0'-4"	675	—	750	1050	1365
			0'-6"	450	—	500	700	910
			1'-0"	225	—	250	350	455
			1'-6"	150	—	165	235	305
			2'-0"	115	—	125	175	230
			3'-0"	75	—	85	115	150
			4'-0"	55	—	60	90	115
	1 1⁄2	1 1⁄2	0'-4"	1200	—	—	1050	1365
			0'-6"	800	—	—	700	910
			1'-0"	400	—	—	350	455
			1'-6"	265	—	—	235	305
			2'-0"	200	—	—	175	230
			3'-0"	135	—	—	115	150
			4'-0"	100	—	—	90	115
(ASD) Allowable Tension Load[3,4] (lbs.)								
3⁄16	1	1 1⁄8	2 1⁄4	125	160	110	240	315
	1 1⁄2	1 1⁄8	2 1⁄4	305	460	—	240	315
1⁄4	1	1 1⁄2	3	145	180	150	290	380
	1 1⁄2	1 1⁄2	3	365	500	—	290	380

1. Allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC.
2. Cold-Formed Steel (CFS) values are based on AISI-S100, Section E4, $\Omega = 3.0$, d_W = 5⁄16" (3⁄16" Titen) and d_W = 3⁄8" (1⁄4" Titen). Reference General Notes for CFS properties.
3. Governing load is the lesser of concrete or CMU and CFS.
4. Use interaction formula for combined tension and shear $(Ps/Pt)+(Vs/Vt) \leq 1.0$.
5. Maximum anchor embedment is 1 1⁄2".

Titen Stainless-Steel Hex Head | **Titen Hex Head** | **Titen Drill Bit** | **Titen Drill Bit/ Driver**

Special hex adapter on the bit allows the Titen Installation Tool to slide over the bit and lock in, ready to drive screws.

Titen Installation Sequence



Warning: Carbon Steel: Industry studies show that hardened fasteners can experience performance problems in wet environments. Accordingly, use this product in dry, interior applications only. Stainless Steel: Acceptable for use in exterior environments. See Corrosion Information on pages 17-20.

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Crimp Drive® Multi-Purpose Anchors

The Crimp Drive® anchor is a multi-purpose expansion anchor for use in concrete and grout-filled block. The pre-formed curvature along the shaft creates an expansion mechanism that secures the anchor in place and eliminates the need for a secondary setting procedure.

Features:

- Available in carbon steel in four head styles
- Designed to handle different applications that include fastening wood or light-gauge steel, attaching concrete formwork, hanging overhead support for sprinkler pipes or suspended ceiling panels
- Curved design helps speed up anchor installation and reduce the overall cost

Warning: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, with the exception of the duplex anchor, use these products in dry, interior and non-corrosive environments only.

Finish: Zinc plated and mechanically galvanized

Codes: Factory Mutual 3031136 for the ⅜" rod coupler version

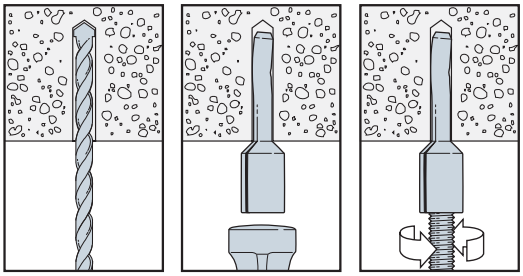
Installation:

- Drill a hole using the specified diameter carbide bit into the base material to a depth of at least ½" deeper than the required embedment.
- Blow the hole clean of dust and debris using compressed air. Overhead application need not be blown clean. Where a fixture is used, drive the anchor through the fixture into the hole until the head sits flush against the fixture.
- Be sure the anchor is driven to the required embedment depth. The rod coupler and tie-wire models should be driven in until the head is seated against the surface of the base material.

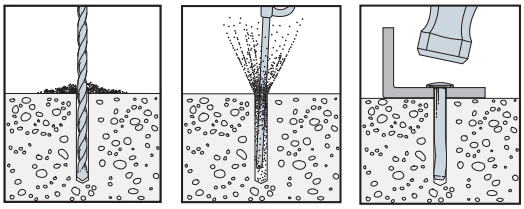
Mushroom Head | Rod Coupler | Tie-Wire | Duplex

Crimp Anchor Installation Sequence

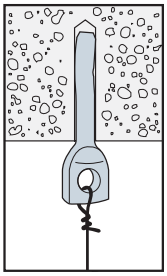
Rod Coupler



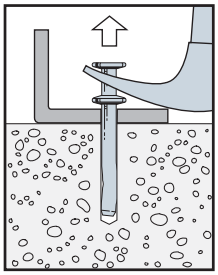
Mushroom Head



Tie-Wire



Duplex



Duplex-head anchor may be removed with a claw hammer

Crimp Anchor Product Data

Size	Model No.	Head Style/ Finish	Drill Bit Dia. (in)	Min. Fixture Hole Size	Min. Embed. (in.)	Quantity	
						Box	Carton
3⁄16" x 1 1⁄4"	CD18114M	Mushroom Head – Zinc Plated	3⁄16	1⁄4	7⁄8	100	1600
3⁄16" x 2"	CD18200M				1 1⁄4	100	500
3⁄16" x 2 1⁄2"	CD18212M				1 1⁄4	100	500
3⁄16" x 3"	CD18300M				1 1⁄4	100	500
3⁄16" x 3 1⁄2"	CD18312M				1 1⁄4	100	500
3⁄16" x 4"	CD18400M				1 1⁄4	100	500
1⁄4" x 1"	CD25100M		1⁄4	5⁄16	7⁄8	100	1600
1⁄4" x 1 1⁄4"	CD25114M				7⁄8	100	1600
1⁄4" x 1 1⁄2"	CD25112M				1 1⁄4	100	1600
1⁄4" x 2"	CD25200M				1 1⁄4	100	500
1⁄4" x 2 1⁄2"	CD25212M				1 1⁄4	100	500
1⁄4" x 3"	CD25300M				1 1⁄4	100	500
3⁄8" x 2"	CD37200M		3⁄8	7⁄16	1 3⁄4	25	125
3⁄8" x 3"	CD37300M				1 3⁄4	25	125
1⁄4" x 3"	CD25300MG	Mushroom Head – Mechanically Galvanized	1⁄4	5⁄16	1 1⁄4	100	500
1⁄4" Rod Coupler	CD25114RC	Rod Coupler – Zinc Plated	3⁄16	N/A	1 1⁄4	100	500
3⁄8" Rod Coupler	CD37112RC		1⁄4	N/A	1 1⁄2	50	250
1⁄4" Tie Wire	CD25118T	Tie Wire – Zinc Plated	1⁄4	N/A	1 1⁄8	100	500
1⁄4" Duplex	CD25234D	Duplex Head – Zinc Plated	1⁄4	5⁄16	1 1⁄4	100	500

1. Mechanical galvanizing meets ASTM B695, Class 55, Type 1. Intended for some preservative-treated wood sill plate applications. Not for use in other corrosive or outdoor environments.

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Crimp Drive® Multi-Purpose Anchors

Tension and Shear Loads in Normal-Weight Concrete

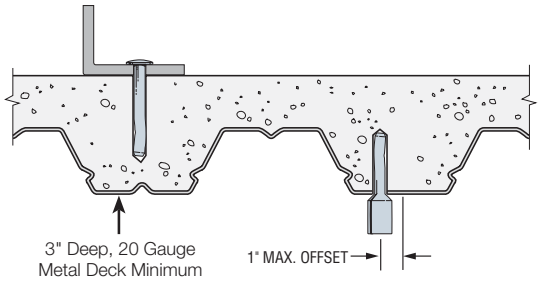
Size (in.)	Drill Bit. Diameter (in.)	Embed. Depth (in.)	Min. Spacing (in.)	Min. Edge Dist. (in.)	Tension Load		Shear Load	
					$f'_c \geq 2000$ psi Concrete	$f'_c \geq 4000$ psi Concrete	$f'_c \geq 2000$ psi Concrete	$f'_c \geq 4000$ psi Concrete
					Allowable Load (lbs.)	Allowable Load (lbs.)	Allowable Load (lbs.)	Allowable Load (lbs.)
MUSHROOM HEAD								
3/16	3/16	1 1/4	3	3	145	250	340	450
1/4	1/4	1 1/4	3	3	175	275	395	610
3/8	3/8	1 3/4	4	4	365	780	755	1305
DUPLEX HEAD								
1/4	1/4	1 1/4	3	3	175	275	395	610
TIE WIRE								
1/4	1/4	1 1/8	3	3	155	215	265	325
ROD COUPLER[4]								
1/4	3/16	1 1/4	3	3	145	250	•	•
3/8	1/4	1 1/2	4	4	265	600	•	•

1. The allowable loads listed are based on a safety factor of 4.0.
2. The minimum concrete thickness is 1 1/2 times the embedment depth.
3. Allowable loads may be linearly interpolated between concrete strengths listed.
4. For rod coupler, mechanical and plumbing design codes may prescribe lower allowable loads; verify with local codes.

Tension and Shear Loads in Sand-Lightweight Concrete Over Metal Deck

Size (in.)	Drill Bit. Diameter (in.)	Embed. Depth (in.)	Min. Spacing (in.)	Min. Edge Dist. (in.)	Tension Load (Install in Concrete)	Tension Load (Install through Metal Deck)	Shear Load (Install in Concrete)	Shear Load (Install through Metal Deck)
					$f'_c \geq 3000$ psi Concrete	$f'_c \geq 3000$ psi Concrete	$f'_c \geq 3000$ psi Concrete	$f'_c \geq 3000$ psi Concrete
					Allowable Load (lbs.)	Allowable Load (lbs.)	Allowable Load (lbs.)	Allowable Load (lbs.)
MUSHROOM HEAD								
3/16	3/16	1 1/4	4	4	115	85	345	600
1/4	1/4	1 1/4	4	4	145	130	375	890
3/8	3/8	1 3/4	5 1/2	5 1/2	315	330	1030	1085
DUPLEX HEAD								
1/4	1/4	1 1/4	4	4	145	130	375	890
TIE WIRE								
1/4	1/4	1 1/8	3	3	130	90	275	210
ROD COUPLER[6]								
1/4	3/16	1 1/4	4	4	115	85	•	•
3/8	1/4	1 1/2	5	5	300	280	•	•

1. The allowable loads listed are based on a safety factor of 4.0.
2. The minimum concrete thickness is 1 1/2 times the embedment depth.
3. Anchors may be installed off-center in the flute, up to 1" from the center of flute.
4. Anchor may be installed in either upper or lower flute.
5. Deck profile shall be 3" deep, 20-gauge minimum.
6. For rod coupler, mechanical and plumbing design codes may prescribe lower allowable loads; verify with local codes.



Sand-Lightweight Concrete Over Metal Deck

Length Identification Head Marks on Mushroom and Duplex-Head Crimp Anchors (corresponds to length of anchor – inches)

Mark	☐	A	B	C	D	E	F
From	1	1 1/2	2	2 1/2	3	3 1/2	4
Up To But Not Including	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2

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Nailon™ Pin Drive Anchors

Zinc Nailon™ anchors are low cost anchors for light-duty applications under static loads. The anchor is not designed for overhead applications and is not recommended for eccentric tension (prying) loading.

Features:

- Available with carbon and stainless-steel pins. The pin and head configuration make this anchor tamper-resistant.

Material: Body – Die cast zinc alloy; Pin – Carbon and type-304 stainless steel (Type 304)

Codes: Meets Federal Specification A-A-1925A, Type 1

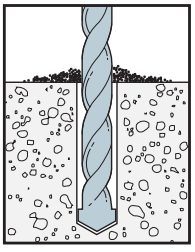
Zinc Nailon™ Anchor (Mushroom)

Zinc Nailon™ (Mushroom Head) Product Data and Tension and Shear Loads in Normal-Weight Concrete

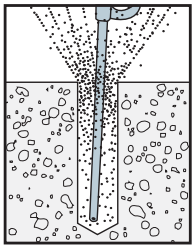
Size (in.)	Carbon Steel Pin Model No.	Stainless Steel Pin Model No.	Drill Bit Dia. (in.)	Embed. Depth (in.)	Allowable Load (lbs.) f'c ≥ 3000 psi		Quantity		
					Tension	Shear	Box	Carton	Bulk
3/16 x 7/8	ZN18078	•	3/16	3/4	165	120	100	1600	1000
1/4 x 3/4	ZN25034	ZN25034SS	1/4	5/8	165	120	100	1600	
1/4 x 1	ZN25100	ZN25100SS		7/8	225	225	100	500	
1/4 x 1 1/4	ZN25114	ZN25114SS		1	255	225	100	500	
1/4 x 1 1/2	ZN25112	ZN25112SS		1 1/4	285	225	100	500	
1/4 x 2	ZN25200	ZN25200SS		1 1/2	285	260	100	400	
1/4 x 2 1/2	ZN25212	ZN25212SS		2	310	260	100	400	
1/4 x 3	ZN25300	ZN25300SS		2 1/2	310	260	100	400	

1. The allowable loads listed are based on a safety factor of 4.0.
2. Bulk Nailon anchors come packed in a single carton of 1,000. To order add a "B" onto the end of the model number. Example: ZN25100B. Not available with stainless-steel pins.

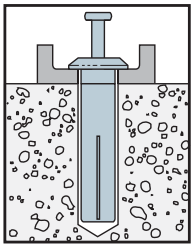
Installation Instruction and Sequence



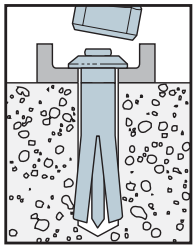
1. Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed.



2. Drill the hole to the specified embedment depth plus ⅛" for pin extension and blow it clean using compressed air. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling.



3. Position fixture, insert Nailon anchor.



4. Tap with hammer until flush with fixture; then drive pin until flush with top of head.

Caution: Oversized holes will make it difficult to set the anchor and will lower the anchor's load capacity.

Caution: Not for use in overhead applications.

Caution: These anchors are not recommended for eccentric tension (prying) loading. Capacity can be greatly reduced in such applications.

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GCN-MEP Gas-Actuated Concrete Nailer

The GCN-MEP gas-actuated concrete nailer is a portable fastener tool for attaching light-duty fixtures to concrete, steel CMU and light-weight concrete over metal deck and cold-formed steel. As a magazine tool, the GCN-MEP is great for attaching mechanical, electrical and plumbing fixtures with pre-assembled pin/accessories such as washer pins, ceiling clips, tophats and threaded studs. The pre-assembled pins for the single shot GCN-MEP tool use .300" fasteners with .125" diameter shanks for stronger fastener performance. Both the single shot and magazine tools offer portability without the need for cords or hoses, and are actuated with GFC24 fuel cells.

Features:

- Easy magazine attachment with no extra tools
- 3,300 pins per battery charge
- Pin-depth control dial
- Easy nose-piece change out (for .25" and .300" headed fasteners) with no extra tools
- High-voltage spark for cleaner fuel combustion
- Comfortable “sure grip” rubber handle
- Battery charge indicator light
- Ladder hook

Code: ICC-ES ESR-2811

GCN-MEP

Magazine sold separately (MEP-MAG1KT)

GCN-MEPKT and GCN-MEPMAGKT with magazine

Pins for the GCN-MEP (single shot configuration):

These pre-assembled fasteners have .300" diameter heads and .125" diameter shanks. This means these pins offer high service loads can be used with the GCN-MEP tool or with any common powder-actuated tool when extra-hard substrates are encountered.

GRH **GCC** **GCL** **GAC** **GCT** **GW** **GTS** **GTH**

GDP Pins

GDP concrete pins are designed to work with the GCN-MEP (with magazine-attached) gas-actuated concrete nailers as well as with most major-brand gas concrete-nailer tools. The patented 10-fastener strip is designed with break-away plastic. The pins are designed for use in A36 and A572 steel, concrete and CMU block.

Codes: ICC-ES ESR-2811; Florida FL15730; City of L.A. RR25837

GDP
U.S. Patent 605,016

GDPS Pins

The new GDPS pins are also designed to work in the GCN-MEPMAG gas-actuated nailer tools for installation into A36 and A572 structural steel. The step-shank pin, with a smaller-diameter tip, facilitates easier penetration into the steel, while the larger diameter upper shank provides more shear resistance and successful installation.

Codes: ICC-ES ESR-2811; Florida FL15730

GDPS

Spiral Knurl Gas Pins

GDPSK gas pins are designed for attaching plywood and OSB to cold-formed steel studs. The spiral knurl provides a positive lock and resists back out. Installed with the GCN-MEPMAG, the GDPSK-138 gas pin provided faster installation and setup times, which contributes to lower labor costs. The hardened pins quickly and cleanly pierce the cold-form steel and leave the pin head flush with the wood fixture. The 1⅜" length pin can be used for ½"–¾" thick plywood, and 22–14 gauge steel.

GDPSK

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GCN-MEP Gas-Actuated Concrete Nailer

GDP and GDPS Pins – Shear and Tension Loads

Model Type	Diameter (in.)	Spacing	Base Material					Attached Material		
			Normal-Weight Concrete[1]		A36 Steel[2]			Cold-Formed Steel[3]		
			2,000 psi	4,000 psi	⅛"	3⁄16"	¼"	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)
Allowable Shear Load[4] (lbs./ft.)										
GDP	0.106	0'-4"	135	225	855	675	615	445	580	1055
		0'-6"	90	150	570	450	410	295	385	700
		0'-8"	70	115	430	340	305	225	290	525
		1'-0"	45	75	285	225	205	150	195	350
		2'-0"	25	40	145	115	100	75	95	175
		3'-0"	15	25	95	75	65	50	65	115
GDPS	0.118/0.102	0'-4"	—	—	—	540	795	430	560	1015
		0'-6"	—	—	—	360	530	285	370	675
		0'-8"	—	—	—	270	400	215	280	505
		1'-0"	—	—	—	180	265	145	185	340
		2'-0"	—	—	—	90	135	70	95	170
		3'-0"	—	—	—	60	90	50	60	115
Allowable Tension Load[4] (lbs.)										
GDP	0.106	—	30	30	125	210	220	195	255	460
GDPS	0.118/0.102	—	—	—	—	95	170	190	250	405

1. For Normal-Weight Concrete the minimum edge distance and spacing is 3" and 4" respectively with ¾" minimum embedment.
2. For A36 steel, the minimum edge distance and spacing is 0.5" and 1" respectively. Entire pointed portion of the fastener must fully penetrate steel base material to obtain tabulated values.
3. Cold-formed steel (CFS) values are based on AISI-S100, Section E4. Reference General Notes for CFS properties.
4. Governing load is the lesser of the base material and CFS.

NEW GDPSK Pin – Shear and Tension Loads

Model Type	Diameter (in.)	Spacing	Base Material: Cold-Formed Steel			
			33 ksi Minimum Yield Strength		50 ksi Minimum Yield Strength	
			33 mils (20 ga)	43 mils (18 ga)	54 mils (16 ga)	68 mils (14 ga)
Allowable Shear Load[4] (lbs./ft.)						
GDPSK	0.109	0'-4"	210	267	450	654
		0'-6"	140	178	300	436
		0'-8"	105	134	225	327
		1'-0"	70	89	150	218
		2'-0"	35	45	75	109
		3'-0"	23	30	50	73
Allowable Tension Load[4] (lbs.)						
GDPSK	0.109	—	30	48	92	73

1. Entire pointed portion of the fastener must penetrate through the steel to obtain tabulated values.
2. The allowable tension and shear values are for the fastener only. Members connected to the steel must be investigated separately in accordance with accepted design criteria.
3. Fastener is to be installed in the center of the stud flange.
4. Minimum edge distance and spacing is 13⁄16" and 4", respectively.

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Powder-Actuated Fasteners

Features:

- PTP-27S: Automatic fastening: no sliding barrel, just load and shoot
- PTP-27SMAGR: Fully automatic tool with rotating fastener magazine
- Can be converted to a single shot tool

Both Tools Feature:

- Adjustable power for fastening versatility
- Operator comfort: cushioned grip, reduced recoil and sound dampening muffler for quiet operation
- No manual resetting of piston required
- Easy disassembly for cleaning and maintenance

Specifications:

- Fastener Length: PTP-27S – ½" thru 1⅝"
  PTP-27SMAGR – ½" thru 1 ¼"
- Fastener Type: .300" or 8mm diameter
- Firing Action: PTP-27S – Automatic
  PTP-27SMAGR – Fully automatic
- Load Caliber: .27 strip loads, brown through red (Levels 2–6)
- Length: 16¾" (PTP-27S), 17½" (LMAGR)
- Weight: PTP-27S – 6.25 lbs.
  PTP-27SMAGR – 8.1 lbs.

Key Fastening Applications:

PTP-27S:

- Conduit clips
- Ceiling clips
- Drywall track
- Metal decking

PTP-27SMAGR:

- Drywall track
- Hat channel
- HVAC duct straps

Tool Is Sold In A Rugged Tool Box Complete With:

- Operator's manual
- Spall suppressor
- Tools for disassembly
- Safety glasses/ear plugs
- Tool lubricant
- Cleaning brushes
- Operator's exam and caution sign
- Tool box also sold separately
- Gloves

Options:

- Extension pole tool for the PTP-27S available in 6' and 8' lengths.
  6' Tool: PET-6PKT
  8' Tool: PET-8PKT
- Single shot conversion kit (PTP-27SCON)

Simpson Strong-Tie® Powder-Actuated Fasteners are featured on pages 104-107.

PTP-27S

Adjustable power increases versatility

PTP-27SMAGR

Rotating magazine allows for installation flexibility

The patent-pending quick-disconnect baseplate makes it easy to convert the PTP-27SMAGR from a magazine to a single shot tool

Collated pins for fully automatic fastening and quick loading

Extension Pole Tool (for the PTP-27S)

Common Repair Parts – PTP-27S

Description	Model No.
Baseplate	PTP-273800
Nosepiece	PTP-273820
Piston	PTP-273320
Piston Disc	PTP-273306
Rubber Returner	PTP-273305

1. Complete tool schematics and parts list available at **www.strongtie.com**.

Common Repair Parts – PTP-27SMAGR

Description	Model No.
Magazine Body	PTP-741000
Nosepiece	PTP-740001
Nosepiece Screw	PTP-750002
Piston	PTP-842001
Piston Disc	PTP-730071CH
Rubber Returner	PTP-742101

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Powder-Actuated Fasteners

.300" Headed Fasteners with .157" Shank Diameter

Length (in.)	Model No.	Description	Pack Qty.	Carton Qty.	Compatible Tools	
					Simpson Strong-Tie	Others
½	PDPA-50	.157 x ½"	100	1,000	PTP-27L PTP-27S PT-27 PT-27HD PT-22 PT-22GS PT-22P PT-22H	721, D-60, U-2000 and most other low-velocity tools.
½ knurled	PDPA-50K	.157 x ½" knurl	100	1,000		
⅝ knurled	PDPA-62K	.157 x ⅝" knurl	100	1,000		
¾	PDPA-75	.157 x ¾"	100	1,000		
1	PDPA-100	.157 x 1"	100	1,000		
1 ¼	PDPA-125	.157 x 1 ¼"	100	1,000		
1 ½	PDPA-150	.157 x 1 ½"	100	1,000		
1 ⅞	PDPA-187	.157 x 1 ⅞"	100	1,000		
2	PDPA-200	.157 x 2"	100	1,000		
2 ½	PDPA-250	.157 x 2 ½"	100	1,000		
2 ⅞	PDPA-287	.157 x 2 ⅞"	100	1,000		

PDPA

This model available in mechanically galvanized finish (PDPA-287MG)

.300" Headed Fasteners with .157" Shank Diameter 10 Pin Collation

Length (in.)	Model No.	Description	Pack Qty.	Carton Qty.	Compatible Tools	
					Simpson Strong-Tie	Others
½	PDPAS-50	.157 x ½"	100	1,000	PTP-27L PTP-27S PT-27 PT22, PT-22GS PT-22P PT-22H	721, D-60, U-2000 and most other low-velocity tools.
½ knurled	PDPAS-50K	.157 x ½" knurl	100	1,000		
⅝ knurled	PDPAS-62K	.157 x ⅝" knurl	100	1,000		
¾	PDPAS-75	.157 x ¾"	100	1,000		
1	PDPAS-100	.157 x 1"	100	1,000		
1 ¼	PDPAS-125	.157 x 1 ¼"	100	1,000		
1 ½	PDPAS-150	.157 x 1 ½"	100	1,000		
1 ⅞	PDPAS-187	.157 x 1 ⅞"	100	1,000		
2	PDPAS-200	.157 x 2"	100	1,000		
2 ½	PDPAS-250	.157 x 2 ½"	100	1,000		
2 ⅞	PDPAS-287	.157 x 2 ⅞"	100	1,000		

PDPAS

.300" Headed Tophat Fasteners with .157" Shank Diameter

Length (in.)	Model No.	Description	Pack Qty.	Carton Qty.	Compatible Tools	
					Simpson Strong-Tie	Others
½ knurled	PDPAT-50K	.157 x ½" knurl	100	1,000	PTP-27L PTP-27S PT-27 PT-27HD PT-22 PT-22GS PT-22P PT-22H	721, D-60, U-2000 and most other low-velocity tools.
⅝ knurled	PDPAT-62K	.157 x ⅝" knurl	100	1,000		
¾	PDPAT-75	.157 x ¾"	100	1,000		
1	PDPAT-100	.157 x 1"	100	1,000		

PDPAT

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Powder-Actuated Fasteners

Pre-Assembled Ceiling Clips – .300" Headed Fasteners with .157" Shank Diameter

Length (in.)	Model No.	Description	Pack Qty.	Carton Qty.	Compatible Tools	
					Simpson Strong-Tie	Others
1 1/16	PCLDPA-106	Ceiling Clip with 1 1/16" Pin	100	1,000	PTP-27L PTP-27S PT-27 PT22 PT-22GS PT-22P PT-22H	DX-350 System 1 721 and most other tools.
1 5/16	PCLDPA-131	Ceiling Clip with 1 5/16" Pin	100	1,000		
1 1/16	PECLDPA-106	Compact Ceiling Clip with 1 1/16" Pin	100	1,000		
1 5/16	PECLDPA-131	Compact Ceiling Clip with 1 5/16" Pin	100	1,000		

PCLDPA

PECLDPA

PCLDPA and PECLDPA Series Rod Hangers – Tension and Oblique Loads in Sand-Lightweight Concrete over Metal Deck[1]

Model No.	Shank Diameter inches (mm)	Minimum Embedment inches (mm)	Installed through Lower Flute of Metal Deck into Concrete			
			3" Deep Deck with 2½" Concrete Fill[2]		1½" Deep Deck with 2" Concrete Fill[3]	
			Allowable Tension Load lbs. (kN)	Allowable Oblique Load lbs. (kN)	Allowable Tension Load lbs. (kN)	Allowable Oblique Load lbs. (kN)
PCLDPA-106	0.157 (4.0)	1 (25)	140 (0.63)	175 (0.78)	160 (0.72)	240 (1.08)
PCLDPA-131		1¼ (32)	160 (0.72)	185 (0.83)	180 (0.81)	280 (1.25)
PECLPDA-131		1 (25)	120 (0.54)	145 (0.65)	135 (0.60)	175 (0.78)

1. Fasteners shall not be driven until the concrete has reached a minimum concrete compressive strength of 3,000 psi.
2. The steel deck must have a minimum thickness of 20 gauge (0.0359-inch-thick-base-steel thickness) and a minimum yield strength of 38,000 psi. Oblique loads are applied at a 45-degree angle to the fastener. The fastener must be a minimum of 1½ inches from the edge of the deck web and 4 inches from the end of the deck. The minimum fastener spacing is 4 inches.
3. The steel deck must have a minimum thickness of 20 gauge (0.0359-inch-thick-base-steel thickness) and a minimum yield strength of 38,000 psi. Oblique loads are applied at a 45-degree angle to the fastener. The fastener must be a minimum of ⅞ inches from the edge of the deck web and 4 inches from the end of the deck. The minimum fastener spacing is 4 inches.

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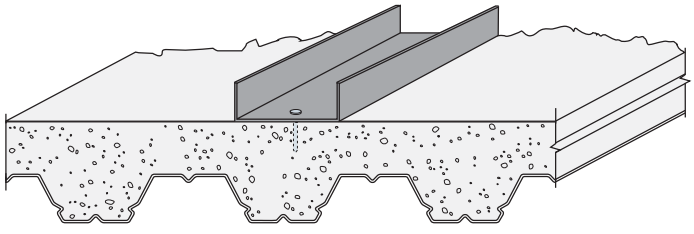
Powder-Actuated Fasteners

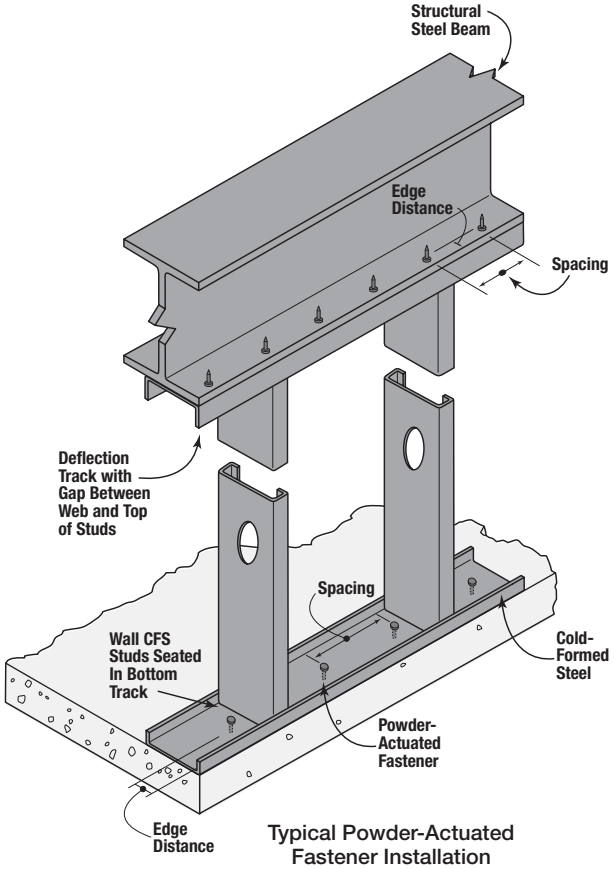
PDPA and PDPAT Pins – Shear and Tension Loads

Model Type	Dia. (in.)	Pin Spacing	Base Material											Attached Material		
			Normal Weight Concrete[1]			Sand-Lightweight Concrete Filled Steel Deck[6,7]			A36 Steel[2]					Cold-Formed Steel[3]		
			Emb. Depth (in.)	2,500 psi	4,000 psi	Emb. Depth (in.)	Concrete[1] (Top)	Lower Flute[8] (Bottom)	3/16"	1/4"	3/8"	1/2"	3/4"	33 mil (20 ga)	43 mil (18 ga)	54 mil (16 ga)
PDPA PDPAT	Allowable Shear Load[4,5] (lbs./ft.)															
	0.157	0'-4"	1	855	930	1	675	840	1,230	1,095	1155[10]	1155[10]	975[9]	660	860	1560
			1¼	1,080	1,260	1¼	1,260	960								
		0'-6"	1	570	620	1	450	560	820	730	770[10]	770[10]	650[9]	440	575	1040
			1¼	720	840	1¼	840	640								
		0'-8"	1	430	465	1	340	420	615	550	580[10]	580[10]	490[9]	330	430	780
			1¼	540	630	1¼	630	480								
		1'-0"	1	285	310	1	225	280	410	365	385[10]	385[10]	325[9]	220	285	520
			1¼	360	420	1¼	420	320								
		2'-0"	1	145	155	1	115	140	205	185	195[10]	195[10]	165[9]	110	145	260
			1¼	180	210	1¼	210	160								
		3'-0"	1	95	105	1	75	95	135	120	130[10]	130[10]	110[9]	75	95	175
			1¼	120	140	1¼	140	105								
	Allowable Tension Load[4,5] (lbs.)															
	0.157	—	1	210	310	1	150	145	260	370	380[10]	530[10]	195[9]	225	295	535
			1¼	320	380	1¼	320	170								

1. For concrete the minimum edge distance and spacing is 3½" and 5" respectively.
2. For A36 steel, the minimum edge distance and spacing is 0.5" and 1" respectively. Entire pointed portion of the fastener must fully penetrate steel base material unless noted otherwise.
3. Cold-formed steel (CFS) values are based on AISI-S100, Section E4. Reference General Notes for CFS properties.
4. Governing load is the lesser of the base material and CFS.
5. Allowable loads are based on ICC-ES ESR-2138.
6. Concrete shall have a minimum compressive strength of f'_c = 3000 psi.
7. For steel deck, the minimum depth and thickness is 3" and 33 mil (20 ga) respectively. Steel deck must have a minimum yield strength of 38,000 psi.
8. For installation through steel deck, the minimum edge and end distance is 1½" and 4" respectively with 4" minimum spacing.
9. Based upon a minimum penetration depth of 0.46 inch (11.7 mm).
10. For applications to structural steel, the fastener must be driven to where at least some of the point of the fastener penetrates through the steel substrate.



PDPAT In Lightweight Concrete Over Steel Deck



Typical Powder-Actuated Fastener Installation

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Powder-Actuated Fasteners

PDPA in 4,000 psi Normal-Weight Concrete

Fastener	Shank Diameter (in.)	Fastener Length (in.)	Edge Distance (in.)	Spacing in Load Dir. (in.)	Track Width (in.)	Number of Fasteners	Allowable Shear Load (lbs.)
PDPA-100	0.157	1	2¼	—	3⅝	1	240
				¾		2	310
				—	6	1	240
				2¼		2	510
PDPA-125		1.25	2¼	—	3⅝	1	325
				¾		2	490
				—	6	1	325
				2¼		2	590

1. Alllowable loads are based on fasteners installed through 16 ga. cold-formed steel (F_y > 33 ksi).
2. Minimum concrete thickness must be three times the fastener length.
3. Edge distance and spcaing are shown in figures below.

PDPA in 3,000 psi Sand-Lightweight Concrete

Fastener	Shank Diameter (in.)	Fastener Length (in.)	Edge Distance (in.)	Spacing in Load Dir. (in.)	Track Width (in.)	Number of Fasteners	Allowable Shear Load (lbs.)
PDPA-100	0.157	1	2¼	—	3⅝	1	235
				¾		2	310
				—	6	1	235
				2¼		2	445
PDPA-125		1.25	2¼	—	3⅝	1	245
				¾		2	455
				—	6	1	245
				2¼		2	530
PDPA-150		1.5	2¼	—	3⅝	1	245
				¾		2	470
				—	6	1	245
				2¼		2	530

1. Alllowable loads are based on fasteners installed through 16 ga. cold-formed steel (F_y > 33 ksi).
2. Minimum concrete thickness must be three times the fastener length.
3. Edge distance and spcaing are shown in figures below.

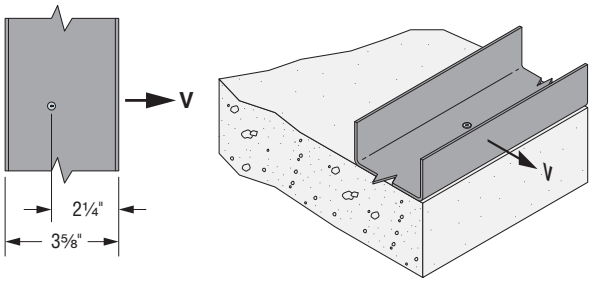

Figure 1: 3⅝" Track – 1 Fastener

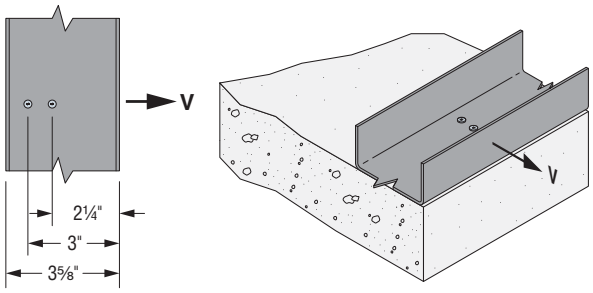

Figure 2: 3⅝" Track – 2 Fasteners

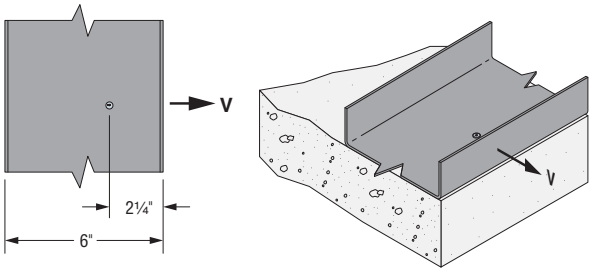

Figure 3: 6" Track – 1 Fastener

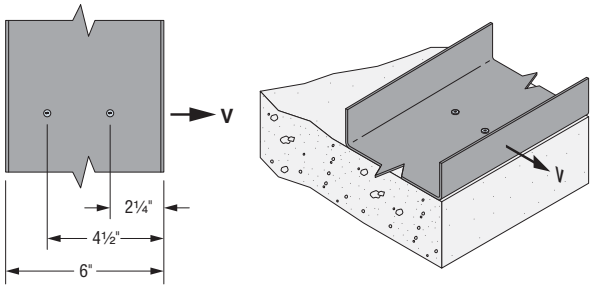

Figure 4: 6" Track – 2 Fasteners

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SB Anchor Bolt

The SB⅝x24 anchor bolt offers a load-tested anchorage solution that exceeds the capacity of all of our holdowns that call for a ⅝" dia. anchor. Similarly, the SB1x30 covers holdowns utilizing a 1" diameter anchor that exceed the capacity of our SSTB bolts. The SB⅞x24 is designed to maximize performance with minimum embedment for holdowns utilizing a ⅞" dia. anchor.

SB anchor bolts are code listed by ICC-ES under the 2009 and 2012 IBC and IRC to meet the requirements of ICC-ES acceptance criteria – AC 399. ICC-ES ESR-2611 is the industry's first code report issued for proprietary anchor bolts evaluated to the criteria of AC 399.

Special Features:

- Identification on the bolt head showing embedment angle and model
- Sweep geometry to optimize position in form
- Rolled thread for higher tensile capacity
- Hex nuts and plate washer fixed in position
- Available in HDG for additional corrosion resistance

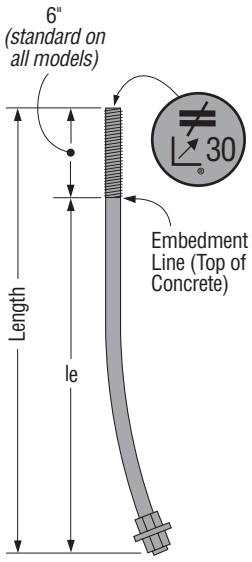
Material: ASTM F-1554, Grade 36

Finish: None. May be ordered HDG. Contact Simpson Strong-Tie.

Installation:

- SB is only for concrete applications poured monolithically except where noted.
- Top nuts and washers for holdown attachment are not supplied with the SB; install standard nuts, couplers and/or washers as required.
- On HDG SB anchors, chase the threads to use standard nuts or couplers or use overtapped products in accordance with ASTM A563—for example, Simpson Strong-Tie® NUT⅝-OST, NUT⅞-OST, NUT1-OST, CNW⅝-OST, CNW⅞-OST and CNW1-OST.
- Install SB before the concrete pour using AnchorMates®. Install the SB per the plan view detail.
- Minimum concrete compressive strength is 2500 psi.
- When rebar is required it does not need to be tied to the SB.

Codes: See page 11 for Code Report Reference Key Chart.



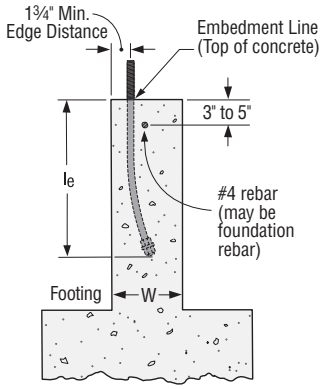
SB1x30
(Other models similar)

SB Bolts at Stemwall

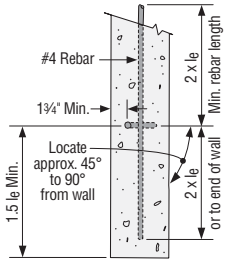
Model No.	Dimensions (in.)				Allowable Tension Loads (lbs.)						Code Ref.
	Stemwall Width	Dia.	Length	Min. Embed. (le)	Wind & SDC A&B			SDC C-F			
					Midwall	Corner	End Wall	Midwall	Corner	End Wall	
SB⅝x24	6	⅝	24	18	6,675	6,675	6,675	6,675	5,730	5,730	I5, F3, L5
SB⅞x24	8	⅞	24	18	10,470	9,355	6,820	8,795	7,855	5,730	
SB1x30	8	1	30	24	13,655	9,905	7,220	11,470	8,315	6,065	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

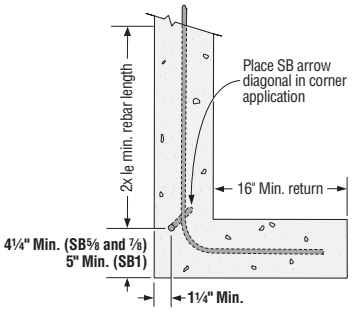
1. For other SB anchorage conditions, reference page 34 of C-C-2015.



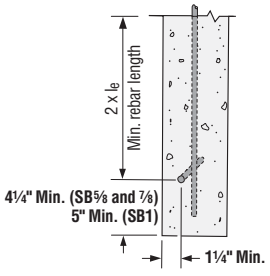
Typical SB Installation



Midwall

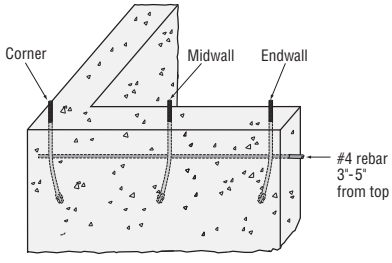


Corner

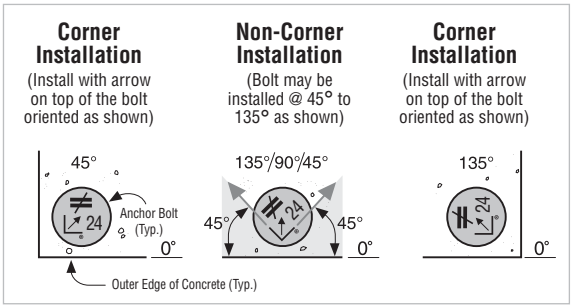


End Wall

STEMWALL PLAN VIEWS



Perspective View



Plan View of SB Placement in Concrete

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SSTB® Anchor Bolt

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The SSTB® anchor bolt is designed for maximum performance as an anchor bolt for holdowns and Simpson Strong-Tie® Strong-Wall® shearwalls. Extensive testing has been done to determine the design load capacity of the SSTB when installed in many common applications.

The Simpson Strong-Tie® SSTB anchor bolts are now code listed by ICC-ES under the 2009 and 2012 IBC® and IRC® to meet the requirements of ICC-ES acceptance criteria AC 399. ICC-ES ESR-2611 is the industry's first code report issued for proprietary anchor bolts evaluated to the criteria of AC 399.

Special Features:

- Identification on the bolt head showing embedment angle and model
- Offset angle reduces side bursting, and provides more concrete cover
- Rolled thread for higher tensile capacity
- Stamped embedment line aids installation
- Available in HDG for additional corrosion resistance

Material: ASTM F-1554, Grade 36

Finish: None. May be ordered HDG; contact Simpson Strong-Tie.

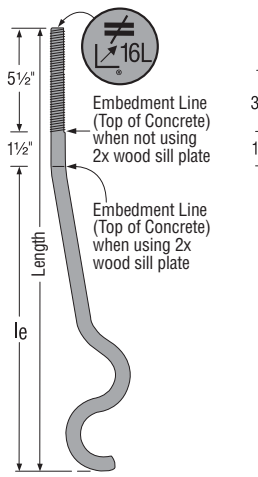
Installation:

- SSTB is suitable for monolithic and two-pour concrete applications.
- Nuts and washers for holdown attachment are not supplied with the SSTB; install standard nuts, couplers and/or washers as required.
- On HDG SSTB anchors, chase the threads to use standard nuts or couplers or use overtapped products in accordance with ASTM A563—for example Simpson Strong-Tie® NUT⅜-OST, NUT⅞-OST, CNW⅝-OST, CNW⅞-OST.
- Install SSTB before the concrete pour using AnchorMates®. Install the SSTB per the plan view detail.
- Minimum concrete compressive strength is 2500 psi.
- When rebar is required, it does not need to be tied to the SSTB.
- Order SSTBL Models (example: SSTB16L) for longer thread length (16L= 5½", 20L = 6½", 24L = 6", 28L = 6½"). SSTB and SSTBL load values are the same. SSTB34 and SSTB36 feature 4½" and 6½" of thread respectively and are not available in "L" versions.

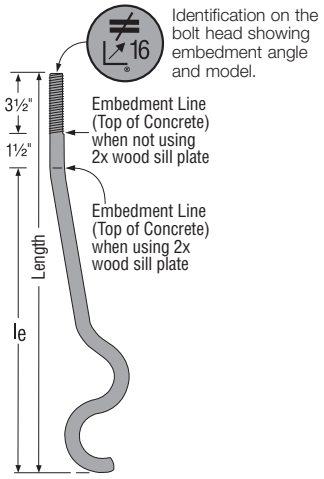
CMU

- One horizontal #4 rebar in the second course.
- One vertical #4 rebar in adjacent cell for ⅝" diameter SSTB.
- One vertical #4 rebar in an adjacent cell and additional vertical #4 rebar(s) at 24" o.c. max. for ⅞" diameter SSTBs (2 total vertical rebars for end wall corner, 3 total vertical rebars for midwall).

Codes: See page 11 for Code Report Reference Key Chart.

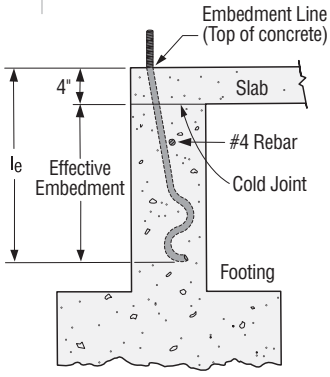


SSTB16L
(other models similar)



SSTB16
(other models similar)

See pages 110-111 for additional installation details.



For two-pour (4" slab) installation loads:

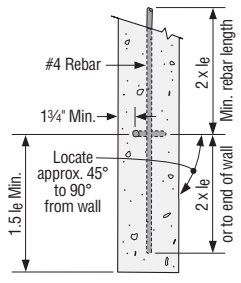
- When using the SSTB20, use the equivalent loads of the SSTB16.
- When using the SSTB24, use the equivalent loads of the SSTB20.
- When using the SSTB34 or 36, use the equivalent loads of the SSTB28.

SSTB Bolts at Stemwall

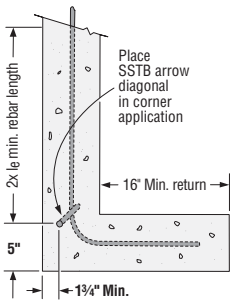
Model No.	Dimensions				Allowable Tension Loads						Code Ref.
	Stemwall Width (in.)	Dia. (in.)	Length (in.)	Min. Embed. (l_e)	Wind & SDC A&B			SDC C - F			
					Midwall	Corner	End Wall[2]	Midwall	Corner	End Wall[2]	
SSTB16	6	⅝	17⅝ (16L = 19⅝)	12⅝	3610	3610	3610	2550	2550	2550	I5, F3, L5
SSTB20	6	⅝	21⅝ (20L = 24⅝)	16⅝	4315	4040	4040	3145	2960	2960	
SSTB24	6	⅝	25⅝ (24L = 28⅛)	20⅝	5025	4470	4470	3740	3325	3325	
SSTB28	8	⅞	29⅞ (28L = 32⅞)	24⅞	9900	8710	7615	8315	7315	6395	
SSTB34	8	⅞	34⅞	28⅞	9900	8710	7615	8315	7315	6395	
SSTB36	8	⅞	36⅞	28⅞	9900	8710	7615	8315	7315	6395	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

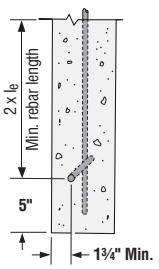
1. See page 110 for notes to the Designer.
2. SSTB28, SSTB34 and SSTB36 with 3⅞" end distance allowable loads are 6605 lbs.(Wind and SDC A&B) and 5550 lbs (SDC C-F).



Midwall

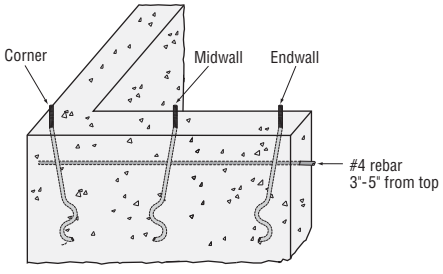


Corner



End Wall

STEMWALL PLAN VIEWS



Perspective View

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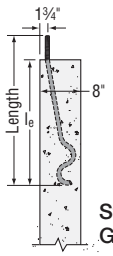
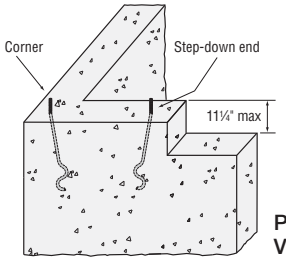
SSTB® Anchor Bolt

SSTB Bolts at Stemwall: Garage Front

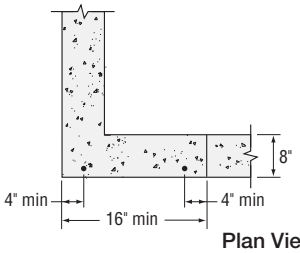
Model No.	Dimensions (in.)				Allowable Tension Loads				Code Ref.
	Stemwall Width	Dia.	Length	Min. Embed. (l_e)	Wind & SDC A&B		SDC C-F		
					Step-Down End	Corner	Step-Down End	Corner	
SSTB28	8	7/8	29 7/8	24 7/8	7015	7045	5895	5920	I5



Stemwall Garage Front



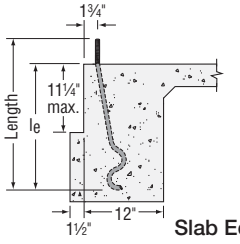
Perspective View



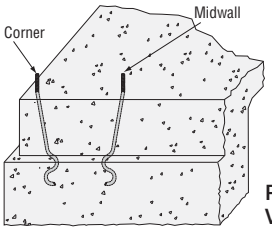
Plan View

SSTB Bolts at Slab on Grade: Edge

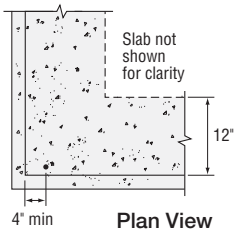
Model No.	Dimensions (in.)				Allowable Tension Loads				Code Ref.
	Footing Width	Dia.	Length	Min. Embed. (l_e)	Wind & SDC A&B		SDC C-F		
					Midwall	Corner	Midwall	Corner	
SSTB16	12	5/8	17 5/8	12 5/8	5355	5355	3780	3780	I5
SSTB20	12	5/8	25 5/8	16 5/8	6550	6550	4785	4785	
SSTB24	12	5/8	25 5/8	20 5/8	6675	6675	5790	5790	
SSTB28	12	7/8	29 7/8	24 7/8	13080	13080	11060	11645	
SSTB34	12	7/8	34 7/8	28 7/8	13080	13080	11060	11645	
SSTB36	12	7/8	36 7/8	28 7/8	13080	13080	11060	11645	



Slab Edge



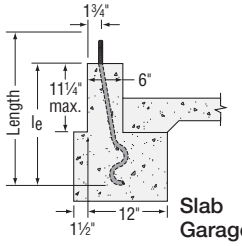
Perspective View



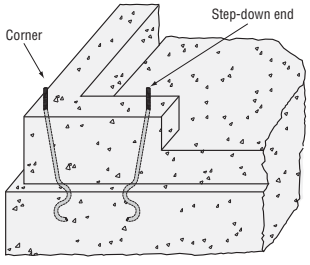
Plan View

SSTB Bolts at Slab on Grade: Garage Curb

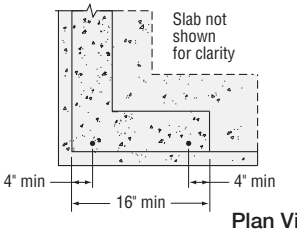
Model No.	Dimensions (in.)				Allowable Tension Loads				Code Ref.
	Curb Width	Dia.	Length	Min. Embed. (l_e)	Wind & SDC A&B		SDC C-F		
					Step-Down End	Corner	Step-Down End	Corner	
SSTB28	6	7/8	29 7/8	24 7/8	10085	12375	8475	10395	I5



Slab Garage Curb



Perspective View



Plan View

Notes to the Designer:

1. Rebar is required at top of stemwall foundations but is not required for Slab-on-Grade Edge and Garage Curb, or Stemwall Garage Front installations.
2. Minimum end distances for SSTB bolts are as shown in graphics.
3. Multiply the tabulated ASD wind or seismic loads by 1.6 or 1.4, respectively, to obtain LRFD capacities.
4. Per Section 1613 of the IBC, detached one- and two-story dwellings in SDC C may use "Wind and SDC A&B" allowable loads.
5. See ESR-2611 for additional information.
6. Midwall loads apply when anchor is 1.5 l_e or greater from the end. For bolts acting in tension simultaneously, the minimum bolt center-to-center spacing is 3 l_e.

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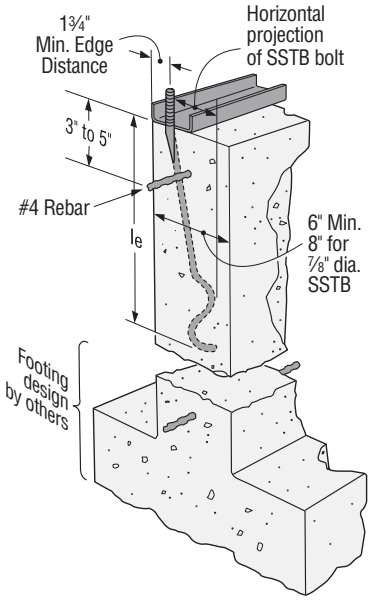
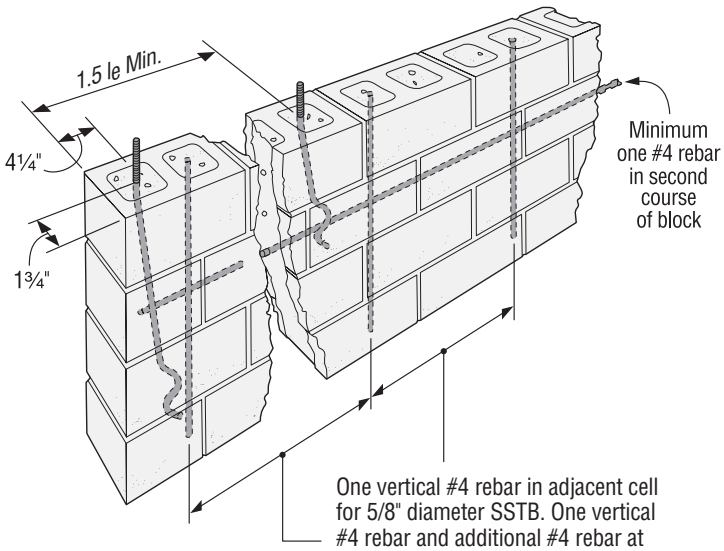
SSTB® Anchor Bolt



Typical SSTB Installation in Concrete Foundation
Maintain minimum rebar cover, per ACI-318 concrete code requirements



One vertical #4 rebar in adjacent cell for 5/8" diameter SSTB. One vertical #4 rebar and additional #4 rebar at 24" o.c. max. for 7/8" diameter SSTB. *(2 total vertical rebars for endwall, 3 total vertical rebars for midwall)*

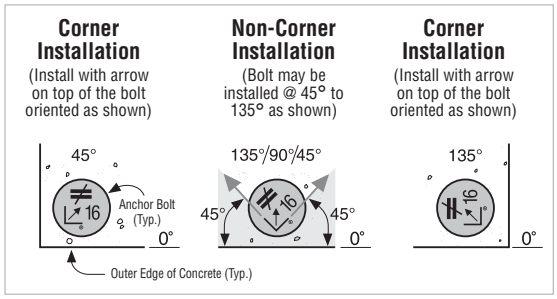
Typical SSTB Installation in Grouted Concrete Block

SSTB Bolts in 8" CMU

Model No.	Dia. (in.)	Length (in.)	Min. Embed. (l_e)	Allowable Tension Load (lbs.)		Code Ref.
				Midwall	Corner/ End Wall	
SSTB16	⅝	17⅝ (16L = 19⅝)	12⅝	4780	1850	170
SSTB20	⅝	21⅝ (20L = 24⅛)	16⅝	4780	1850	
SSTB24	⅝	25⅝ (24L = 28⅛)	20⅝	4780	1850	
SSTB28	⅞	29⅞ (28L = 32⅞)	24⅞	6385	4815	
SSTB34	⅞	34⅞	28⅞	6385	4815	
SSTB36	⅞	36⅞	28⅞	6385	4815	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Loads are based on a minimum CMU compressive strength, f'_m, of 1500 psi.
2. Minimum end distance required to achieve midwall table loads is 1.5 l_e.
3. Minimum end distance for corner/end wall loads is 4¼".
4. Loads may not be increased for duration of load.



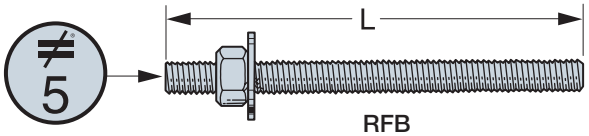
Plan View of SSTB Placement in Concrete

RFB Retrofit Bolts

RFBs are clean, oil-free, pre-cut threaded rod, supplied with nut and washer. Offers a complete engineered anchoring system when used with Simpson Strong-Tie® adhesive. Inspection is easy; the head is stamped with rod length and "No Equal" symbol for identification after installation.

Material: ASTM F1554 Grade 36

Finish: Zinc-Plated (unless otherwise noted), available in HDG (per ASTM A153); stainless steel (RFB#5x8SS only).



RFB

Model No.	Length L (in.)	Bolt Diameter
RFB#4X4	4	½
RFB#4X5	5	½
RFB#4X6	6	½
RFB#4X7	7	½
RFB#4X10	10	½
RFB#4x8HDG-R	8	½
RFB#5X5	5	⅝
RFB#5X8	8	⅝
RFB#5X10	10	⅝
RFB#5X12HDG-R	12	⅝
RFB#5X16	16	⅝
RFB#6X10.5	10½	¾

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. RFB#4X8HDG-R and RFB#5X12HDG-R are only available with a hot-dip galvanized coating. They are retail packaged and are sold 10 per carton.
2. Washer provided on all RFB (except RFB#5x8SS).

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PAB Pre-Assembled Anchor Bolt

The PAB anchor bolt is a versatile cast-in-place anchor bolt ideal for high-tension-load applications, such as rod systems and shearwalls. It features a plate washer at the embedded end sandwiched between two fixed hex nuts and a head stamp for easy identification after the pour.

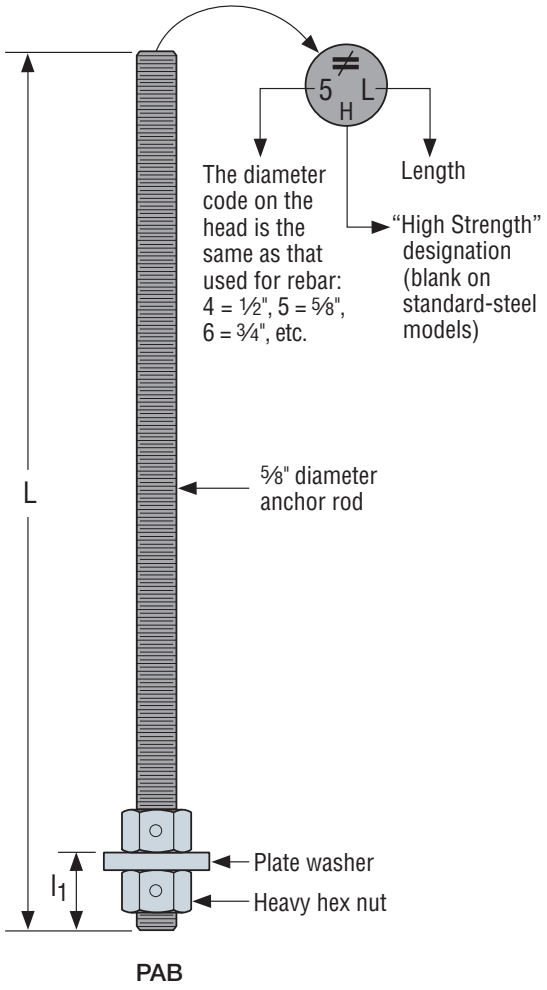
- Available in diameters from ½" to 1¼" in lengths from 12" to 36" (in 6" increments)
- Available in standard and high-strength steel
- Head stamp contains the No Equal sign, diameter designation and an "H" on high-strength rods

Material: Standard Steel—ASTM F1554 Grade 36, A36 or A307 – F_u = 58 ksi
High-Strength Steel (up to 1" dia.)—ASTM A449 – F_u = 120 ksi
High-Strength Steel (1⅛" and 1¼" dia.)—ASTM A193 B7 or F1554 Grade 105 – F_u = 125 ksi

Finish: None

Codes: See page 11 for Code Report Reference Key Chart.

The Simpson Strong-Tie® Anchor Designer™ Software analyzes and suggests anchor solutions using the ACI 318 Appendix D strength-design methodology (or CAN/CSA A23.3 Annex D Limit States Design methodology). It provides cracked- and uncracked-concrete anchorage solutions for numerous Simpson Strong-Tie mechanical and adhesive anchors as well as the PAB anchor bolt. With its easy-to-use graphical user interface, the software makes it easy for the Designer to identify anchorage solutions without having to perform time-consuming calculations by hand.



PAB

How to specify and order:

When calling out PAB anchor bolts, substitute the desired length for the "XX" in the Root Model Number.

For a ⅝"x18" anchor bolt, the model number would be PAB5-18 (or PAB5H-18 for high strength).

PAB Anchor Bolt – Standard Steel

Diameter (in.)	Plate Washer Size (in.)	l_1 (in.)	Root Model No.	Lengths (in.)
½	⅜ x 1½ x 1½	1⅛	PAB4-XX	12" to 36" (in 6" increments)
⅝	½ x 1¾ x 1¾	1⅜	PAB5-XX	
¾	½ x 2¼ x 2¼	1½	PAB6-XX	
⅞	½ x 2½ x 2½	1⅝	PAB7-XX	
1	⅝ x 2¾ x 2¾	1⅞	PAB8-XX	
1⅛	⅝ x 3¼ x 3¼	2	PAB9-XX	
1¼	¾ x 3½ x 3½	2¼	PAB10-XX	

PAB Anchor Bolt – High-Strength Steel

Diameter (in.)	Plate Washer Size (in.)	l_1 (in.)	Root Model No.	Lengths (in.)
½	⅜ x 1½ x 1½	1⅛	PAB4H-XX	12" to 36" (in 6" increments)
⅝	½ x 1¾ x 1¾	1⅜	PAB5H-XX	
¾	½ x 2¼ x 2¼	1½	PAB6H-XX	
⅞	½ x 2½ x 2½	1⅝	PAB7H-XX	
1	⅝ x 2¾ x 2¾	1⅞	PAB8H-XX	
1⅛	⅝ x 3¼ x 3¼	2	PAB9H-XX	
1¼	¾ x 3½ x 3½	2¼	PAB10H-XX	

1. Lengths longer than 36" available as special order.
2. Plate washers are designed to develop the capacity of the bolt.

Naming Legend:

PAB5H-12

- **PAB Anchor Bolt**
- **Diameter* and Grade**
- **Length (12", 18", 24", 30" or 36")**

*** Units in ⅛" Increments (Ex: 9 = ⅝" or 1⅛")**

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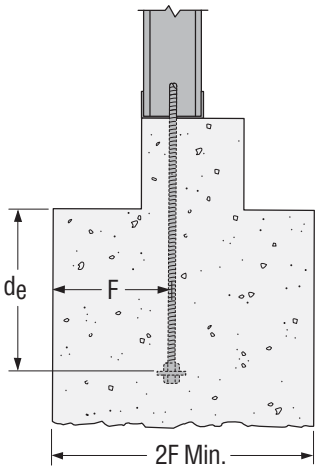
PAB Pre-Assembled Anchor Bolt

PAB Anchor Bolt – Anchorage Solutions

Design Criteria	Diameter (in.)	Anchor Bolt	2500 psi Concrete				3000 psi Concrete				Code Ref.
			Dimensions (in.)		Tension Load (lbs.)		Dimensions (in.)		Tension Load (lbs.)		
			d_e (in.)	F (in.)	ASD	LRFD	d_e (in.)	F (in.)	ASD	LRFD	
Wind	½	PAB4	4½	7	4270	6405	4	6	4270	6405	200
	⅝	PAB5	4	6	4030	6720	4	6	4415	7360	
			6	9	6675	10010	5½	8½	6675	10010	
	¾	PAB6	5½	8½	6500	10835	5	7½	6175	10290	
			7½	11½	9610	14415	7	10½	9610	14415	
	⅞	PAB7	6	9	7405	12345	5½	8½	7120	11870	
			9	13½	13080	19620	8½	13	13080	19620	
		PAB7H	9	13½	13610	22680	8½	13	13680	22805	
			14	21	27060	40590	13½	20½	27060	40590	
	1	PAB8	8	12	11405	19005	7½	11½	11340	18900	
			10½	16	17080	25565	10	15	17080	25560	
		PAB8H	10½	16	17150	28580	10	15	17460	29100	
			16½	25	35345	53015	15½	23½	35345	53015	
	1⅛	PAB9	9	13½	13610	22680	8	12	12495	20820	
			12½	19	21620	32430	12	18	21620	32430	
	1¼	PAB10	14	21	26690	40035	13½	20½	26690	40035	
Seismic	½	PAB4	5	7½	4270	6405	4½	7	4270	6405	
	⅝	PAB5	6½	10	6675	10010	6	9	6675	10010	
	¾	PAB6	7½	11½	9060	12940	7	10½	8945	12780	
			8	12	9610	14415	7½	11½	9610	14415	
	⅞	PAB7	9	13½	11905	17010	8½	13	11970	17100	
			10	15	13080	19620	9½	14½	13080	19620	
		PAB7H	14½	22	25350	36215	13½	20½	24650	35215	
			15½	23½	27060	40590	14½	22	27060	40590	
	1	PAB8	11	16½	15996	22850	10½	16	16435	23480	
			11½	17½	17080	25625	11	16½	17080	25625	
		PAB8H	17	25½	33045	47205	16	24	32720	46740	
			18	27	35345	53015	17	25½	35345	53015	
	1⅛	PAB9	12½	19	19795	28275	12	18	20255	28940	
			13½	20½	21620	32430	12½	19	21620	32430	
	1¼	PAB10	14½	22	25350	36215	14	21	26190	37415	
			15	22½	26690	40035	14½	22	26690	40035	



Design loads are calculated using a full shear cone. Coverage on each side of the bolt shall be a minimum of F or reductions must be taken.

1. Anchorage designs conform to ACI 318-11 Appendix D and assume cracked concrete with no supplementary reinforcement.
2. Seismic indicates Seismic Design Category C through F. Detached one- and two-family dwellings in SDC C designs conform to ACI 318-11 Section D3.3.4.
3. Wind includes Sesmic Design Category A and B.
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by Designer. The registered design professional may specify alternate embedment, footing size, and anchor bolt.
5. Where tension loads are governed by anchor steel, the design provisions from AISC 360-10 are used to determine the tensile steel limit. LRFD values are calculated by multiplying the nominal AISC steel capacity by a 0.75 phi factor and allowable values are calculated by dividing the AISC nominal capacity by a 2.0 omega factor.
6. Where tension loads are governed by an Appendix D concrete limit, the allowable Stress Design (ASD) values are obtained by multiplying Load Factor Resistance Design (LRFD) capacities by 0.7 for Seismic and 0.6 for Wind.

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S/HDU Holdowns

The S/HDU series of holdowns combines performance with ease of installation. The pre-deflected geometry virtually eliminates material stretch, resulting in low deflection under load. Installation using self-drilling tapping screws into the studs reduces installation time and saves labor cost.

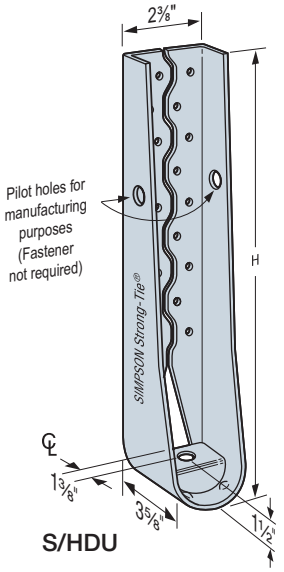
Material: 118 mil (10 ga)

Finish: Galvanized

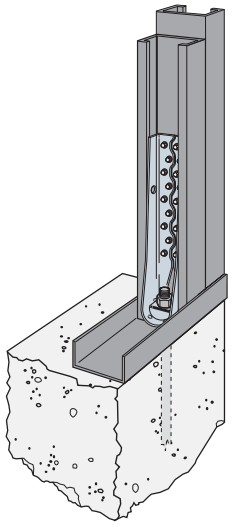
Installation:

- Use all specified fasteners. See General Notes.
- Use standard #14 self-drilling screws to fasten to studs.
- Anchor bolt washer is not required.
- See SB, SSTB and PAB Anchor Bolts on pages 108-113 for cast-in-place anchorage options.
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options.

Codes: See page 11 for Code Report Reference Key Chart.



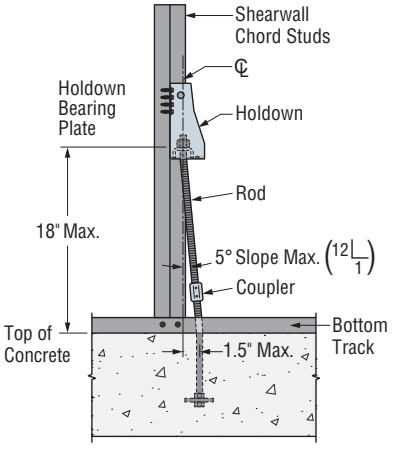
S/HDU


Typical S/HDU Installation

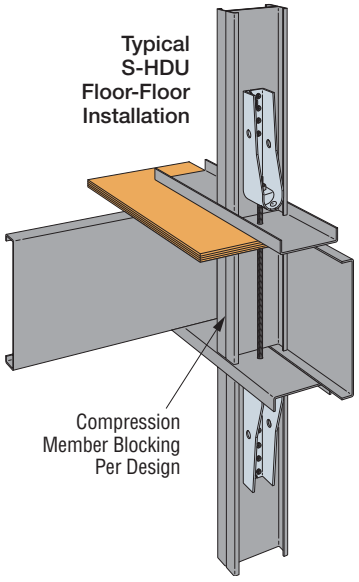
Model	H (in.)	Fasteners: Anchor Bolt Diameter[1] (in.)	Fasteners: Stud Fasteners[7]	Stud Member Thickness[2] mil (ga.)	ASD (lbs.): Tension Load	ASD (lbs.): Deflection at ASD Load[5]	LRFD (lbs.): Tension Load	LRFD (lbs.): Deflection at LRFD Load[5]	Nominal Tension Load[6] (lbs.)	Code Ref.
S/HDU4	7⅞	⅝	6-#14	2-33 (2-20ga)	2320	0.093	3705	0.149	5685	IP1, L2, F4
				2-43 (2-18ga)	3825	0.115	6105	0.190	9365	
				2-54 (2-16ga)	3970	0.093	6345	0.156	9730	
				Steel Fixture	4470	0.063	7165	0.103	12120	
S/HDU6	10⅜	⅝	12-#14	2-33 (2-20ga)	4895	0.125	8495	0.250	10470	
				2-43 (2-18ga)	6125	0.119	9690	0.250	15460	
				2-54 (2-16ga)	6125	0.108	9785	0.234	15005	
				Steel Fixture	5995	0.060	9580	0.136	14695	
S/HDU9	12⅞	⅞	18-#14	2-33 (2-20ga)	6965	0.103	11125	0.189	13165	
				2-43 (2-18ga)	9255	0.125	15485	0.250	21810	
				2-54 (2-16ga)	9990	0.106	15960	0.225	24480	
				Steel Fixture	12715	0.125	20510	0.177	31455	
S/HDU11	16⅝	⅞	27-#14	2-33 (2-20ga)	6965	0.103	11125	0.189	13165	
				2-43 (2-18ga)	9595	0.096	15330	0.162	23515	
				2-54 (2-16ga)	9675	0.110	15460	0.158	23710	
		⅞ with Heavy Hex Nut	27-#14	2-43 (2-18ga)[6]	11100	0.125	17500	0.250	24955	
				2-54 (2-16ga)[6]	12175	0.125	19445	0.243	29825	
				Steel Fixture[6]	12945	0.111	20680	0.163	31715	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. The Designer shall specify the foundation anchor material type, embedment and configuration. Some of the tabulated holdown tension loads exceed the tension strength of typical ASTM A36 or A307 anchor bolts.
2. Stud design by Specifier. Tabulated loads are based on a minimum stud thickness for fastener connection.
3. ¼-inch self-drilling screws may be substituted for #14 self-tapping screws.
4. A heavy hex nut for the anchor bolt is required to achieve the table loads for S/HDU11.
5. Deflection at ASD or LRFD includes fastener slip, holdown deformation and anchor rod elongation for holdowns installed up to 4" above top of concrete. Holdowns may be installed raised, up to 18" above top of concrete, with no load reduction provided that additional elongation of the anchor rod is accounted for.
6. The Nominal Tension Load is based on the tested average ultimate (peak) load and is provided for design in accordance with section C5 of AISI S213 that requires a holdown to have a nominal strength to resist the lesser of the amplified seismic load or the maximum force the system can deliver.
7. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Holdown Raised Off CFS Bottom Track



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S/LTT, S/DTT and HTT Tension Ties

The HTT is a single-piece formed tension tie – no rivets, and a 4-ply formed seat. No washers are required.

S/DTT2Z tension tie is suitable for lighter-duty hold-down applications on single or back-to-back studs, and installed easily with #14 self-drilling screws.

The HTT, S/DTT and S/LTT Tension Ties are ideal for retrofit or new construction projects. They provide high-strength, post-pour, concrete-to-steel connections.

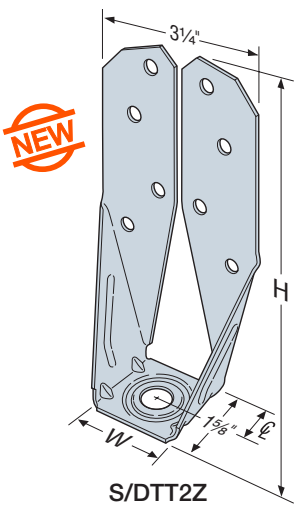
Material: HTT—111 mil (11ga)
S/DTT2Z—68 mil (14ga)
S/LTT20B—Strap: 97 mil (12ga); Plate: 229 mil (3ga)

Finish: HTT, S/LTT—Galvanized; S/DTT2Z—ZMAX® coating

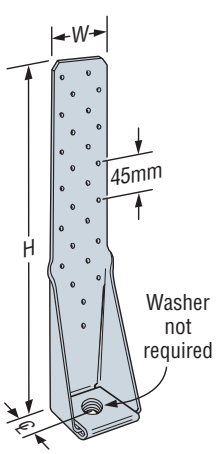
Installation:

- Use all specified fasteners.
- Use the specified number of type of screws to attach the strap portion to the steel stud. Bolt the base to the wall or foundation with a suitable anchor; see table for the required bolt diameter.
- S/DTT2Z requires a standard cut washer (included) be installed between the nut and the seat.
- Do not install S/LTT20B raised off of the bottom track.
- See SB and SSTB Anchor Bolts on pages 108-111 for anchorage options.
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options.

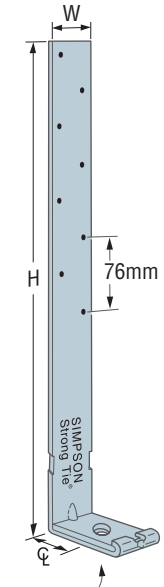
Codes: See page 11 for Code Report Reference Key Chart.



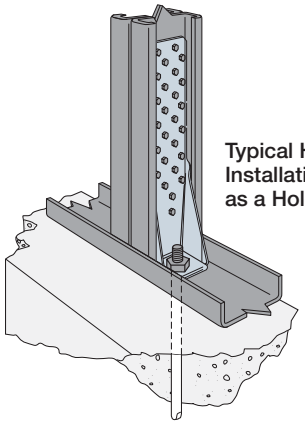
S/DTT2Z



HTT5
(HTT4 similar)



S/LTT20



Typical HTT5 Installation as a Holdown

Model	Dimensions (in.)			Fasteners		Stud Member Thickness mil (ga.)	ASD (lbs.)		LRFD (lbs.)		Nominal Tension Load[4] (lbs.)	Code Ref.
	W	H	℄	Anchor Bolt Diameter[1] (in.)	Stud Fasteners[5]		Tension Load	Deflection at ASD Load[3]	Tension Load	Deflection at LRFD Load[3]		
S/LTT20	2	20	1½	½	8 - #10	33 (20 ga)	1200	0.125	1890	0.250	4625	IP1, L2, F4
NEW S/DTT2Z	1⅝	6 15/16	13/16	½	8 - #14	33 (20 ga)	1570	0.138	2200	0.250	4265	
						43 (18 ga)	1685	0.151	2355	0.250	5570	
						2-33 (2-20 ga)	1735	0.153	2430	0.250	5735	
HTT4	2½	12⅜	1⅜	⅝	18 - #10	33 (20 ga)	3180	0.104	4770	0.187	8215	
						2-33 (2-20 ga)	4395	0.125	6675	0.250	11835	
HTT5	2½	16	1⅜	⅝	26 - #10	43 (18 ga)	4240	0.125	6505	0.250	11585	
						2-43 (2-18 ga)	4670	0.125	6970	0.250	12195	
						1-54 (1-16 ga)	4150	0.125	6425	0.250	12365	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. The Designer shall specify the foundation anchor material type, embedment and configuration.
2. Stud design by Specifier. Tabulated loads are based on a minimum stud thickness for fastener connection.
3. Deflection at ASD or LRFD includes fastener slip, holdown deformation and anchor rod elongation for holdowns installed up to 4" above top of concrete. Holdowns may be installed raised, up to 18" above top of concrete, with no load reduction provided that additional elongation of the anchor rod is accounted for. See bottom of page 114 for installation detail.
4. The Nominal Tension Load is based on the tested average ultimate (peak) load and is provided for design in accordance with section C5 of AISI S213 that requires a tension tie to have a nominal strength to resist the lesser of the amplified seismic load or the maximum force the system can deliver.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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S/HDS and S/HDB Holdowns

The S/HD series of holdowns is designed for installation with either screws or bolts into the studs or column. The S/HDS series installs with #14 screws and has been designed to utilize fewer fasteners to reduce installation time. The S/HDB series is ideal for bolt-on applications where the cold-formed stud manufacturer can pre-punch the bolt holes.

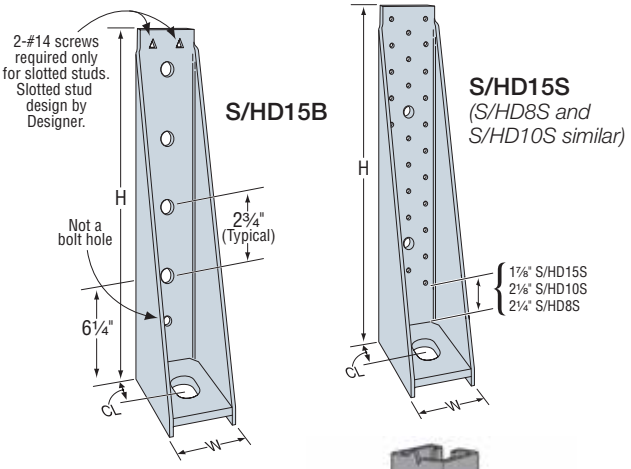
Material: See table

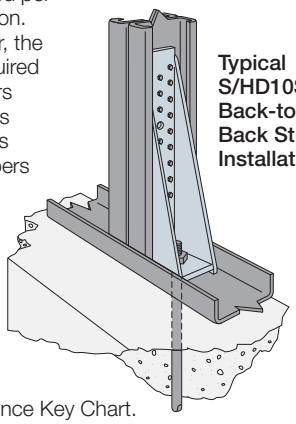
Finish: Simpson Strong-Tie® gray paint. Hot-dip galvanized is available; see Corrosion-Information, pages 17-20.

Installation: • Use all specified fasteners; some models have extra fastener holes. See General Notes.

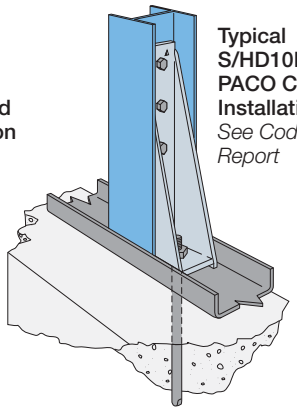
- Anchor bolt washer is not required.
- Standard washers are required on stud bolt nuts for model S/HDB.
- Thin wall socket (OD=2" maximum) is required for S/HD15 to tighten the 1" anchor bolt.
- Stud bolts – use A307.
- Boundary members (back-to-back studs) design shall be by Designer.
- S/HDS and S/HDB holdowns can be welded per Designer's recommendation and specification. To tie back-to-back stud members together, the Designer must determine the fasteners required to bind members to act as one unit. Welders and welding procedures shall be qualified as specified in AWS D1.3. Welded connections used for cold-formed steel structural members in which the thickness of the thinnest connected part is 0.18 inch or less shall comply to AISI S100 Specification Section E2.
- See SB, SSTB and PAB Anchor Bolts on pages 108-113 for anchorage options.
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options.

Codes: See page 11 for Code Report Reference Key Chart.

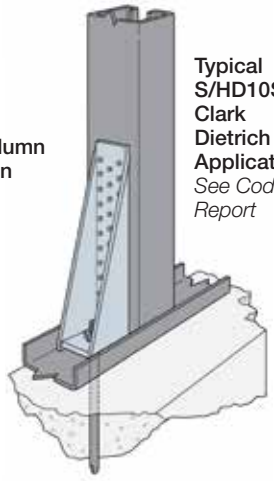




Typical S/HD10S Back-to-Back Stud Installation



Typical S/HD10B PACO Column Installation *See Code Report*



Typical S/HD10S Clark Dietrich Stud Application *See Code Report*

Model No.	Mil (Ga.)	H (in.)	W (in.)	℄ (in.)	Fasteners		Stud Member Thickness mil (ga.)	ASD (lbs.)		LRFD (lbs.)		Nominal Tension Load (lbs.)	Code Ref.
					Anchor Bolt Dia.[1] (in.)	Stud Fasteners[7]		Tension Load	Deflection at ASD Load[4]	Tension Load	Deflection at LRFD Load[4]		
S/HD8S	118 (10)	11	2⅝	1½	⅞	17 - #14[7]	2-33 (2-20ga)	7,335	0.12	11,715	0.204	13,720	IP1, L2, F4
							2-43 (2-18ga)	8,750	0.086	13,975	0.146	21,435	
							2-54 (2-16ga)	8,855	0.106	14,145	0.162	21,700	
							Steel Fixture	10,840	0.053	17,335	0.072	32,525	
S/HD10S	118 (10)	13½	2⅝	1½	⅞	22 - #14[7]	2-33 (2-20ga)	7,400	0.122	11,815	0.192	13,835	
							2-43 (2-18ga)	11,120	0.112	17,755	0.124	20,795	
							2-54 (2-16ga)	12,220	0.096	19,520	0.145	29,940	
							Steel Fixture	12,375	0.043	19,820	0.061	33,535	
S/HD15S	171 (7)	17	2⅝	1⅜	1	30 - #14[7]	2-43 (2-18ga)	12,110	0.096	19,340	0.164	22,645	
							2-54 (2-16ga)	13,500	0.11	21,565	0.13	33,075	
							Steel Fixture	15,810	0.043	25,320	0.065	42,845	
S/HD8B	171 (7)	11	2⅝	1½	⅞	2-¾ Dia.	2-33 (2-20ga)	3,895	0.081	5,620	0.144	8,645	
							2-43 (2-18ga)	5,345	0.098	7,710	0.146	11,865	
							2-54 (2-16ga)	8,950	0.082	14,280	0.141	20,310	
							Steel Fixture	9,080	0.069	14,545	0.104	22,975	
S/HD10B	118 (10)	13½	2⅝	1½	⅞	3-¾ Dia.	2-33 (2-20ga)	5,840	0.070	8,430	0.124	12,970	
							2-43 (2-18ga)	8,015	0.087	11,565	0.12	17,795	
							2-54 (2-16ga)	12,090	0.125	19,720	0.23	28,050	
							Steel Fixture	15,635	0.102	24,955	0.123	35,495	
S/HD15B	171 (7)	17	2⅝	1⅜	1	4-¾ Dia.	2-43 (2-18ga)	16,020	0.118	15,425	0.179	22,165	
							2-54 (2-16ga)	16,020	0.090	25,565	0.121	36,360	
							Steel Fixture	18,690	0.104	29,825	0.139	42,425	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. The Designer shall specify the foundation anchor material type, embedment and configuration. Some of the tabulated holdown tension loads exceed the tension strength of typical ASTM A 36 or A 307 anchor bolts.
2. Stud design by Specifier. Tabulated loads are based on a minimum stud thickness for fastener connection.
3. ¼ inch self-drilling screws may be substituted for #14 self-tapping screws.
4. Deflection at ASD or LRFD includes fastener slip, holdown deformation and anchor rod elongation for holdowns installed up to 4" above top of concrete. Holdowns may be installed raised, up to 18" above top of concrete, with no load reduction provided that additional elongation of the anchor rod is accounted for. See bottom of page 114 for installation detail.
5. The Nominal Tension Load is based on the tested average ultimate (peak) load and is provided for design in accordance with section C5 of AISI S213 that requires a holdown to have a nominal strength to resist the lesser of the amplified seismic load or the maximum force the system can deliver.
6. Not all fastener holes for S/HDS holdowns need to be filled, as additional fastener holes provided. Install fasteners symmetrically.
7. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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PA/HPA Purlin Anchors

PA/HPA purlin anchors offer solutions for CFS to concrete and concrete block connections which satisfy code requirements. The PAs dual embedment line allows installation in concrete or concrete block.

Material: PA—12 gauge; HPA—10 gauge

Finish: Galvanized. PAs available in HDG or ZMAX® coating.

Installation:

- Use all specified fasteners; some models have extra fastener holes. See General Notes.
- Purlin Anchor must hook around rebar.
- Allowable loads are for a horizontal installation into the side of a concrete or masonry wall.
- Strap may be bent one full cycle. (Bent vertical 90° then bent horizontal.)

EDGE DISTANCE—Minimum concrete edge distance is 5". Minimum concrete block left-to-right edge distance is 20".

CONCRETE BLOCK WALL—The minimum wall specifications are:

A One #4 vertical rebar, 32" long, 16" each side of anchor.

B Two courses of grout filled block above and below the anchor (no cold joints allowed).

C A horizontal bond beam with two #4 rebars, 40" long, a maximum of two courses above or below the anchor.

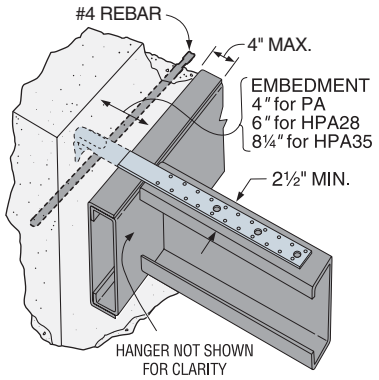
D Minimum masonry compressive strength, f'_m = 1500 psi.

Options: See S/LTT and HTT Tension Ties for alternate retrofit solutions.

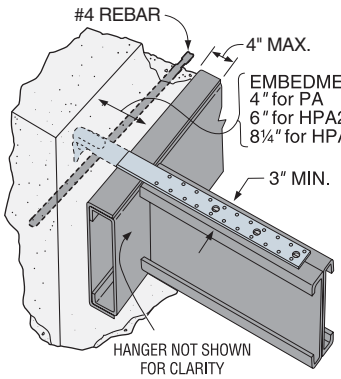
Codes: See page 11 for Code Report Reference Key Chart.

The IBC 1620.2.1 states:

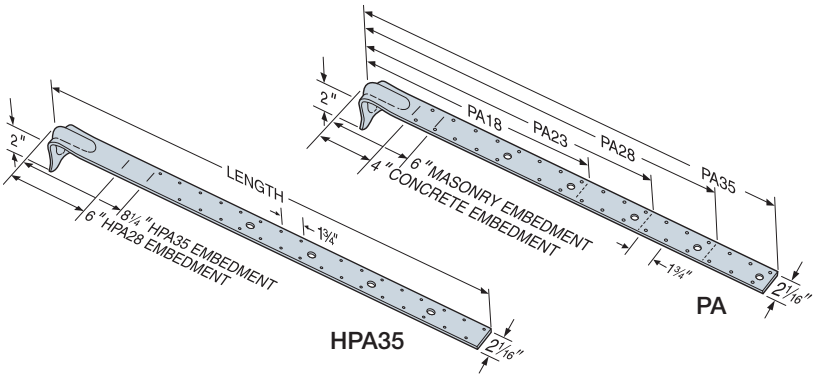
. . . Diaphragm to wall anchorage using embedded straps shall have the straps attached to or hooked around the reinforcing steel, or otherwise terminated to effectively transfer forces to the reinforcing steel.

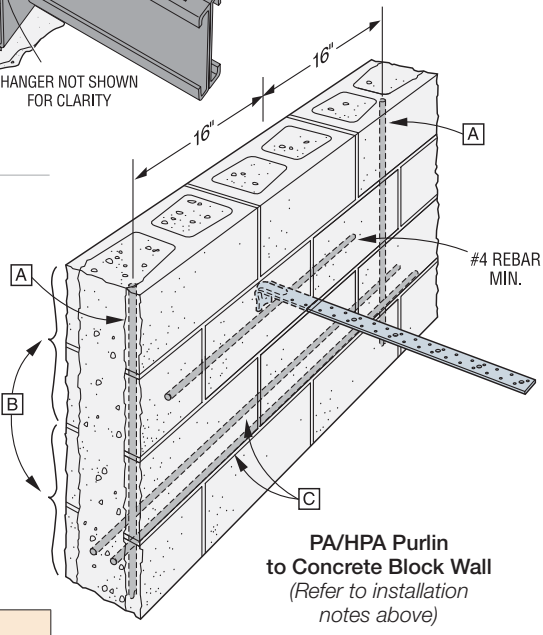


PA/HPA Purlin to Concrete Wall Single C-Shape Joist Installation



PA/HPA Purlin to Concrete Wall Back-to-Back Joist Installation





PA/HPA Purlin to Concrete Block Wall
(Refer to installation notes above)

Model No.	Strap Length L (in)	le (in)	Fasteners[8] Rafter/Stud /Joist Thickness 33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	Non Cracked Tension Load	Cracked Tension Load	Max. Allowable Strap Tensile Capacity	Masonry Installation Tension Load	Code Ref.
Wind and SDC A & B – Allowable Loads (lbs.)										
PA18	18½	4	16- #10	16- #10	8- #10	2830	2360	NA	1895	
PA23	23¾	4	22-#10	16- #10	8- #10	3220	2360	NA	2815	
PA28	29	4	22-#10	16- #10	8- #10	3370	2360	NA	2815	
PA35	35	4	22-#10	16- #10	8- #10	3370	2360	NA	2815	
HPA28	32½	6	28- #10	20- #10	10- #10	4845	4845	NA	—	
HPA35	38½	8¼	32- #10	22- #10	12- #10	5145	5145	NA	—	
SDC C-F – Allowable Loads (lbs.)										I8
PA18	18½	4	16- #10	16- #10	8- #10	2830	1980	3220	1895	
PA23	23¾	4	22-#10	16- #10	8- #10	2830	1980	3220	2815	
PA28	29	4	22-#10	16- #10	8- #10	2830	1980	3935	2815	
PA35	35	4	22-#10	16- #10	8- #10	2830	1980	3935	2815	
HPA28	32½	6	28- #10	20- #10	10- #10	4845	4090	5145	—	
HPA35	38½	8¼	32- #10	22- #10	12- #10	5145	5145	5145	—	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Loads may not be increaed for short-term loading.
2. For concrete installs, the minimum compressive strength, f'_c = 3000 psi.
3. Multiply Seismic and Wind ASD load values by 1.4 or 1.6 respectively to obtain LRFD capacities.
4. In accordance with 2006 and 2009 IBC Section 1613.1, detached one- and two-family dwellings in Seismic Design Category (SDC) C may use "Wind and SDC A&B" allowable loads.
5. Minimum center-to-center spacing is 3 times the required embedment (S_{min} = 3xl_e) for PA/HPAs acting in tension simultaneously, where l_e = embedment depth. Standard installation is based on minimum 5" end distance.
6. Install fasteners symmetrically and with a minimum of 4 of the required fasteners between the embedment line and the first tooling hole. In some cases, not all of the fastener holes will need to be filled.
7. Per ASCE7-10, 12.11.2.2.2, for diaphragms in structures assigned to SDC C-F, maximum allowable strap tensile capacity shall be no less than 1.4 times the design load. Not applicable (NA) for Wind and SDC A&B designs.
8. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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STHD/LSTHD Strap Tie Holdowns

SIMPSON Strong-Tie®

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The STHD is an embedded strap-tie holdown offering high-load capacity. The STHD incorporates many features that aid correct installation and improve performance. When installed on the forms with the StrapMate® strap holder, the unique design of the STHD delivers enhanced stability before and during the pour to help prevent both parallel and perpendicular movement (relative to the form). This results in accurate positioning of the strap and reduced possibility of spalling.

Features

- The fastener pattern allows for fastening to the edges of back-to-back studs
- Strap nail slots are countersunk to provide a lower nail head profile
- The slots below the embedment line enable increased front-to-back concrete bond and help to reduce spalling
- Rim joist models accommodate up to a 17" clear span without any loss of strap fastening

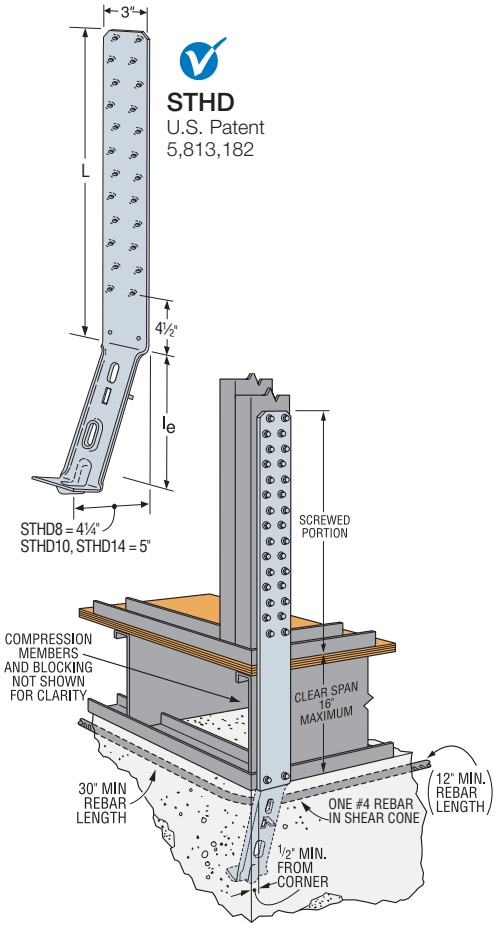
Material: LSTHD8, LSTHD8RJ—14 gauge, all others—12 gauge

Finish: Galvanized

Installation: • Use all specified fasteners. See General Notes.

- Use table below for both standard concrete and post-tension slab installations.
- Install before concrete pour with a StrapMate® or other holding device.
- Fasten strap from the bottom up.
- Strap may be bent one full cycle (bent horizontal 90° then bent vertical) to aid wall placement, but may cause spalling behind the strap. If the spall is 1" or less, measured from the embedment line to the bottom of the spall, full loads apply. 1" to 4" spalls for LSTHD8 achieve 0.9 times table loads. STHD10 and STHD14 achieve full load for spalls less than 4". Any portion of the strap left exposed should be protected against corrosion.
- Other than where noted in the two-pour detail, do not install where: (a) a horizontal cold joint exists within the embedment depth between the slab and foundation wall or footing beneath, unless provisions are made to transfer the load, or the slab is designed to resist the load imposed by the anchor; or (b) slabs are poured over concrete block foundation walls.
- Additional studs attached to the shearwall studs or post may be required by the Designer for wall sheathing fastening.

Codes: See page 11 for Code Report Reference Key Chart.



Typical STHD14RJ Rim Joist Application

Allowable Stress Design (ASD) Loads for STHD Strap Style Hold-Down on CFS - 2500 psi Concrete

Wind and SDC A & B – Allowable Tension Loads (lbs.) – 33 mil (20 ga.) Studs														Code Ref.
Min. Stem Wall (in.)	Model No.		Strap Length (L)		le (in.)	Non Cracked				Cracked				
	Standard	Rim Joist	Standard (in.)	Rim Joist (in.)		Req'd Screws[5]	Mid Wall	Corner	End Wall	Req'd Screws[5]	Mid Wall	Corner	End Wall	
6	LSTHD8	LSTHD8RJ	18⅝	32⅛	8	20 -#10	3115	2700	1690	16 -#10	2675	2320	1455	I8, F6
	STHD10	STHD10RJ	24⅝	38⅛	10	24 -#10	3690	3820	2050	22 -#10	3140	3140	1705	
	STHD14	STHD14RJ	26⅛	39⅝	14	30 -#10	5150	5150	3200	30 -#10	5150	5150	3200	
8	LSTHD8	LSTHD8RJ	18⅝	32⅛	8	20 -#10	3115	2700	2230	16 -#10	2675	2320	1915	
	STHD10	STHD10RJ	24⅝	38⅛	10	28 -#10	4755	4120	3145	26 -#10	4195	3500	2585	
	STHD14	STHD14RJ	26⅛	39⅝	14	30 -#10	5300	5300	4210	30 -#10	5300	5300	4210	
SDC C-F – Allowable Tension Loads (lbs.) – 33 mil (20 ga.) Studs														
Min. Stem Wall (in.)	Model No.		Strap Length (L)		le (in.)	Non Cracked				Cracked				
	Standard	Rim Joist	Standard (in.)	Rim Joist (in.)		Req'd Screws[5]	Mid Wall	Corner	End Wall	Req'd Screws[5]	Mid Wall	Corner	End Wall	
6	LSTHD8	LSTHD8RJ	18⅝	32⅛	8	16 -#10	2270	2090	1220	14 -#10	2250	1950	1220	
	STHD10	STHD10RJ	24⅝	38⅛	10	18 -#10	2750	2750	1615	18 -#10	2640	2640	1435	
	STHD14	STHD14RJ	26⅛	39⅝	14	22 -#10	3695	3695	2685	22 -#10	3695	3695	2685	
8	LSTHD8	LSTHD8RJ	18⅝	32⅛	8	16 -#10	2615	2125	1635	14 -#10	2250	1820	1610	
	STHD10	STHD10RJ	24⅝	38⅛	10	20 -#10	3400	2940	2295	20 -#10	3400	2940	2175	
	STHD14	STHD14RJ	26⅛	39⅝	14	24 -#10	3815	3815	3500	24 -#10	3815	3815	3500	

For SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psi = 6.895 kPa.

1. Deflection at highest allowable loads for install over CFS double studs are as follows: LSTHD8 = 0.065", STHD8 = 0.071", STHD10 = 0.096" and STHD14 = 0.115".
2. Multiply Seismic and Wind ASD load values by 1.4 or 1.6 respectively to obtain LRFD capacities.
3. Per 2009 and 2013 IBC Section 1613, detached one- and two-family dwellings in Seismic Design Category (SDC) C may use "Wind and SDC A&B" allowable loads.
4. Minimum center-to-center spacing is 3 times the required embedment (S_{min} = 3xl_e) for STHD's acting in tension simultaneously. Mid wall install is based on 1.5xle end distance.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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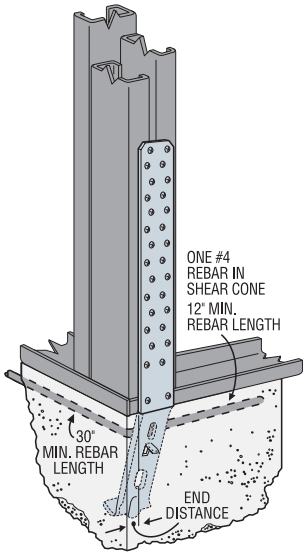
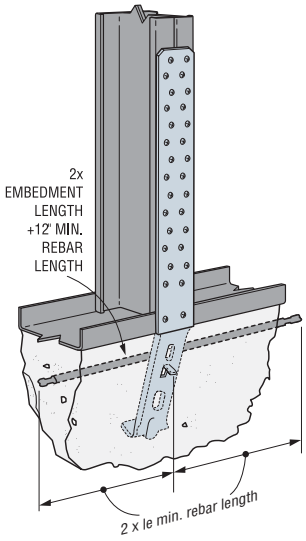
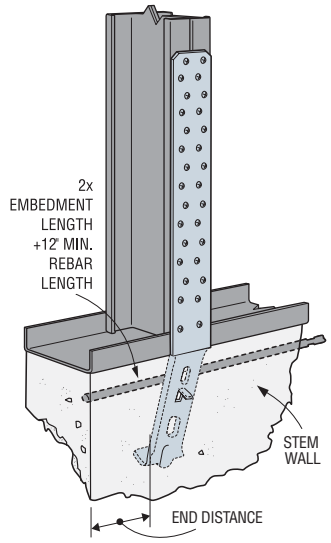
STHD/LSTHD Strap Tie Holdowns



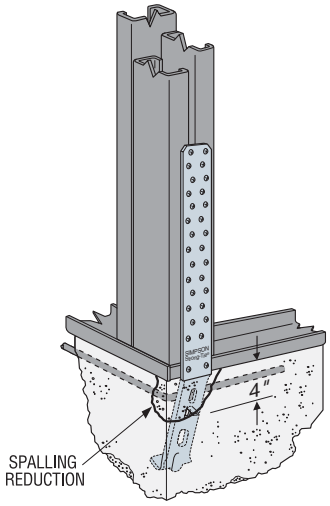
Typical STHD14 Corner Installation on 3 Studs (End of Wall Similar)



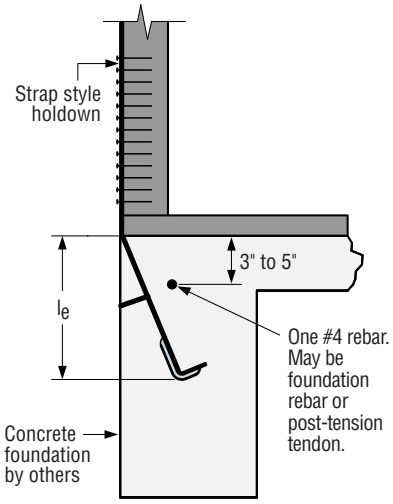
Typical STHD14 Mid Wall Installation



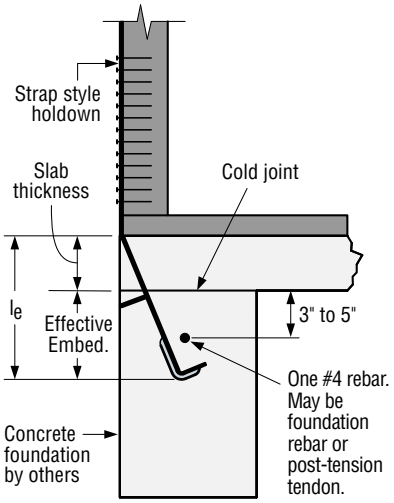
Typical STHD End Installation



SPALLING LOAD REDUCTION
If strap is bent horizontal 90° during installation, and then bent vertical for fastening to the stud, concrete spalling could result. Load reductions may apply, see installation note.



Single-Pour Rebar Installation
**Maintain minimum rebar cover, per ACI-318 concrete code requirements.*



Two-Pour Installation for Downturn Footings

Spall Reduction System for STHD Holdown

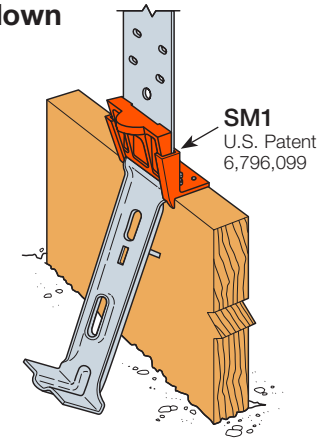
FEATURES
- Built-in tab
- StrapMate® locator line
- Additional diamond hole in RJ versions

BENEFITS

Built-in Tab:
- Reduces spalling and costly retrofits.
- No additional labor to install.
- Holds STHD away from form board.

StrapMate Locator Line:
- Easy inspection to ensure proper location.
- Allows adjustment without removing STHD.

Additional Diamond Hole:
- One more fastener to help prevent the STHD RJ models from bowing out at the rim joist section.



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S/JCT and S/HJCT Steel-Joist Connectors

SIMPSON Strong-Tie®

This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The S/JCT and S/HJCT are unique, skewable steel-joist framing connectors that combine strength, versatility and low installed cost. The connectors can be used with CFS headers, wood headers, steel I-beams (with welds or PAF fasteners) and masonry walls. Installed cost is minimized since these products are shear rather than bearing connectors, eliminating the need for web stiffeners. The connectors also feature horizontal tabs that facilitate top flange alignment and joist support during screw installation.

Material: S/JCT—68 mil (14 ga); S/HJCT—97 mil (12 ga)

Finish: Galvanized

Features:

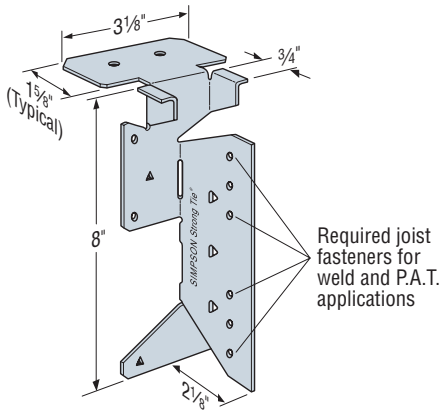
- Uni-directional: Joist can be attached from left or right
- One size fits joists 8" through 14" deep.
- Optional holes for additional load capacity.
- Simplicity of design.
- Quick and easy installation.
- Field skewable up to 45° left or right.

Installation:

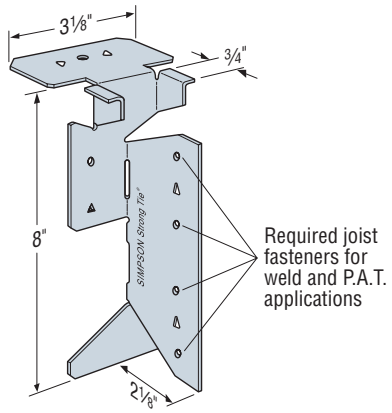
- Attach hanger with specified fasteners. Use round holes for minimum load, use round and triangle holes for maximum load.
- May be used for weld-on applications. The minimum required weld to the top flange is ⅛" x 2½" fillet weld to each side of top flange. Consult the code for special considerations when welding galvanized steel.
- May be installed using PDPAT-62KP (0.157" x ⅝") powder-actuated fasteners. Steel headers with thicknesses between ¼" and ¾" having a minimum F_y = 36 ksi. A Red (level 5) or Purple (level 6) powder load may be required to achieve specified penetration (p). See illustration on page 121.

Codes: See page 11 for Code Report Reference Key Chart.

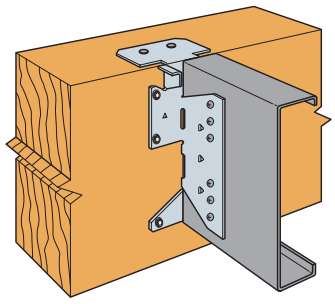
Ordering Information: The S/JCT is sold in cartons of 50. The S/HJCT is sold in kits as the S/HJCT-KT and contains five (5) connectors and (95) #14 screws.



S/HJCT
U.S. Patent 6,230,467



S/JCT



S/HJCT Installation with a 4x10 Wood Header

Model No.	Fasteners[7]			Allowable Loads[1]		Code Ref.
	Top	Face	Joist	Uplift	Down	
Attached to CFS Header: 54 mil (16 ga)[3] – Straight Hanger						IP1 L2 F4
S/JCT (min)	1-#10	2-#10	4-#10	940	1195	
S/JCT (max)	1-#10	4-#10	6-#10	1435	2105	
S/HJCT (min)	2-#10	4-#14	6-#14	1510	2920	
S/HJCT (max)	2-#10	8-#14	9-#14	1670	3855	
Attached to CFS Header: 54 mil (16 ga)[3] – Skewed Hanger						
S/JCT (min)	1-#10	2-#10	4-#10	940	1135	
S/JCT (max)	1-#10	4-#10	6-#10	940	1185	
S/HJCT (min)	2-#10	4-#10	6-#14	1510	2305	
Attached to Steel Header[4] – Straight and Skewed Hanger						
S/JCT (min)	⅛" x 2½" fillet weld to each side of top flange		4-#10	145	940	
S/HJCT (min)			4-#14	195	1450	
S/HJCT (min) Skew			4-#14	195	1235	
S/JCT (min)	2 - 0.157" x ⅝" Powder-actuated fastener[8]		4-#10	145	750	170
S/HJCT (min)			4-#14	195	1185	
Attached to Masonry – Straight and Skewed Hanger						
S/HJCT (min)	2-¼" x 2¼" Titen	4-¼" x 2¼" Titen	6-#14	710	1785	
S/HJCT (min) Skew				710	1410	

Model No.	Fasteners[7]			Allowable Loads[1,2]		Code Ref.
	Top	Face	Joist	Uplift (160)	Down (100)	
Attached to 4x DF/SP Wood Header – Straight Hanger						IP1 L2 F4
S/JCT (min)	1-10d	2-10d	4-#10	555	945	
S/JCT (max)	1-10d	4-10d	6-#10	945	1465	
S/HJCT (min)	2-10d	4-¼"x3" SDS	6-#14	1210	2625	
S/HJCT (max)	2-10d	8-¼"x3" SDS	9-#14	1475	2980	
Attached to 4x DF/SP Wood Header – Skewed Hanger						
S/JCT (min)	1-10d	2-10d	4-#10	390	845	
S/JCT (max)	1-10d	4-10d	6-#10	775	1300	
S/HJCT (min)	2-10d	4-¼"x3" SDS	6-#14	1210	1935	

1. Allowable loads are based on on a minimum of single 54 mil (16 ga) CFS joist member. CFS joist shall be laterally braced per Designer specification.
2. Allowable loads for wood header are based on 4x DF/SP minimum, for SPF/HF wood species use an adjustment factor of 0.72.
3. CFS header must be braced to prevent web buckling per Designer specification and header must have full bearing of 1⅝" flange-depth.
4. Backing in the steel beam cavity is not required behind the hanger for load listed.
5. Screws shall be installed using joist hanger holes screwing through the hanger into the joist.
6. CFS joists with up to a 0.50" gap (short cut), use an adjustment factor of 0.87 and joists with a 0.50" to 0.90" gap (short cut), use an adjustment factor of 0.75.
7. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.
8. See page 104 for more information.

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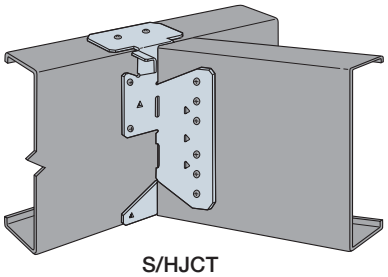
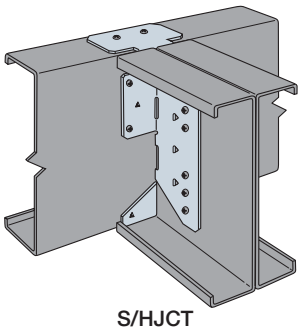
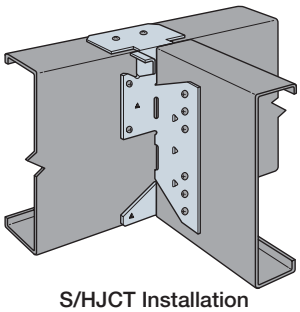
S/JCT and S/HJCT Steel-Joist Connectors



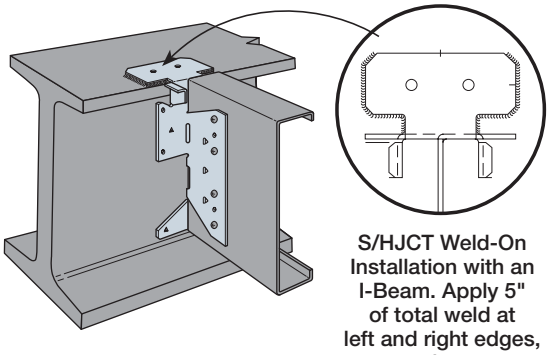
S/HJCT
Skewed 45° Installation



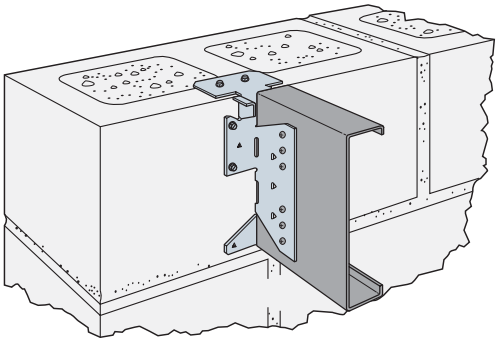
S/HJCT
Double-Joist Installation



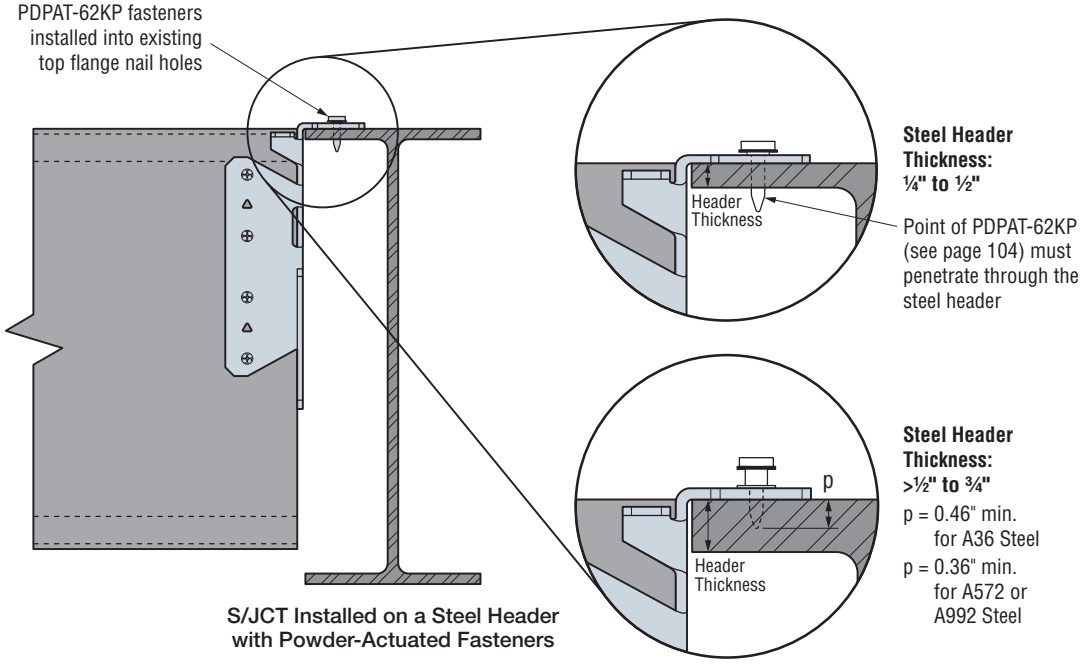
S/HJCT Installation
with a CFS Steel Header



S/HJCT Weld-On
Installation with an
I-Beam. Apply 5"
of total weld at
left and right edges,
as shown.



S/HJCT Installation
on Masonry Header



S/JCT Installed on a Steel Header
with Powder-Actuated Fasteners

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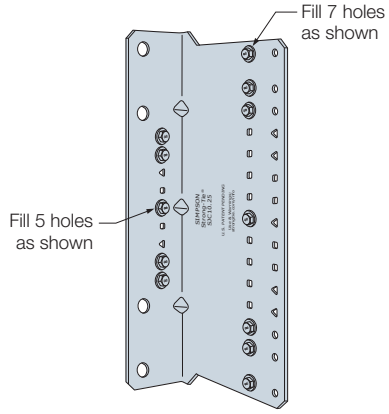
SJC Steel-Joist Connectors

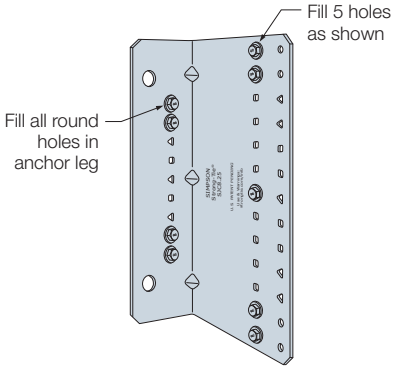
SJC Connectors: Steel-to-Steel

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Framing Member Depth[5] (in.)	Fasteners[6]			Allowable F_4 Loads (lbs.)[3]			Code Ref.
				Pattern[2]	Carried Member	Carrying Member	Minimum Member Thickness		Maximum Connector Load[4]	
							54 mil (16 ga.)	68 mil (14 ga.)		
SJC8.25	68 (14)	8¼	10	Min.	4 - #10	4 - #10	980	980	2930	160
				Max.	9 - #10	7 - #10	1005	1490		
				Inner	5 - #10	4 - #10	1345	2005		
MSJC8.25	97 (12)	8¼	10	Min.	4 - #10	4 - #10	1005	1710	2930	
				Max.	9 - #10	7 - #10	1135	1765		
				Inner	5 - #10	4 - #10	1535	2220		
SJC10.25	68 (14)	10¼	12	Min.	6 - #10	4 - #10	1170	1625	3935	
				Max.	11 - #10	7 - #10	1265	1625		
				Inner	7 - #10	5 - #10	1620	2170		
MSJC10.25	97 (12)	10¼	12	Min.	6 - #10	4 - #10	1200	2045	3935	
				Max.	11 - #10	7 - #10	1265	2045		
				Inner	7 - #10	5 - #10	1730	2635		

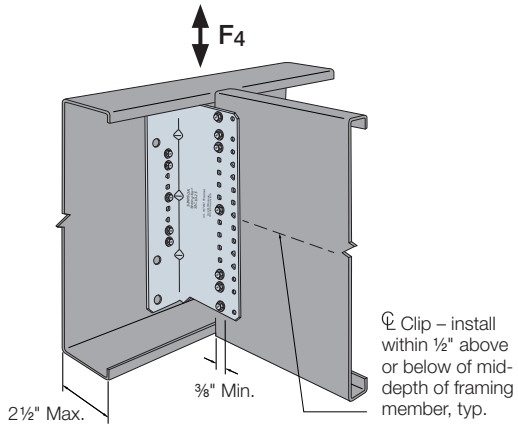
1. See page 43 for product information.
2. Min. fastener quantity and load values—fill all round holes; Max. fastener quantity and load values—fill all round and triangular holes; Inner fastener quantity and load values—see illustrations for fastener placement.
3. Allowable loads are based on bracing of the members located within 12" of the connection.
4. Maximum allowable load for connector that may not be exceeded when designing custom installations. Designer is responsible for member and fastener design.
5. For 6" and 8" joists, SSC connectors are recommended.
6. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



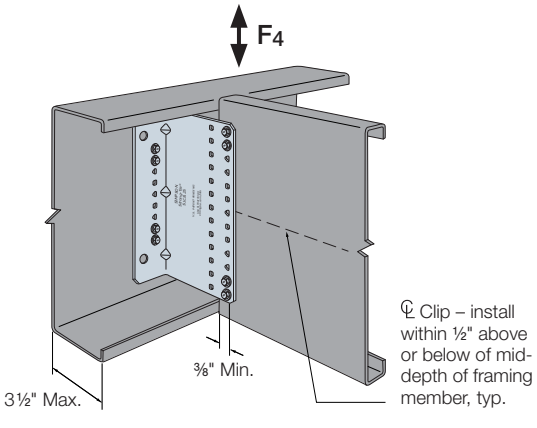
SJC10.25-Inner Fastener Pattern
(MSJC10.25 Similar)



SJC8.25-Inner Fastener Pattern
(MSJC8.25 Similar)



SJC Installation with Carried Member Fasteners in Inner Row



SJC Installation with Carried Member Fasteners in Outer Row
(For Min./Max. Load Values)

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S/LBV, S/B and S/BA Hangers

The S/BA is a cost-effective alternative to heavier, special-order hangers. It is value engineered and tested to achieve higher allowable loads and increased performance. It may be fastened with screws or powder-actuated fasteners or welded to the header, providing more design options and greater versatility.

S/LBV and S/B top-flange hangers are manufactured with precision forming and quality control, providing dimensional accuracy and helping to ensure proper bearing area and connection.

Material: S/LBV, S/BA—68mil (14 ga); S/B—97mil (12 ga)

Finish: Galvanized

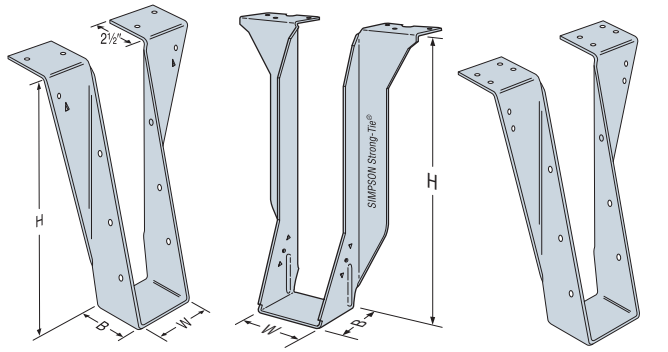
Installation:

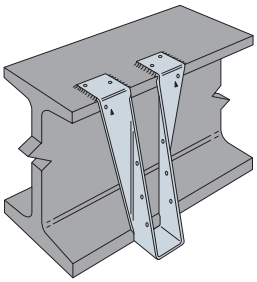
- S/LBV, S/B, and S/BA may be used for weld-on applications; a minimum of ⅛" x 2" fillet weld on each top flange is required. Distribute the weld equally on both top flanges. Consult the code for special consideration when welding galvanized steel. Uplift loads do not apply.
- S/BA may be installed using PDPAT-62KP (0.157" x ⅝") powder-actuated fasteners. Steel headers with thicknesses between ¼" and ¾" having minimum F_y – 36 ksi. A Red (level 5) or Purple (level 6) powder load may be required to achieve specified penetration (p).

Options: Skew only:

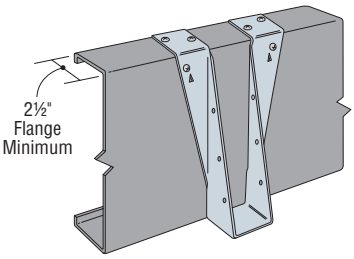
- S/LBV and S/B series (max. width = 5½") can be skewed to a maximum of 45 degrees.

Codes: See page 11 for Code Report Reference Key Chart





S/LBV, S/B, and S/BA Are Acceptable for Weld-on Applications
(S/LBV shown)



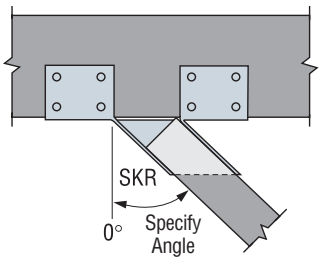
S/LBV Installation with a CFS Steel Header

Model	Dimensions			Fasteners[6]			Allowable ASD Loads[5]		Code Ref.
	W	H	B	Top	Face	Joist	Uplift	Down	
Cold-Formed Steel Header – Straight Hanger									
S/LBV	See Table	6 to 20	2¼	4 - #10	2 - #10	3 - #10	1010	3150	IP1, F4, L2
S/B		6 to 30	3	8 - #10	4 - #14	3 - #14	1855	5970	
S/BA		See Table	3	6 - #10	—	1 - #10	—	3475	
Cold-Formed Steel Header – Skewed Hanger									
S/LBV	See Table	6 to 20	2¼	4 - #10	2 - #10	3 - #10	1010	2220	IP1, F4, L2
S/B		6 to 30	3	8 - #10	4 - #14	3 - #14	1855	4195	
Powder-Actuated Fastener or Welded to Steel Header – Straight Hanger									
S/LBV	See Table	6 to 20	2¼	4 - ⅛" x 2" fillet weld to each side of top flange	—	3 - #10	—	2965	IP1, F4, L2
S/B		6 to 30	3		—	3 - #14	—	5755	
S/BA		See Table	3		—	1 - #10	—	2920	
S/BA			3	6 - 0.157" x ⅝" PAT	—	1 - #10	—	2685[4]	

1. Designer shall ensure that the joist member adequately transfers load to hanger.
2. Cold-formed steel / steel-beam header must be braced to prevent buckling per Designer specification.
3. Powder-actuated fasteners may be installed in up to ⅜" steel headers having a minimum F_y = 36,000 psi.
4. Load is based on using the Simpson Strong-Tie® PDPAT-62KP powder-actuated fastener and a minimum Red (level 5) powder load.
5. Tabulated loads are based on testing with full bearing of 2½" flange-depth minimum with 68 mil (14 ga) CFS for S/LBV and S/BA hanger and 97 mil (12 ga) CFS for S/B hanger.
6. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

S/LBV Series Model No.	S/B Series Model No.	W
S/LBV1.56X	S/B1.56X	1 9⁄16
S/LBV1.68X	S/B1.68X	1 11⁄16
S/LBV1.81X	S/B1.81X	1 13⁄16
S/LBV2.06X	S/B2.06X	2 1⁄16
S/LBV2.37X	S/B2.37X	2 3⁄8
S/LBV2.56X	S/B2.56X	2 9⁄16
S/LBV2.68X	S/B2.68X	2 11⁄16
S/LBV3.12X	S/B3.12X	3 1⁄8
S/LBV3.56X	S/B3.56X	3 9⁄16
S/LBV3.62X	S/B3.62X	3 5⁄8
S/LBV4.06X	S/B4.06X	4 1⁄16
S/LBV4.12X	S/B4.12X	4 1⁄8
S/LBV4.28X	S/B4.28X	4 1⁄4
S/LBV4.75X	S/B4.75X	4 3⁄4
—	S/B5.25X	5 1⁄4
S/LBV5.5X	S/B5.5X	5 1⁄2
—	S/B5.56X	5 9⁄16
—	S/B6.06X	6 1⁄16
—	S/B7.12X	7 1⁄8
—	S/B7.25X	7 1⁄4
—	S/B7.5X	7 1⁄2

S/BA Series Model No.	W	H
S/BA2.12/8	2 1⁄8	8
S/BA2.12/10		10
S/BA2.12/12		12
S/BA2.12/14		14
S/BA4.18/8	4 3⁄16	8
S/BA4.18/10		10
S/BA4.18/12		12
S/BA4.18/14		14



Top View S/B Hanger Skewed Right

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W/WP Hangers

This series of purlin hangers offer the greatest design flexibility and versatility.

Material: Stirrup—97 mil (12 ga)

Finish: Simpson Strong-Tie® gray paint. Some models available hot-dip galvanized; specify HDG; see Corrosion Information on pages 17-20.

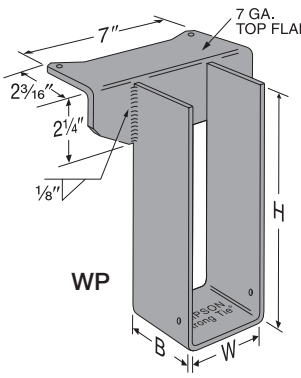
Installation: Hangers may be welded to steel headers with ⅛" for W and 3⁄16" for WP by 1½" fillet welds located at each end of the top flange.

Options: • W and H dimensions are modifiable.

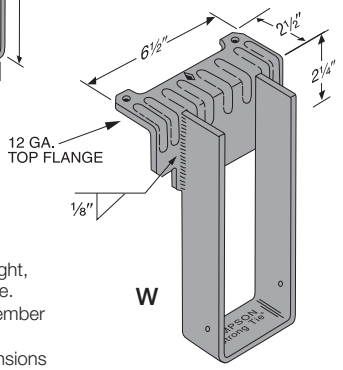
Sloped And/Or Skewed Seat

- W/WP series may be skewed to a maximum of 84° and/or sloped to a maximum of 45°.
- For slope only, skew only, or slope and skew combinations, the allowable load is 100% of the table load.
- Specify the slope up or down in degrees from the horizontal plane and/or the skew right or left in degrees from the perpendicular vertical plane. Specify whether low side, high side or center of joist will be flush with the top of the header.

Codes: See page 11 for Code Report Reference Key Chart.



Some model configurations may differ from those shown. Call Simpson Strong-Tie for details.



Model No.	Dimensions (in.)			Fasteners[4]		Allowable Down Loads (lbs.)	Code Ref.
	W	H	B	Header	Joist		
W	1½ -4	4˚- 30	2½ - 5	Weld	1- #10	2335	170
WP	1 3⁄16 - 7½	4˚- 30	2½ - 5	Weld	1- #10	3650	

1. For hanger heights exceeding the joist height, the allowable load is 0.50 of the table value.
2. The Designer shall ensure that the joist member adequately transfers load to the hanger.
3. Not all combinations of W, H, and B dimensions are available. Contact Simpson Strong-Tie.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

HUC Hangers

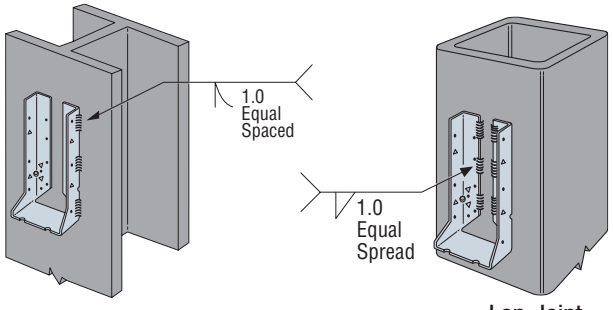
Material: 68 mil (14 ga)

Finish: Galvanized

Installation:

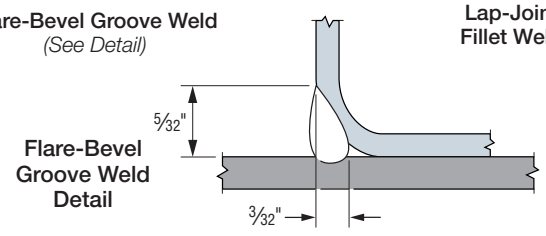
- HUC series hangers may be welded to supporting structural steel members.
- Use 1" weld segments equally spaced top and bottom, with half the segments on each side of hanger.
- Welds may be either Lap Joint (on outside edge of flanges) or Flare-Bevel Groove (on flange bend line).

Codes: See page 11 for Code Report Reference Key Chart.



Flare-Bevel Groove Weld
(See Detail)

Lap-Joint Fillet Weld

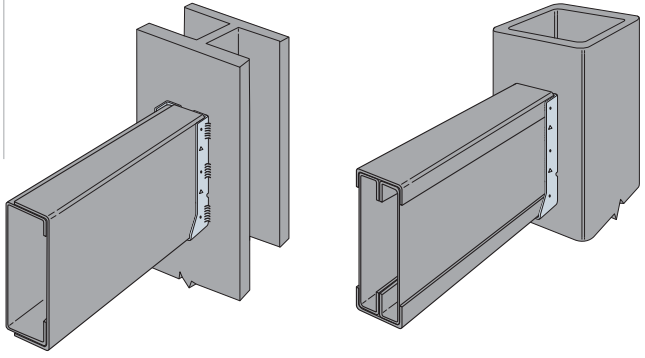


Flare-Bevel Groove Weld Detail

Model Series	Connection Type		Max Allowable Down Load (lbs.)	Code Ref.
	Joist	Structural Steel		
	Fastener[5]	Weld		
HUC	#10	4 - 1" segments	3280	170
	#10	6 - 1" segments	4855	

1. Loads assume an E-70S-6 (60 ksi) filler rod.
2. Welds must conform to the current A.W.S. D1.3 structural welding code for sheet steel and must be performed by certified welder.
3. Designer shall ensure that the joist member adequately transfers load to hanger.
4. Hanger-to-joist connection shall be made using screws on the side of the hanger where it meets the web of the joist.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

Installation for CFS Built-Up Beam
The Designer is responsible for design of beam member.



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L, LS and S/LS Utility Clips and Skewable Angles

L, LS, and S/LS angles are load rated, providing the correct thickness and number of fasteners for the specifier compared with field fabricated clip angles. These angles also have well-defined fastener locations, and testing ensures that the tabulated load values account for connection eccentricities. The connectors are general utility reinforcing angles with multiple uses. S/LS and LS connectors are skewable and can be used to attached members intersecting at angles.

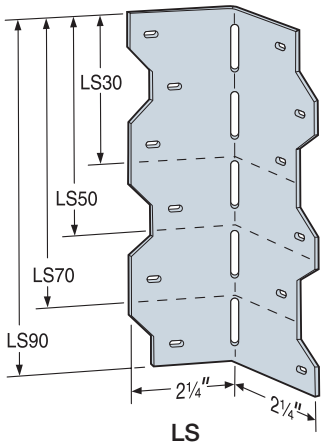
Material: L—54 mil (16 ga.); S/LS and LS—43 mil (18 ga.)

Finish: Galvanized (G90)

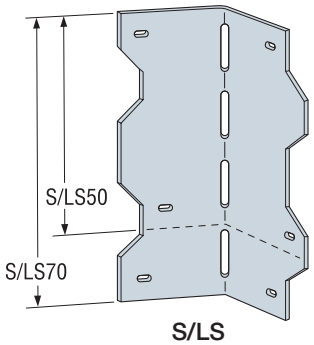
Installation:

- Use all specified fasteners.
- S/LS and LS—field-skewable; bend one time only.
- CFS framing must be constrained against rotation when using a single S/LS or LS per connection.

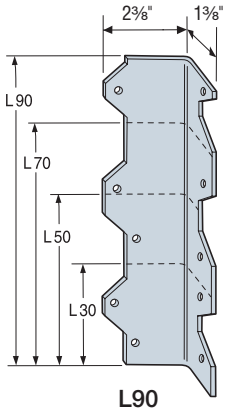
Codes: See page 11 for Code Report Reference Key Chart.



LS
U.S. Patent 4,230,416



S/LS
U.S. Patent 4,230,416

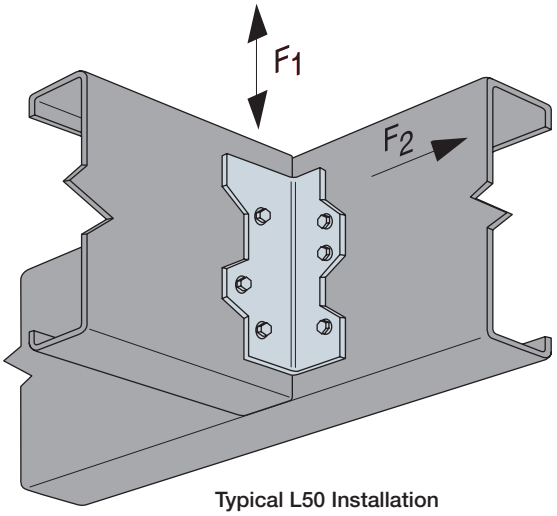


L90

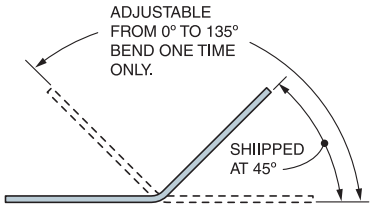
Model No.	Length (in.)	Fasteners[2]	Allowable Loads (lbs.)						Code Ref.
			33 mil (20 ga.)		43 mil (18 ga.)		54 mil (16 ga.)		
			F_1	F_2	F_1	F_2	F_1	F_2	
L30	3	4-#10	200	60	315	85	610	—	170
L50	5	6-#10	475	—	675	90	750	110	
L70	7	8-#10	705	—	760	110	1100	110	
L90	9	10-#10	795	—	945	110	1740	110	
LS30	3⅜	6-#10	200	—	370	—	500	—	
S/LS50	4⅞	4-#10	200	—	370	—	500	—	
S/LS70	6⅜	6-#10	465	—	575	—	715	—	
LS90	7⅞	12-#10	465	—	895	—	915	—	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

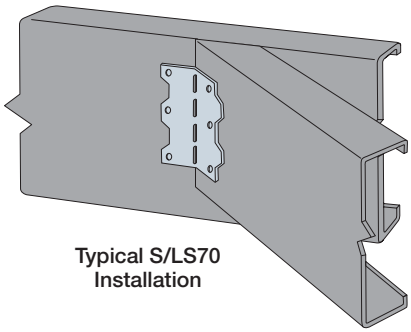
1. Loads are for one part only.
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical L50 Installation



S/LS Top View



Typical S/LS70 Installation

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ICFVL Ledger Connector System

The ICFVL Ledger Connector System is engineered to solve the challenges of mounting CFS ledgers to insulated concrete form (ICF) walls. The ICFVL is designed to provide both vertical and lateral, in-plane performance. There are many benefits over traditional anchor bolting, including better on-center spacing in most cases, faster installation and no protrusions. The embedded legs of the ICFVL are embossed for additional stiffness and the hole allows for concrete to flow through and around the connector. The exposed flange on the face of the ICF provides a structural surface for mounting a CFS ledger.

Material: ICFVL—68 mil (14 ga.)

Finish: Galvanized (G90)

Installation:

ICFVL in ICF

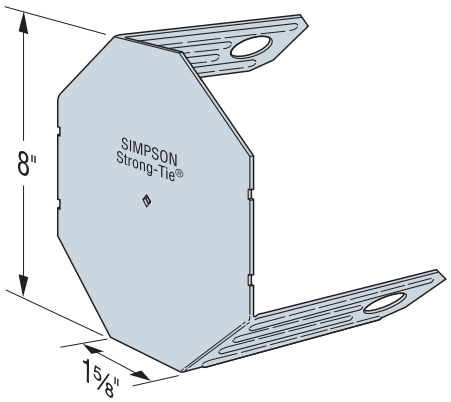
- Snap a chalk line for the bottom of the ledger.
- Mark required on-center spacing.
- Use ICFVL to mark kerfs locations.
- Cut kerfs as marked.
- Insert ICFVL flush to the face of the ICF.
- Pour concrete.

CFS Ledger Attachment

- Position the ledger level to the chalk line and against the ICFVL.
- Attach with four #14 x ¾", #3 drill point screws (not provided).
- All screws should be located at least ½" from the edge of the ICFVL.
- Space screws evenly.

Codes: See page 11 for Code Report Reference Key Chart.

WARNING:
Industry studies show that hardened fasteners can experience performance problems in wet environments. Accordingly, use this product in dry environments only.



ICFVL
Patent Pending

Reduce the chance of mis-installations using the wrong size screws; specify Simpson Strong-Tie® #14 Self-Drilling E Metal Screw (Model No. E1B1414) with the ICFVL Ledger Connector System.
See page 67 for details.

Available in 100 ct. and 2500 ct. cartons.

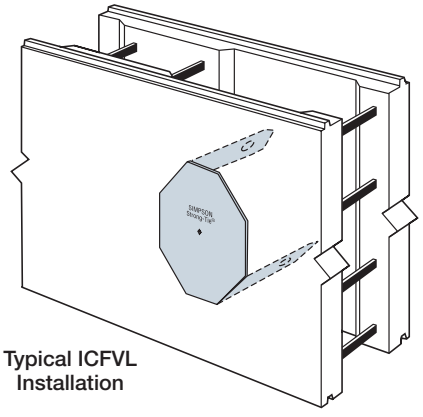
Model No.	Fasteners	Allowable ASD Loads (lbs.) 54 mil (16 ga.) 68 mil (14 ga.)		Code Ref.
		Download	Lateral F_1	
ICFVL	4-#14 x ¾"[3]	1660	1525	170

1. Fasteners for CFS ledger are not provided.
2. Loads apply to ICF foam thicknesses of 2¾" or less. Contact Simpson Strong-Tie for allowable loads on thicker walls.
3. Alternately, ¼" x ¾" fastener may be used.
4. Concrete f'_c = 2500 psi minimum.
5. When combining download and lateral loads, Designer shall evaluate as follows: Design Download/Allowable Download + Design Lateral Load/Allowable Lateral Load ≤ 1.

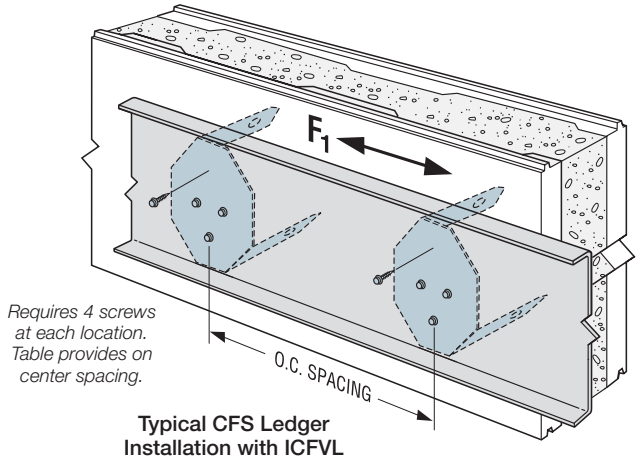
These tables address vertical load applications only

Ledger Material Thickness mil (ga.)	Connector Type	ICFVL Spacing to Replace Anchor Bolts on a CFS Ledger (in.)[1,2]							
		½" Dia. Anchors at				⅝" Dia. Anchors at			
		12" o.c.	24" o.c.	36" o.c.	48" o.c.	12" o.c.	24" o.c.	36" o.c.	48" o.c.
68 (14)	ICFVL	11	22	33	44	9	18	27	36
54 (16)	ICFVL	15	30	45	48	12	24	36	48

1. The Designer may specify different spacing based on the load requirements.
2. See flier F-ICFVL for additional connection details.



Typical ICFVL Installation



Requires 4 screws at each location. Table provides on center spacing.

Typical CFS Ledger Installation with ICFVL
(Minimum 54 mil)

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TB and LTB Bridging

TB and LTB bridging connectors are a cost-effective solution for bracing between floor joists when compared with field fabricated blocking and clip angles.

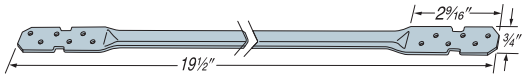
Material: LTB—27 mil (22 ga.); TB—33 mil (20 ga.)

Finish: Galvanized (G90)

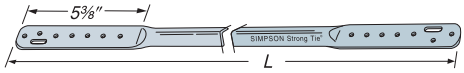
Installation:

- Use (2) #10 screws at each end.

Codes: See page 11 for Code Report Reference Key Chart.

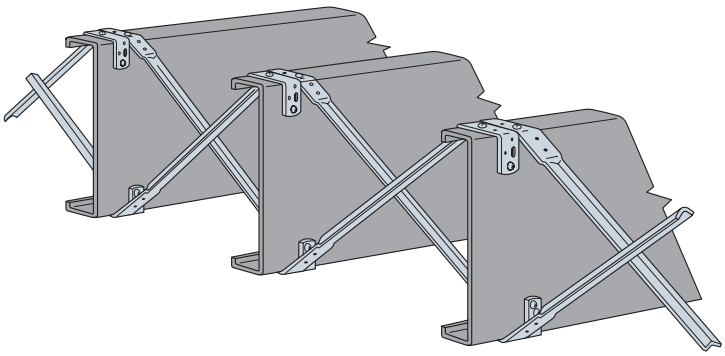


LTB20



TB

Web Height (in.)	Spacing (in.)	TB		LTB Model No.	Code Ref.
		Model No.	L (in.)		
6	12	TB20	20	LTB20	180
8		TB20	20	LTB20	
10		TB20	20	—	
12		TB27	27	—	
14		TB27	27	—	
6	16	TB27	27	—	
8		TB27	27	—	
10		TB27	27	—	
12		TB27	27	—	
14		TB27	27	—	
10	24	TB36	36	—	
12		TB36	36	—	
14		TB36	36	—	



Typical TB Installation

CS Coiled Strap

CS coiled utility straps are an ideal solution when it is desired to brace floor joist flanges with flat strap. These products are packaged in lightweight cartons (about 40 pounds) and can be cut to length on the jobsite.

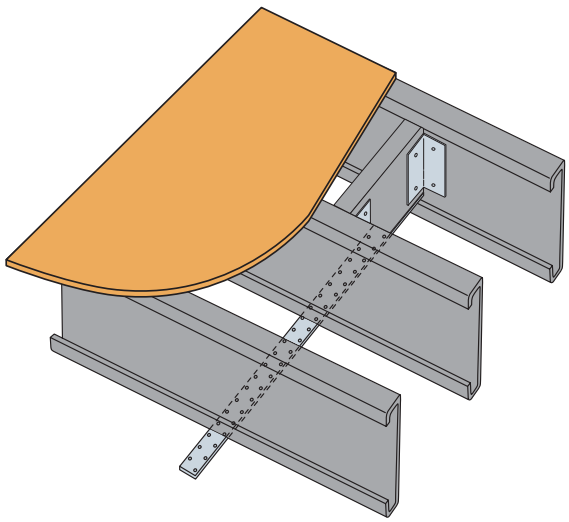
Material: See table.

Finish: Galvanized (G90)

Installation:

- Use all specified fasteners.
- Refer to the applicable code for minimum edge and end distance.

Codes: See page 11 for Code Report Reference Key Chart.



Typical CS Installation for Block and Strap Joist Bridging

Model No.	Total Length (ft.)	Connector Material Thickness mil (ga.)	Width (in.)	Fasteners[4] (At Blocking)			Allowable Tension Loads (lbs.)	Code Ref.
				Framing Thickness mil (ga.)				
				33 (20 ga.)	43 (18 ga.)	54 (16 ga.)		
CS16	150	54 (16 ga)	1¼	9 - #10	6 - #10	4 - #10	1550	IP1, L2, F4
CS18	200	43 (18 ga)	1¼	7 - #10	5 - #10	3 - #10	1235	
CS20	250	33 (20 ga)	1¼	6 - #10	4 - #10	3 - #10	945	
CS22	300	27 (22 ga)	1¼	5 - #10	3 - #10	3 - #10	775	

1. In order to achieve the tabulated loads in the strap, attach each strap to the blocking with the tabulated number of screws.
2. Strap length at blocking to achieve tabulated load = number of tabulated screws + 1".
3. Calculate the strap value for a reduced number of screws to the blocking as follows:

$$\text{Allowable Load} = \frac{\text{No. of Screws Used}}{\text{No. of Screws in Table}} \times \text{Table Load}$$

4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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SSP/DSP/TSP Stud Plate Ties

The SSP and DSP single- and double-stud plate ties connect single and double studs to top and bottom track. Each can be used for either top- or bottom-track applications.

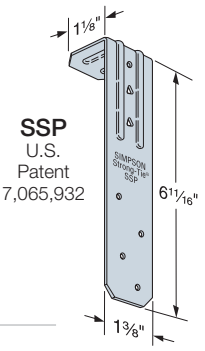
Material: SSP/DSP—43 mil (18 ga); TSP—54 mil (16 ga)

Finish: Galvanized. Some products available in ZMAX®; see Corrosion Information, pages 17-20.

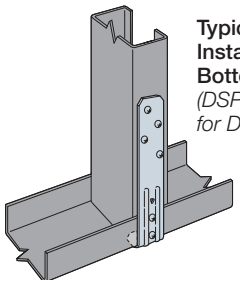
Installation: • Use all specified fasteners; see General Notes.

• DSP/SSP—top track installation-fill all round and triangle holes.

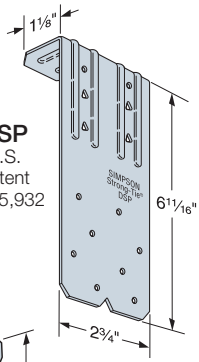
Codes: See page 11 for Code Report Reference Key Chart.



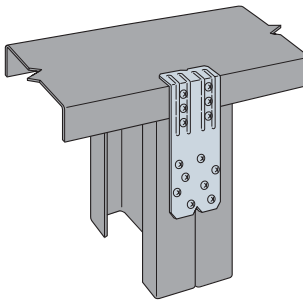
SSP
U.S. Patent 7,065,932



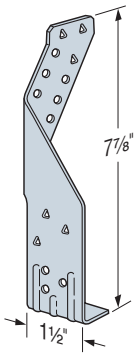
Typical SSP Installed to Bottom Track *(DSP similar for Double Stud)*



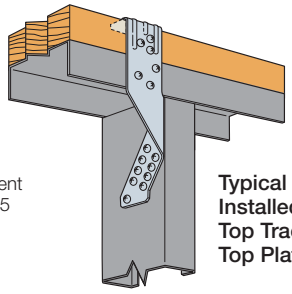
DSP
U.S. Patent 7,065,932



Typical DSP Installed to Top Track *(SSP similar for Single Stud)*



TSP
U.S. Patent D618,085



Typical TSP Installed to Top Track with Top Plate

Model No.	Fasteners[4]				Allowable Uplift Loads (lbs.)		Code Ref.
	Studs	Top Track		Bottom Track	33 mil (20 ga.)	43 mil (18 ga.)	
	CFS	Wood	CFS	CFS			
SSP	4 - #10	—	—	2 - #10	355	625	IP1, L2, F4
		—	2 - #10	—	340	600	
		2 - #10[3]	1 - #10	—	4051	7151	
		2 - 10d	1 - #10	—	4801	8401	
DSP	8 - #10	—	—	4 - #10	430	695	
		—	4 - #10	—	475	775	
		4 - #10[3]	2 - #10	—	5851	9551	
		4 – 10d	2 - #10	—	7301	12001	
TSP	6 - #10	—	—	3 - #10	345	645	
		—	3 - #10	—	370	700	
	9 - #10	3 - #10[3]	3 - #10	—	3601	6851	
		3 - 10d	3 - #10	—	4801	9051	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. For wood plates, noted values only apply to DF/SP members where wood top plates are used. For SPF values, multiply by 0.86.
2. For wood plates, when cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
3. Screws installed into wood plates with a minimum #10x¾".
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

SP Stud Plate Ties

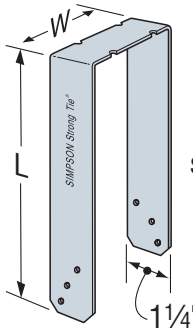
The SP stud plate tie is a plate-to-stud connection providing uplift resistance.

Material: See table.

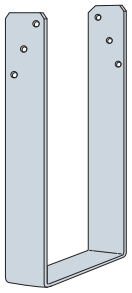
Finish: Galvanized. Available with ZMAX® coating; see Corrosion Information, pages 17-20.

Installation: • Use all specified fasteners.

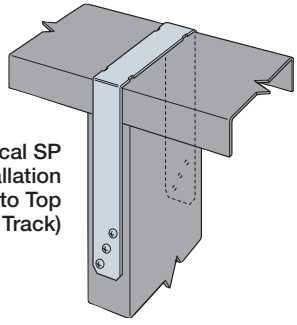
Codes: See page 11 for Code Report Reference Key Chart.



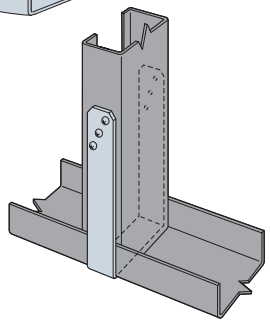
SP4



SPH6



Typical SP Installation (Wall to Top Track)



Typical SP Installation (Wall to Bottom Track) *(SPH similar)*

Model No.	Connector Material Thickness mil (ga.)	Dimensions (in.)		Stud Fasteners[1]	Allowable Uplift Loads 33 mil (20 ga.) (lbs.)	Code Ref.
		W	L			
SP4	33 (20ga)	3⁹⁄₁₆	7¼	6 - #10	825	IP1, L2, F4
SP6	33 (20ga)	5⁹⁄₁₆	7¾	6 - #10	825	
SP8	43 (18ga)	7⁵⁄₁₆	8⁵⁄₁₆	6 - #10	930	170
SPH4	43 (18ga)	3⁹⁄₁₆	8¾	12 - #10	1490	
SPH4R	43 (18ga)	4¹⁄₁₆	8¼	12 - #10	1490	
SPH6	43 (18ga)	5⁹⁄₁₆	9¼	12 - #10	1490	
SPH6R	43 (18ga)	6¹⁄₁₆	8¾	12 - #10	1490	
SPH8	43 (18ga)	7⁵⁄₁₆	8⅜	12 - #10	1490	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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S/H and H Seismic and Hurricane Ties

Designed to provide seismic and wind ties for trusses or joists, this versatile line may be used for general tie purposes, strongback attachments, and as all-purpose ties where one member crosses another.

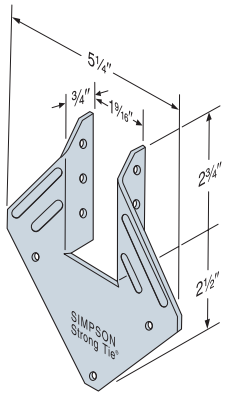
Material: See table

Finish: Galvanized. Available with ZMAX® coating; see Corrosion Information, pages 17-20.

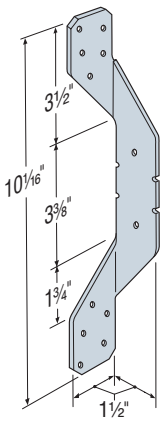
Installation: • Use all specified fasteners.

- The S/H1 can be installed with flanges facing outwards (reverse of illustration 1) when installed inside a wall for truss applications.
- Hurricane ties do not replace solid blocking.
- S/H2.5, S/H3 and H6 ties are only shipped in equal quantities of rights and lefts.

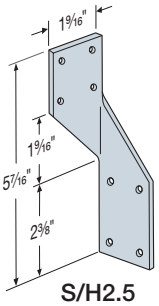
Codes: See page 11 for Code Report Reference Key Chart.



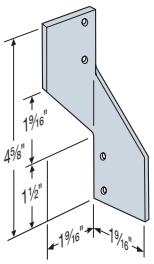
S/H1



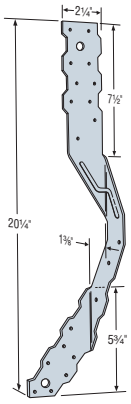
H2A



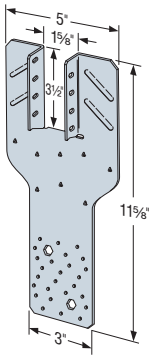
S/H2.5



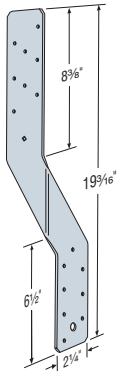
S/H3



H7Z



H10S

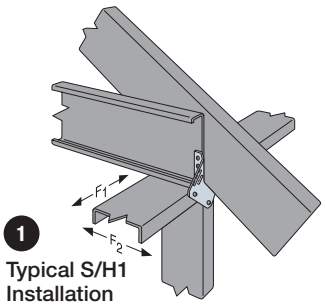


H6

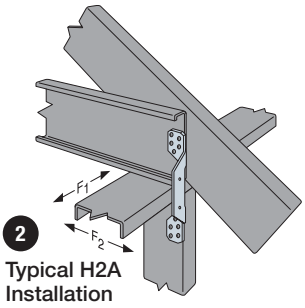
Model No.	Connector Material Thickness mil (ga.)	Fasteners[5]			Allowable Loads (lbs.) 33 mil (20 ga.)			Code Ref.
		To Rafters /Truss	To Top Track	To Stud	Uplift	Lateral F_1	Lateral F_2	
S/H1	43 (18ga)	3 - #10	2 - #10	1 - #10	305	100	115	170
H2A	43 (18ga)	5 - #10	1 - #10	5 - #10	450	90	100	
S/H2.5	43 (18ga)	4 - #10	—	4 - #10	390	90	125	
S/H3	43 (18ga)	2 - #10	2 - #10	—	375	90	125	
H6	54 (16ga)	—	8 - #10	8 - #10	950	—	—	
H7Z	54 (16ga)	4 - #10	2 - #10	8 - #10	985	—	—	
H10S[4]	43 (18ga)	8 - #10	—	8 - #10	9303	—	—	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

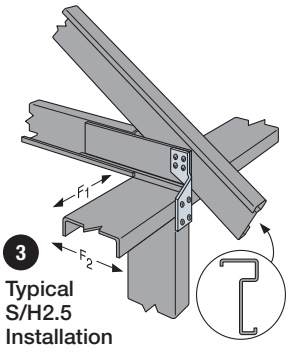
1. Loads are based on attachment of cold-formed steel members having a minimum thickness of 33 mil (20 ga).
2. Hurricane ties are shown installed on the outside of wall for clarity. Installation inside of wall is acceptable. For Continuous Load Path, connections in the same area must be on same side of wall.
3. For H10S connectors with CFS members having a minimum thickness of 43mil (18 ga), the allowable load is 1260 lbs.
4. H10S connectors can be installed ¾" (max.) from the center of the vertical stud per the in-line framing specifications of the AISI General Provisions for reduced uplift of 890 lbs., provided that the screw edges are met.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



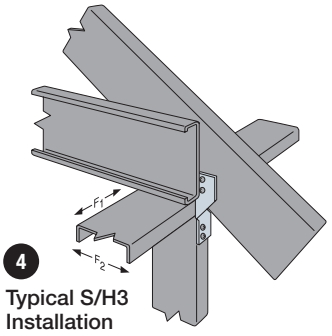
1 Typical S/H1 Installation



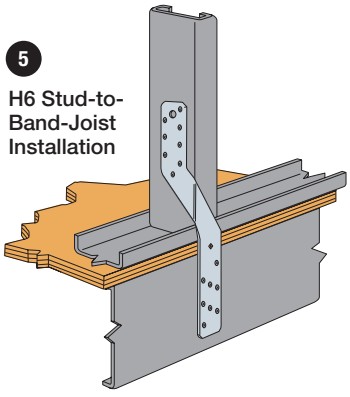
2 Typical H2A Installation

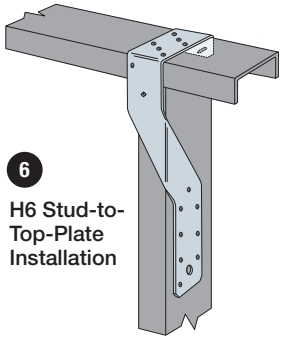


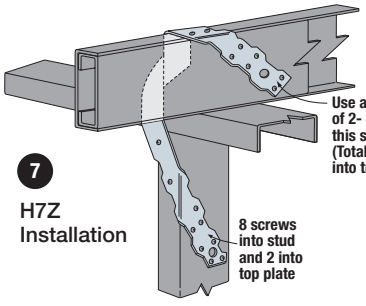
3 Typical S/H2.5 Installation



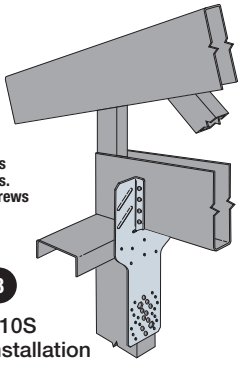
4 Typical S/H3 Installation


5 H6 Stud-to-Band-Joist Installation


6 H6 Stud-to-Top-Plate Installation



7 H7Z Installation


8 H10S Installation

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H Hybrid Connectors Seismic & Hurricane Ties for Wood Truss or Joist-to-CFS Wall

Designed to provide seismic and wind ties for wood trusses or joists-to-CFS walls, this versatile line may be used for general purposes, strongback attachments, and as all-purpose ties where one member crosses another.

HS24 attaches the bottom chord of a truss or rafter at pitches from 0:12 to 4:12 to steel top plates.

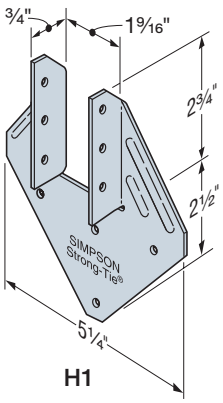
Material: See table

Finish: Galvanized. Selected products available in stainless steel or ZMAX® coating. See Corrosion Information, pages 17-20.

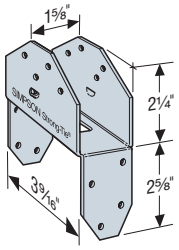
Installation: • Use all specified fasteners. See General Notes

- H1 can be installed with flanges facing inward (reverse of illustration 1).
- Hurricane ties do not replace solid blocking.
- H3 and H6 ties are only shipped in equal quantities of rights and lefts.

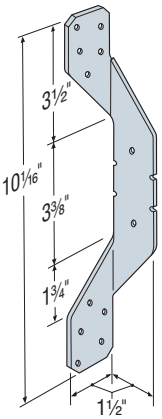
Codes: See page 11 for Code Report Reference Key Chart.



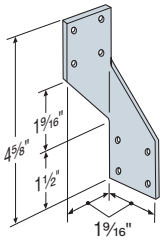
H1



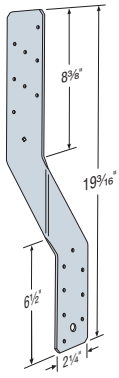
HS24
U.S. Patents
5,603,580



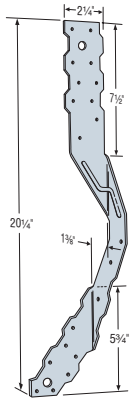
H2A



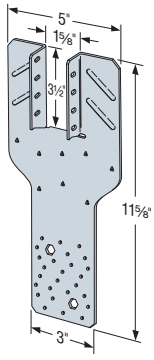
H3



H6



H7Z

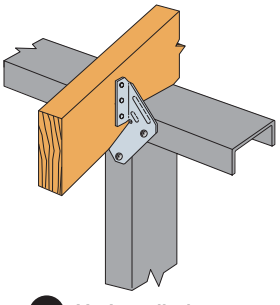


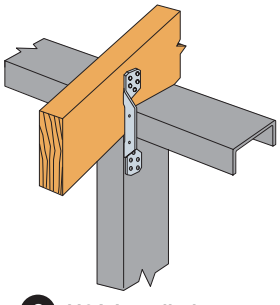
H10S

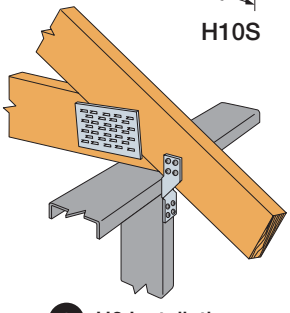
Model No.	Connector Material Thickness mil (ga.)	Fasteners[6]			Allowable Uplift Loads 33 mil (20 ga.) (160) (lbs.)		Code Ref.
		To Rafters/ Truss	To Top Track	To Stud	DF/SP	SPF/HF	
H1	43 (18ga)	6 - 8dx1½	3 - #10	1 - #10	600	500	170
H2A	43 (18ga)	5 - 8dx1½	1 - #10	5 - #10	550	460	
H3	43 (18ga)	4 - 8dx1½	4 - #10	—	365	305	
H6	54 mil (16)	—	8 - 8d	8 - #10	950	820	
H7Z	54 mil (16)	4 - 8dx1½	2 - #10	8 - #10	985	845	
HS24	43 (18ga)	8 - 8dx1½	4 - #10	4 - #10	625	520	
H10S[5]	43 (18ga)	8 - 8dx1½	—	8 - #10	930	780	

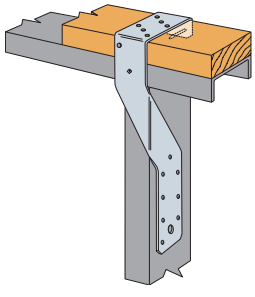
These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

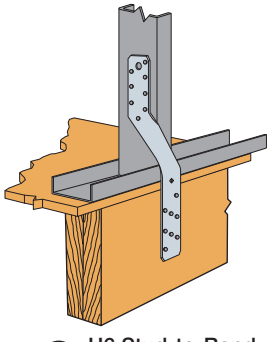
1. Allowable loads on wood have been increased 60% for wind or earthquake loading with no further increase allowed; reduce where other load duration factors govern.
2. Loads are based on attachment of cold-formed steel vertical stud members having a minimum thickness of 33 mil (20 ga).
3. Hurricane Ties are shown installed on the outside of wall for clarity. Installation inside of wall is acceptable. For Continuous Load Path, connections must be on same side of wall.
4. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such force should be considered.
5. H10S connectors can be installed ¾" (max.) from the center of the vertical stud per the in-line framing specifications of the AISI General Provisions for reduced uplift of 890 lbs., provided that the screw edges are met.
6. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

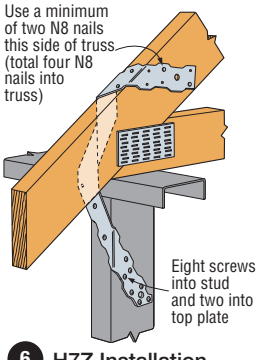

1 H1 Installation


2 H2A Installation

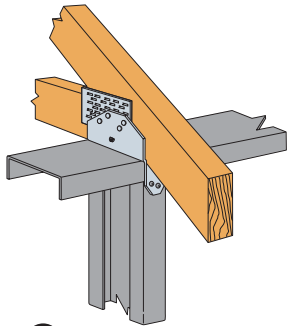

3 H3 Installation

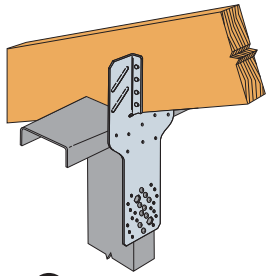

4 H6 Stud-to-Top-Plate Installation


5 H6 Stud-to-Band-Joist Installation



6 H7Z Installation


7 HS24 Installation


8 H10S Installation

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S/H1A Seismic and Hurricane Ties

S/H1A is designed to fit within several proprietary truss chords to provide uplift resistance.

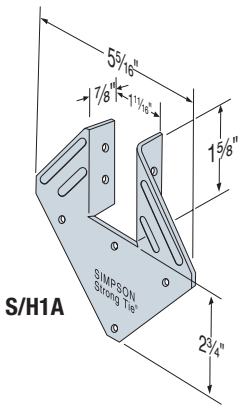
Material: 43 mil (18 ga)

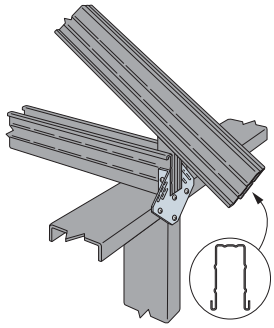
Finish: Galvanized

Installation: • Use all specified fasteners.

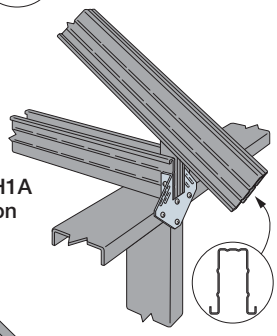
- S/H1A can be installed with flanges facing outwards, reverse of illustration, when installed inside a wall for truss applications.
- S/H1A does not replace solid blocking.
- S/H1A may be used with proprietary truss sections. Contact material supplier for specific installation details.

Codes: See page 11 for Code Report Reference Key Chart.

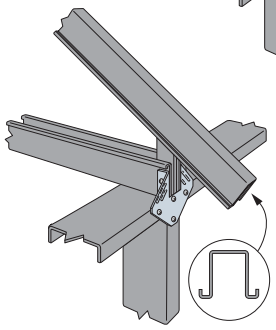




Typical S/H1A Installation



Typical S/H1A Installation



Typical S/H1A Installation

Model No.	Fasteners[2]			Truss Thickness[2] mil (ga.)	Allowable Uplift Loads (lbs.)			Code Ref.
	Truss	Top Track	Stud		Plate/Wall Stud Thickness mil (ga.)			
					33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	
S/H1A	4- #10	3- #10	1- #10	27 (22 ga)	470	470	470	IP1, F4, L2
	4- #10	3- #10	1- #10	33 (20 ga)	510	550	690	
	4- #10	3- #10	1- #10	43 (18 ga)	510	550	690	
	4- #10	3- #10	1- #10	54 (16ga)	520	675	850	

1. Tabulated loads based on truss members with yield strength, F_y, of 50 ksi and tensile strength, F_u, of 65 ksi. Reduce tabulated load proportionally for lower truss member steel strength. For example: 43 mil (18 ga) truss member with a yield strength, F_y of 33 ksi and a tensile strength, F_u, of 45 ksi is connected to 43 mil top track and wall stud. The adjusted allowable load is then 550 lbs. x minimum [33/50 or 45/60] = 363 lbs.
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

MTSM/HTSM Twist Straps

The MTSM and HTSM offer high-strength truss-to-masonry connections.

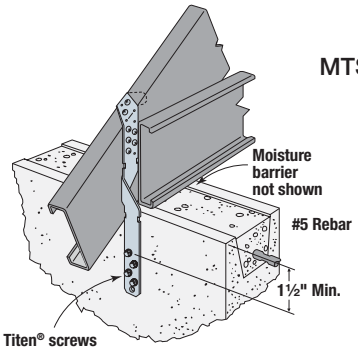
Material: See table.

Finish: Galvanized. Some products available in stainless steel and ZMAX®; see Corrosion Information, pages 17-20.

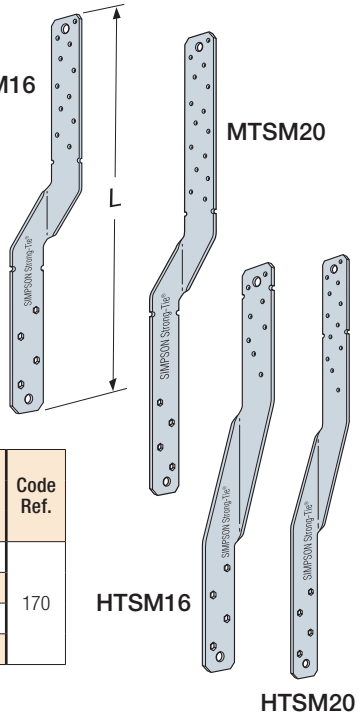
Installation:

- Use all specified fasteners. See General Notes.
- May be attached to either side of a grouted block wall. A minimum of one #5 horizontal rebar shall be installed in the top course of this wall.

Codes: See page 11 for Code Report Reference Key Chart.



Typical MTSM20 Installation



Model No.	Connector Material Thickness mil (ga.)	L (in.)	Fasteners[6]					Allowable Loads 33 mil (20 ga.) (lbs.)	Code Ref.
			Rafter/Stud/Joist Thickness			CMU[5]	Concrete[3,5]		
			33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)				
MTSM16	54 (16 ga)	16	5 - #10	4 - #10	3 - #10	4 - ¼x2¼ Titen	4 - ¼x1¼ Titen	860	170
MTSM20		20	5 - #10	4 - #10	3 - #10	4 - ¼x2¼ Titen	4 - ¼x1¼ Titen	860	
HTSM16	68 (14 ga)	16	7 - #10	5 - #10	3 - #10	4 - ¼x2¼ Titen	4 - ¼x1¼ Titen	1175	
HTSM20		20	7 - #10	5 - #10	3 - #10	4 - ¼x2¼ Titen	4 - ¼x1¼ Titen	1175	

1. All straps have additional fastener holes.
2. Twist straps do not have to be wrapped over the truss to achieve the load.
3. Minimum edge distance in concrete block for Titen screws is 1½".
4. They can be installed on the inside face of the wall.
5. Min. f'_m = 1500 psi and f'_c = 2500 psi.
6. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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META/HETA/HHETA Embedded Truss Anchors

The embedded truss anchor series provides an engineered method to properly attach roof trusses to concrete and masonry walls. Information regarding the use of two anchors on single- and multi-ply trusses is included below.

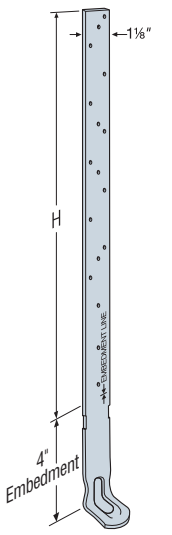
Material: HHETA—14 gauge; HETA—16 gauge; META—18 gauge.

Finish: Galvanized. Some products available in ZMAX® coating; see Corrosion Information on pages 17-20.

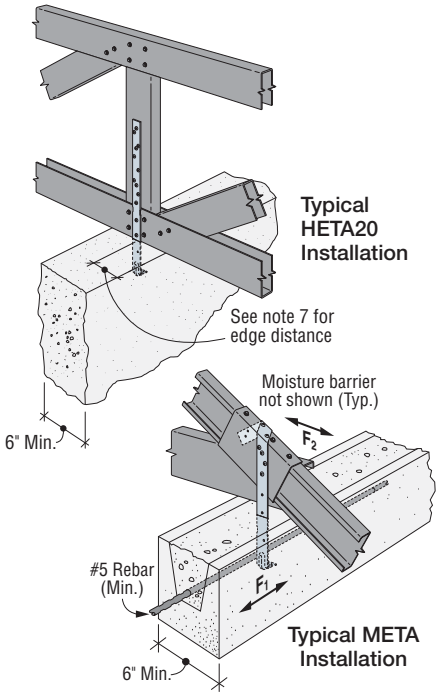
Installation: • Use all specified fasteners. See General Notes.

- The META, HETA and HHETA are embedded 4" into a 6" minimum concrete beam or 8" nominal grouted block wall.
- For mislocated truss anchors which are greater than ⅛" but less than 1½" from the face of the truss, a shim must be provided. Shim design by Truss Engineer. When gap is greater than 1½", install new anchors.
- In double embedded anchor installations, do not install fasteners where the straps overlap when wrapped over the truss heel.

Codes: See page 11 for Code Report Reference Key Chart.



HETA20
(META/HHETA similar)



Typical HETA20 Installation

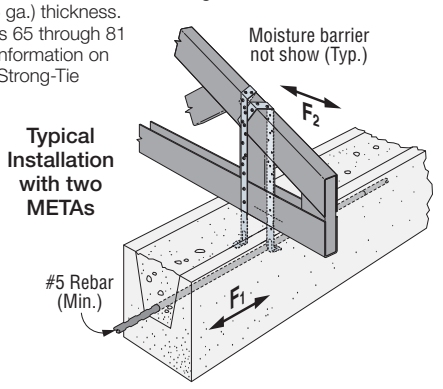
Typical META Installation

Single Embedded Anchor Installation

Model No.	H (in.)	Fastener[9] Rafter/Stud/Truss Thickness 33 mil, 43 mil & 54 mil (20 ga., 18 ga. & 16 ga.)	Allowable Uplift Loads (lbs.) Rafter/Stud/Truss Thickness 33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	Lateral Loads[8] F_1 54 mil (16 ga.)	F_2 54 mil (16 ga.)	Code Ref.
META12	8	7 - #10	1240	1450	1450	340	725	170
META16	12	9 - #10	1450	1450	1450			
META18	14	9 - #10	1450	1450	1450			
META20	16	9 - #10	1450	1450	1450			
META22	18	9 - #10	1450	1450	1450			
META24	20	9 - #10	1450	1450	1450			
META40	36	9 - #10	1450	1450	1450			
HETA12	8	7 - #10	1240	1780	1780	340	725	
HETA16	12	9 - #10	1595	1810	1810			
HETA20	16	9 - #10	1595	1810	1810			
HETA24	20	9 - #10	1595	1810	1810			
HETA40	36	9 - #10	1595	1810	1810			
HHETA12	8	7 - #10	1240	1820	1820	340[5]	815	
HHETA16	12	10 - #10	1770	2235	2235			
HHETA20	16	10 - #10	1770	2235	2235			
HHETA24	20	10 - #10	1770	2235	2235			
HHETA40	36	10 - #10	1770	2235	2235			

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Allowable loads may not be increased for wind or seismic load.
2. Minimum f'_c = 2500 psi. Minimum f'_m = 1500 psi.
3. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note c, page 13 under Instuctions to the Designer.
4. It is acceptable to use a reduced number of fasteners provided that there is a reduction in uplift load capacity. Lateral loads do not apply when fewer fasteners are used.
5. The HHETA allowable F_1 load cab be increased to 435 lbs. if the strap is wrapped over the truss and a minimum of 12 fasteners are installed.
6. Minimum spacing for multiple anchor installation in 2 times the embedment depth for full load. See Double Embedded Anchor Installation table below for loads on closer spaced anchors.
7. Minimum edge distance is 1½" for concrete and 2" masonry.
8. Lateral loads are limited to attaching to CFS members with 54 mil (16 ga.) thickness.
9. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical Installation with two METAs

Double Embedded Anchor Installation

Model No.	Qty.	Application	Fasteners[8] Rafter/Stud/Truss Thickness 33 mil, 43 mil & 54 mil (20 ga., 18 ga. & 16 ga.)	Allowable Uplift Loads (lbs.) 33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	Lateral Loads[7] F_1 54 mil (16 ga.)	F_2 54 mil (16 ga.)
1½" Width Minimum of Rafter/Stud/Truss								
META	2	CMU	10 - #10	1770	1985	1985	340	725
		Concrete	10 - #10	1770	1985	1985		
HETA	2	CMU	10 - #10	1770	2035	2035	340	725
		Concrete	10 - #10	1770	2035	2035		
HHETA	2	CMU	10 - #10	1770	2035	2035	340	815
		Concrete	10 - #10	1770	2235	2235		
3" Width Minimum of Rafter/Stud/Truss								
META	2	CMU	14 - #10	1900	1900	1900	1210	1160
		Concrete	14 - #10	2480	2565	2565		
HETA	2	CMU	12 - #10	2480	2500	2500	1225	1520
		Concrete	12 - #10	2480	2700	2700		
HHETA	2	CMU	12 - #10	2480	2500	2500	1225	1520
		Concrete	12 - #10	2480	3050	3050		
		Concrete	14 - #10	2480	3350	3350		

1. Allowable loads may not be increased for wind or seismic load.
2. Minimum f'_c = 2500 psi. Minimum f'_m = 1500 psi.
3. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note c, page 13 under Instuctions to the Designer.
4. Minimum spacing for multiple anchor installation in 2 times the embedment depth for full load. See Double Embedded Anchor Installation table for loads on closer spaced anchors.
5. Install with spoons facing outward and straps spaced no more than ⅛" wider than the truss width.
6. F_1 lateral loads listed may casued an additional 1/16" deflection beyond the standard ⅛" limit there the straps are installed not wrapped over the heel as shown.
7. Lateral loads are limited to attaching to CFS members with 54 mil (16 ga.) thickness.
8. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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LTS/MTS/HTS Twist Straps

Twist straps provide a tension connection between two members. They resist uplift at the heel of a truss economically. LTS/ MTS have a 2" bend section and HTS has a 3¾" bend section that eliminates interference at the transition points between the two members.

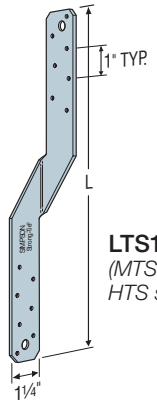
Material: See table.

Finish: Galvanized. Some products available in stainless steel and ZMAX®; see Corrosion Information, pages 17-20.

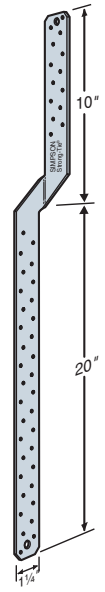
Installation:

- Use all specified fasteners. See General Notes.
- LTS, MTS and HTS are available with the bend reversed. Specify "–REV" after the model number, such as MTS16-REV.

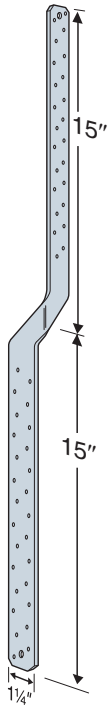
Codes: See page 11 for Code Report Reference Key Chart.



LTS12
(MTS and HTS similar)



MTS30
(HTS30 similar)

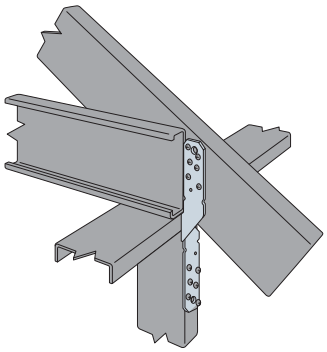


MTS30C
(HTS30C similar)

Model No.	Connector Material Thickness mil (ga.)	L (in.)	Fasteners[6] (Total) Rafter/Stud/Joist Thickness 33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	Allowable Tension Loads (lbs.) 33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	Code Ref.
LTS12	43 (18 ga)	12	10-#10	6-#10	6-#10	775			IP1, F4, L2
LTS16		16	10-#10	6-#10	6-#10	775			
LTS18		18	10-#10	6-#10	6-#10	775			
LTS20		20	10-#10	6-#10	6-#10	775			
MTS12	54 (16 ga)	12	12-#10	8-#10	6-#10	995			
MTS16		16	12-#10	8-#10	6-#10	995			
MTS18		18	12-#10	8-#10	6-#10	995			
MTS20		20	12-#10	8-#10	6-#10	995			
MTS30		30	12-#10	8-#10	6-#10	995			
MTS24C		24	12-#10	8-#10	6-#10	995			
MTS30C		30	12-#10	8-#10	6-#10	995			
HTS16	68 (14 ga)	16	16-#10	12-#10	6-#10	1415			
HTS20		20	18-#10	12-#10	6-#10	1450			
HTS24		24	18-#10	12-#10	6-#10	1450			
HTS30		30	18-#10	12-#10	6-#10	1450			
HTS30C		30	18-#10	12-#10	6-#10	1450			

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Not all fastener holes need to be filled, as additional fastener holes are provided. Install fasteners symmetrically.
2. Install half of the fasteners on each end of strap to achieve full loads.
3. All straps except the MTS30 and HTS30 have the twist in the center of the strap.
4. Twist straps do not have to be wrapped over the truss to achieve the load.
5. May be installed on the inside face of the stud.
6. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical MTS Installation
Truss to Steel Studs

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VGT and SVGT2.5 Variable-Pitch Girder Tiedown

The variable-pitch girder tiedown, S/VGT2.5, is a high-capacity tiedown for single- or multi-ply CFS girder trusses. It attaches with self-drilling screws from the side of the truss. The VGT uses Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws for wood truss applications. They both feature a predeflected crescent washer that allows them to accommodate top-chord pitches up to 8/12.

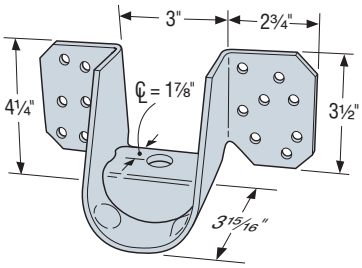
Material: 171 mil (7 ga)

Finish: Galvanized

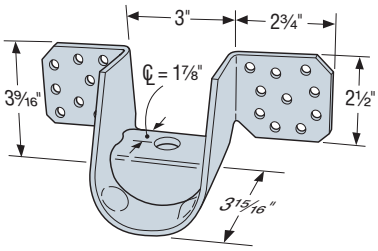
Installation:

- Use all specified fasteners.
- Screw holes are configured to allow for double installation on multi-member girders.
- Install washer component (provided) so that top of washer is horizontal and parallel with top of wall.

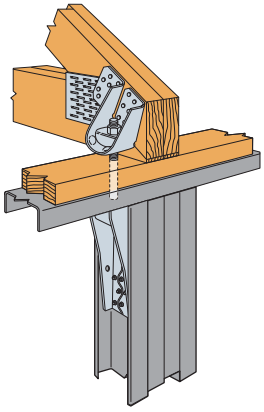
Codes: See page 11 for Code Report Reference Key Chart.



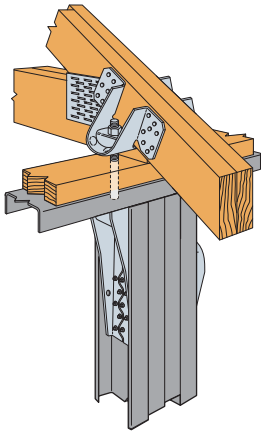
VGT
U.S. Patent 7,707,785



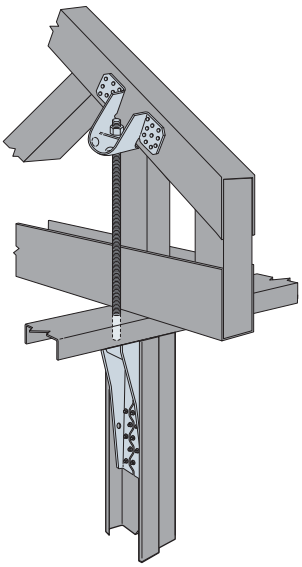
S/VGT2.5
U.S. Patent 7,707,785



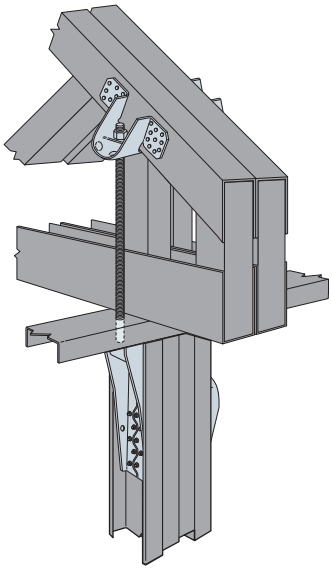
Typical Hybrid VGTR Single Installation with S/HDU4



Typical Hybrid VGT Double Installation with S/HDU6



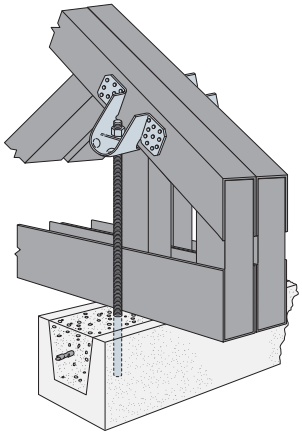
Typical S/VGT2.5 Single Installation with HDU6



Typical S/VGT2.5 Double Installation with S/HDU6

Model No.	Quantity	No. of Truss Plies	Fasteners[5]		Allowable Uplift Loads[2] (lbs.)		Code Ref.
			Anchor Dia.	Girder Truss	3/12	8/12	
Cold-Formed Steel Connection					54mil (16ga)		
S/VGT2.5 (min)[4]	1	1	1 - ⅝	16 - #14	3050	2620	170
	2	2	2 - ⅝	32 - #14	6100	5240	
S/VGT2.5 (max)	1	1	1 - ⅝	20 - #14	3860	3130	
	2	2	2 - ⅝	40 - #14	7720	6260	
Hybrid Connection					Allowable Uplift Loads[3] up to 8/12 (lbs.)		Code Ref.
					DF/SP (160)	SPF/HF (160)	
VGT	1	2	1 - ⅝	16 - ¼"x3" SDS	4940	3555	F1
	2	2	2 - ⅝	32 - ¼"x3" SDS	7185	5175	
	2	3	2 - ⅝	32 - ¼"x3" SDS	8890	6400	
VGTR/L	1	2	1 - ⅝	16 - ¼"x3" SDS	2230	1605	
	2	2	2 - ⅝	32 - ¼"x3" SDS	5545	3990	

1. Designer shall insure attached members are adequately designed to resist applied loads.
2. Straight-line interpolation can be used to determine allowable loads for pitches between 3/12 and 8/12.
3. Allowable loads on wood have been increased 60% for wind or earthquake loading with no further increase allowed; reduce where other load duration factors govern.
4. For (min.) tabulated values, not all screw holes need to be filled. Install screws symmetrically.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical S/VGT2.5 Installation in CMU

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LTA2, S/HGAM10 and H10S Seismic and Hurricane Ties

The LTA2 develops high uplift at a minimum heel height. Great in areas where a strap over the heel is not required. The side tab acts as a locator in the masonry block and the four embedded hooks provide for a positive bond in the concrete grout.

The H10S and the S/HGAM10 attaches to truss joist and provides good uplift resistance.

Material: See table.

Finish: Galvanized

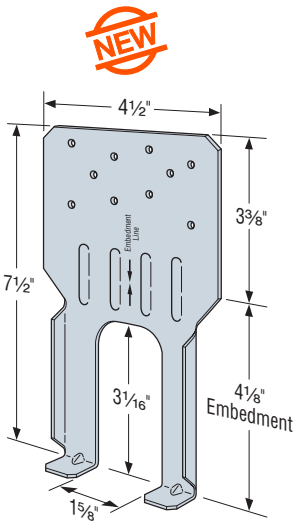
Installation:

- Use all specified fasteners. See General Notes.
- S/HGAM10 can be installed into grouted concrete block.
- Titen® screws are provided.
- Hurricane ties do not replace solid blocking.
- Attach to grouted concrete block with a minimum one #5 rebar horizontal in the top lintel block.

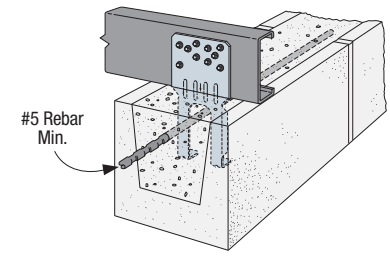
Codes: See page 11 for Code Report Reference Key Chart.

Ordering Information:

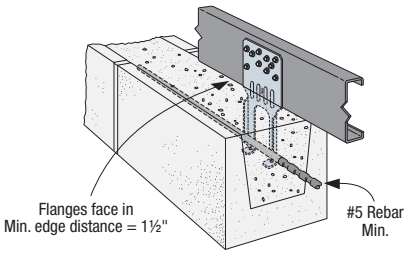
- The HGAM10KT is a kit of (10) connectors with (40) ¼"x2¾" Titen screws.



LTA2
U.S. Patent 6,560,943



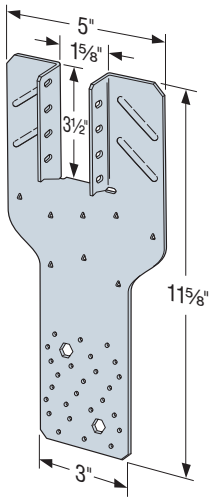
Typical LTA2 Installation
(Perpendicular to Wall)



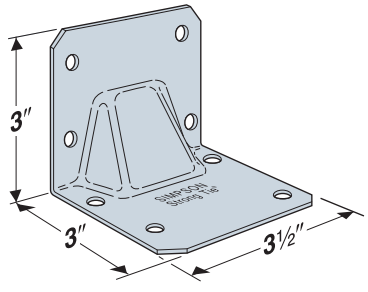
Typical LTA2 Installation
(Parallel to Wall)

Model No.	Connector Material Thickness mil (ga.)	Fasteners			Allowable Uplift Loads (lbs.)		Code Ref.
		To Rafter/ Truss[5]	To CMU	To Concrete	33 mil (20 ga.)	43 mil (18 ga.)	
LTA2 Perpendicular to Wall Installation	43 (18 ga)	10 - #10	Embed	Embed	1295	1425	170
LTA2 Parallel to Wall Installation	43 (18 ga)	10 - #10	Embed	Embed	1295	1390	
S/HGAM10KT	68 (14 ga)	4 - #14	4 - ¼x2¾ Titen	4 - ¼x1¾ Titen	810	850	IP1, L2, F4
H10S	43 (18ga)	8 - #10	2 - ⅜x4 Titen HD	2 - ⅜x4 Titen HD	915	1245	

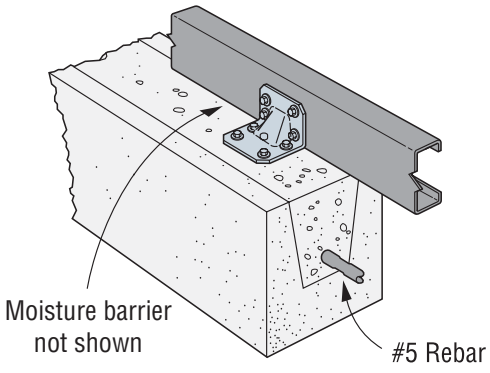
1. Min. f'_m = 1500 psi and f'_c = 2500 psi.
2. Minimum edge distance is 1½" for Titen® screws.
3. The products shall be installed such that the Titen screws and Titen HD® anchors are not exposed to the weather.
4. See page 97 for Titen screw information and page 92 for Titen HD information.
5. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



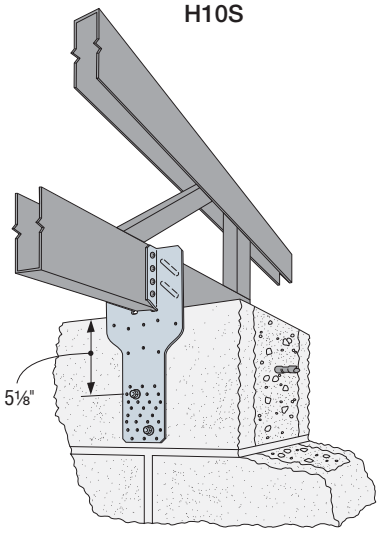
H10S



S/HGAM10



Typical S/HGAM10 Installation



H10S Installation

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TJC Jack Truss and Rafter Connector

TJC is a versatile connector for skewed members. Adjustable from 0 to 67.5 degrees (shipped with 67.5 degree bend). Screw hole locations allow for easy installation.

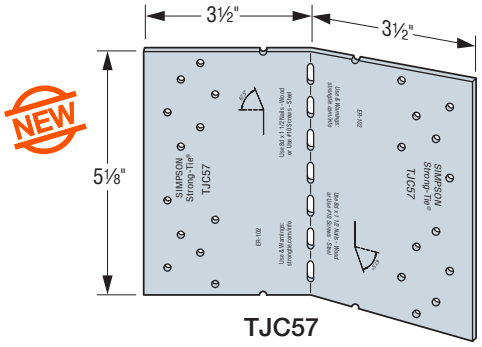
Material: 54 mil (16 ga.)

Finish: Galvanized

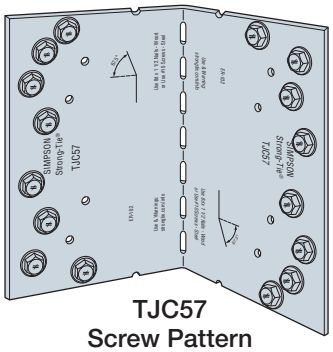
Installation:

- Use all specified fasteners; see General Notes.
- Position the skewed member on the inside of the bend line with the end of the member flush with the bend line.
- Bend the TJC to the desired position (one bend cycle only).

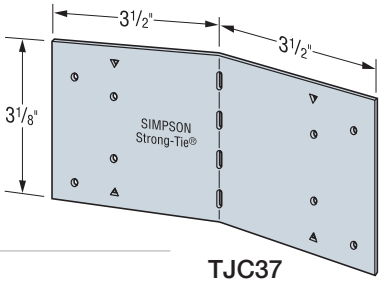
Codes: See page 11 for Code Report Reference Key Chart.



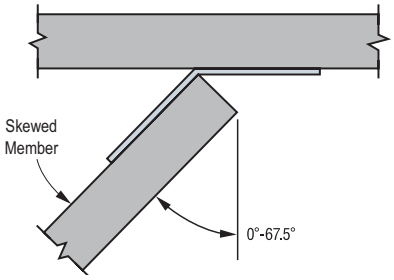
TJC57



TJC57
Screw Pattern



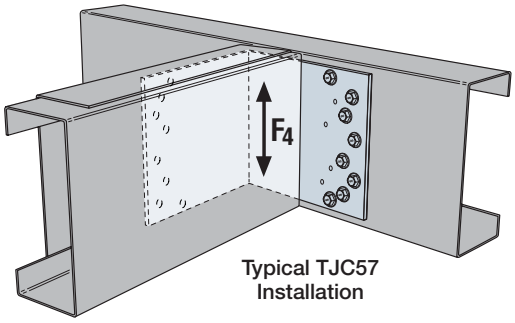
TJC37



Top View Installation

Model No.	Fasteners[2]		Member Thickness mil (ga.)	Allowable Loads F_4 (lbs.)			Code Ref.
	Carrying Member	Carried Member		0°	1°–60°	61°–67.5°	
TJC37 (Min)	4-#10	4-#10	43 (18 ga)	660	565	475	IP1, L2, F4
TJC37 (Max)	6-#10	6-#10	43 (18 ga)	680	630	530	
NEW TJC57 (Min)	8-#10	8-#10	43 (18 ga)	1295	1215	1235	170
NEW TJC57 (Max)	8-#10	8-#10	54 (16 ga)	1790	1790	1790	

1. Reference the illustration for the required screw pattern of the TJC57.
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical TJC57
Installation

LS and S/LS Skewable Angles

LS and S/LS skewable angles are a cost effective method for connecting roof rafters to hip rafters.

Material: 43 mil (18 ga.)

Finish: Galvanized (G90)

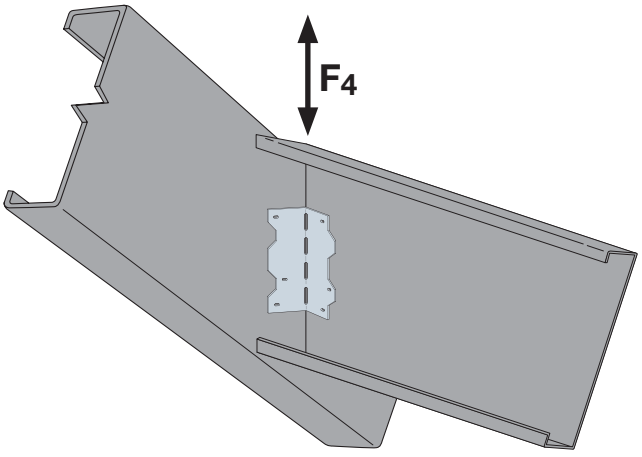
Installation:

- Use all specified fasteners.
- Field-skewable; bend one time only.

Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Length (in.)	Fasteners[2]	Allowable Loads (lbs.)			Code Ref.
			33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	
			F_4	F_4	F_4	
LS30	3⅞	8-#10	200	370	500	170
S/LS50	4⅞	4-#10	200	370	500	
S/LS70	6⅜	6-#10	465	575	715	
LS90	7⅞	12-#10	465	895	915	

1. Loads are for one part only.
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical Installation Between
Roof Rafter and Hip Rafter

C-CFS-15 © 2015 SIMPSON STRONG-TIE COMPANY INC.

STC/STCT/DTC Roof Truss Clips

For alignment control between a roof truss and nonbearing walls; the 1½" slot permits vertical truss chord movement when loads are applied.

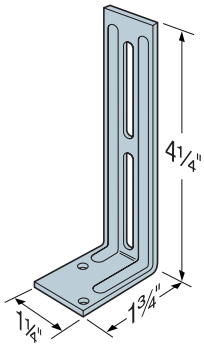
Material: 43 mil (18 ga)

Finish: Galvanized

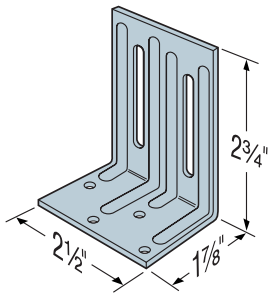
Installation:

- Use all specified fasteners; see General Notes.
- Use STC or DTC depending on required loads.
- STC / STCT / DTC may be used with proprietary material sections. Contact material supplier for specific installation details.
- Use STCT where truss or rafter is separated from the top plate of the nonbearing wall.
- Install slot screws in the middle of the slot.

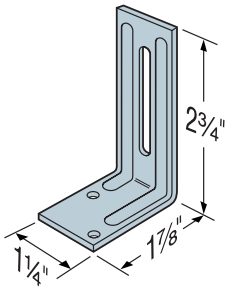
Codes: See page 11 for Code Report Reference Key Chart.



STCT



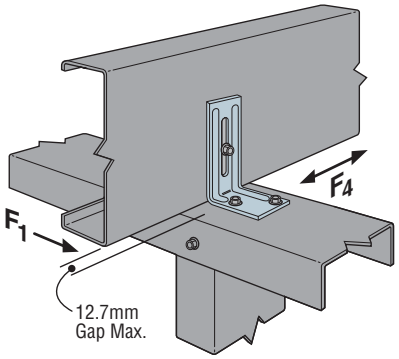
DTC



STC

Model No.	Fasteners[3]		Allowable Loads 33 mil (20 ga.) (lbs.)						Code Ref.
	Base	Slot	Without Gap		¼" Max. Gap		¼"< Gap ≤ ½"		
			F_1	F_4	F_1	F_4	F_1	F_4	
STC	2-#8	1-#8	185	35	135	35	75	35	IP1, L2, F4
STCT	2-#8	1-#8	—	—	—	—	—	—	180
DTC	4-#8	2-#8	200	160	200	160	145	160	IP1, L2, F4

1. Truss or rafter must be bearing on top plate to achieve the allowable loads under "WITHOUT GAP."
2. Clips are required on both sides of the truss to achieve F_1 loads in both directions (stagger parts to avoid screw interferences).
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical STC Installation

To allow for vertical truss movement, screws into the truss or rafter should not be driven completely flush against the connector.

S/HTC Heavy Truss Clips

S/HTC provides a slotted connection from the truss or joist to the top track when isolation of two members is required.

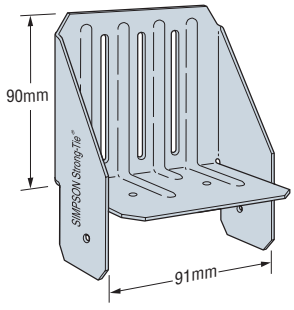
Material: 43 mil (18 ga)

Finish: Galvanized

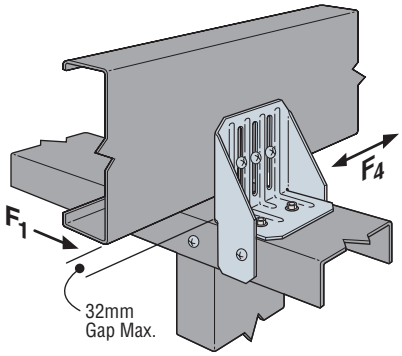
Installation:

- Use all specified fasteners.
- Screws in vertical slots shall not be driven completely flush against the connector when vertical movement is desired

Codes: See page 11 for Code Report Reference Key Chart.



S/HTC4



Typical S/HTC4 Installation

Model No.	Fasteners[3]		Allowable Loads 43 mil (18 ga.) (lbs.)				Code Ref.
	Top Track	Truss	Without Gap[1]		With 1¼" Gap[2]		
			F_1	F_4	F_1	F_4	
S/HTC4	4-#8	3-#8	320	460	85	175	170

1. Truss or rafter must be bearing on top plate to achieve the allowable loads under "WITHOUT GAP."
2. Installed with maximum 1¼" space between rafter or truss and top plate under "WITH 1¼" GAP." Where loads are not required, space is not limited to 1¼".
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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AHEP Adjustable Hip-End Purlin

The Simpson Strong-Tie AHEP is a structural purlin that also serves as an installation aid during the truss-erection process. The AHEP attaches to the step-down hip trusses at the leading edge, eliminating the need for drop top chords and C-stud fillers. The AHEP installs linearly, aligned with the end jacks, to maintain sheathing spacing from eave to hip or peak. Roof sheathing/decking attaches directly to the purlin. Adjustable in length, the AHEP is designed to accommodate a pitch range of 3/12 to 9/12.

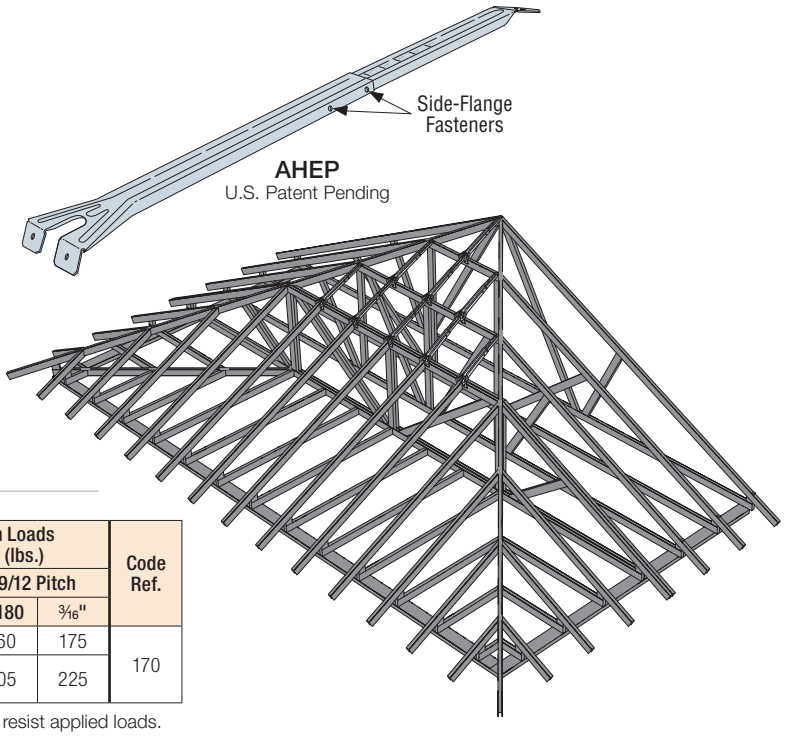
Material: 33 mil (20 ga)

Finish: Galvanized

Installation:

- Use all specified fasteners. See General Notes.

Codes: See page 11 for Code Report Reference Key Chart.



Model No.	Fasteners[3]		Sheathing Option	Allowable Down Loads 33 mil (20 ga.) (lbs.)				Code Ref.
	Side Flanges	Truss Ends		3/12 Pitch		9/12 Pitch		
				L/180	3/16"	L/180	3/16"	
AHEP	4 - #10	4 - #10	None	285	360	160	175	170
			½" Wood Sheathing	285	360	205	225	

1. Designer shall ensure attached members are adequately designed to resist applied loads.
2. Straight line interpolation can be used to determine allowable loads for pitches betwwen 3/12 and 9/12.
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

TBD22 Truss Brace Diagonal

The TBD22 diagonal truss brace offers a time-saving substitute for hat channel or C-stud diagonal bracing that helps meet the prescriptive recommendations of CFSBCSI. The TBD22 travels in a box like a flat strap (160 feet per carton), and is formed into an A-shape as it is pulled from the carton to provide rigidity and prevent sagging between trusses during installation. As it is fastened to the trusses the brace flattens, allowing sheathing to be installed over it, saving the time typically needed to remove bracing prior to applying the sheathing or decking.

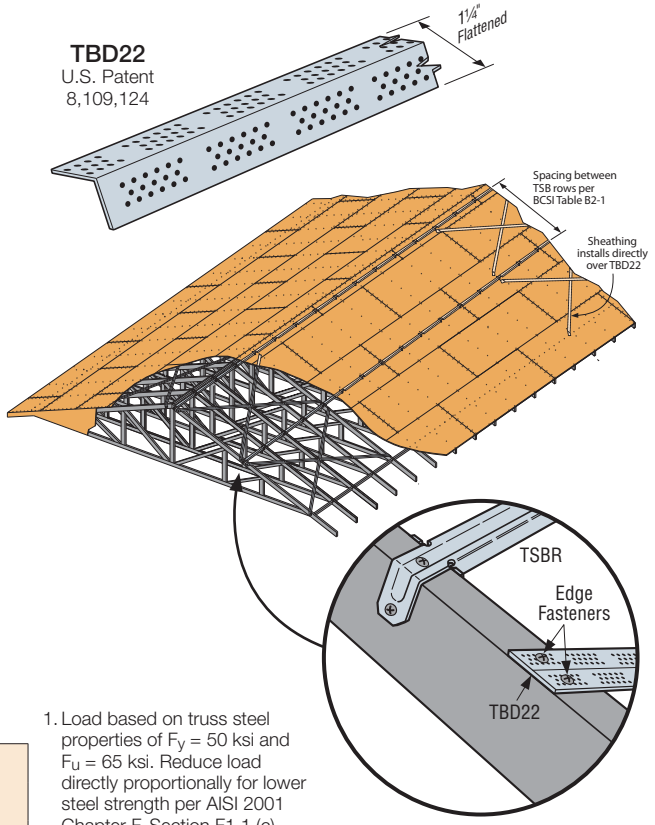
Material: 27 mil (22 ga)

Finish: Galvanized

Installation: • Use all specified fasteners; see General Notes.

- Strap does not have holes for fasteners. Screws shall be installed in the dimpled areas and placed to maintain a minimum of ¼" strap edge distance and a minimum of ½" center to center distance.
- TBD22 strap span diagonally at approximately 45 degrees.
- Strap shall not be slack, but tight and ready to engage in tension.
- To resist construction forces, diagonal X-bracing is required at each end and every 10 truss spaces (20' max.). Refer to SBCA CFS-BCSI for additional information.
- At the end of the TBD22 braces, trusses shall be laterally restrained to resist out-of-plane forces.
- Bracing locations shown in the drawing are recommendations for temporary bracing only. Installation of TBD22 for permanent bracing shall be by the Building Designer or Engineer of Record.

Codes: See page 11 for Code Report Reference Key Chart.



Typical TBD22 Top Chord Installation

Model No.	Fasteners[2]		Allowable Tension Loads (lbs.)		Code Ref.
	Strap Ends	Intermediate Trusses	Truss Member Thickness		
			27 mil (22 ga.)	33 mil (20 ga.)	
TBD22	2 - #10	2 - #10	380	510	IP1, L2, F4

1. Load based on truss steel properties of F_y = 50 ksi and F_u = 65 ksi. Reduce load directly proportionally for lower steel strength per AISI 2001 Chapter F, Section F1.1 (c).
2. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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TSBR Truss Spacer Restraint

The TSBR captures the on-center spacing of CFS truss chords and webs and laterally restrains the truss members, allowing quicker, easier and safer installations. The tubular shape provides strength in both compression and tension.

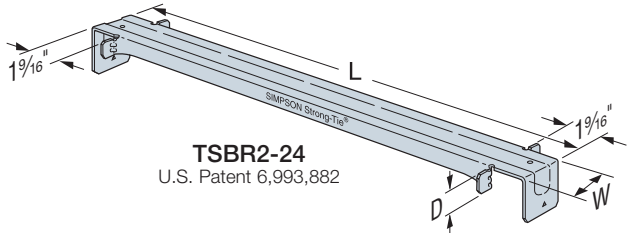
Material: 27 mil (22 ga)

Finish: Galvanized

Installation:

- Use all specified fasteners; see General Notes.

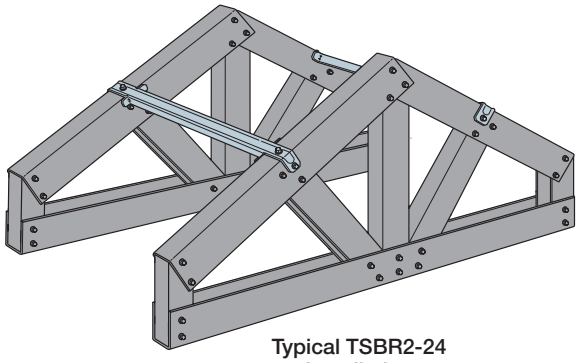
Codes: See page 11 for Code Report Reference Key Chart.



TSBR2-24
U.S. Patent 6,993,882

Model No.	Dimensions (in.)				Fasteners[3]		Allowable Loads (lbs.)		Code Ref.
	W	L[2]	H	B	Bend End	Straight End	Compression 33 mil (20 ga.)	Tension 33 mil (20 ga.)	
TSBR2-24	1½	25½	1	1¾	1 - #10	1 - #10	455	215	170
					2 - #10	2 - #10	455	575	

1. Designer shall ensure attached members are adequately designed to resist applied loads.
2. Length, L, equals the effective out-to-out dimension of the braced trusses.
3. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical TSBR2-24 Installation

S/DSC Drag Strut Connector

The S/DSC is used as a drag strut transferring loads from roof framing to the wall plates below.

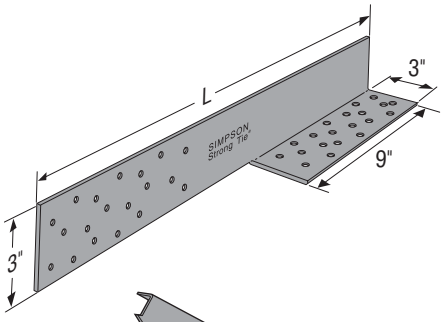
Material: 229 mil (3 ga)

Finish: Simpson Strong-Tie® gray paint

Installation:

- Use all specified fasteners; see General Notes.

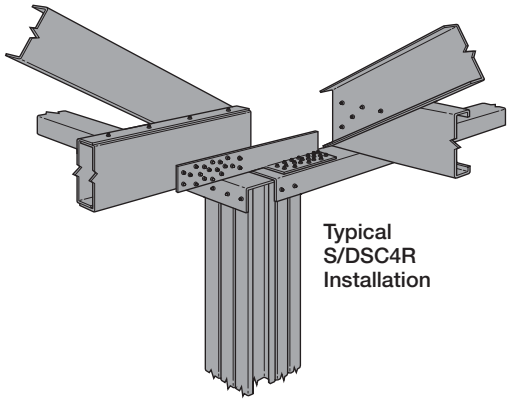
Codes: See page 11 for Code Report Reference Key Chart.



S/DSC4R/L
(Right hand S/DSC shown; specify right or left hand when ordering)
U.S. Patent 6,655,096

Model No.	L (in.)	Fasteners[1]	Allowable Loads (lbs.)		Code Ref.
			43 mil (18 ga.)		
			Compression	Tension	
S/DSC4R/L	22	40-#10	3220	4025	170

1. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Typical S/DSC4R Installation

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HRS/ST/FHA/PS/LSTA/LSTI/S/MST/MSTA/MSTC/MSTI Strap Ties

Straps are load rated and provide the correct thickness and number of fasteners the specifier is looking for compared with field fabricated straps.

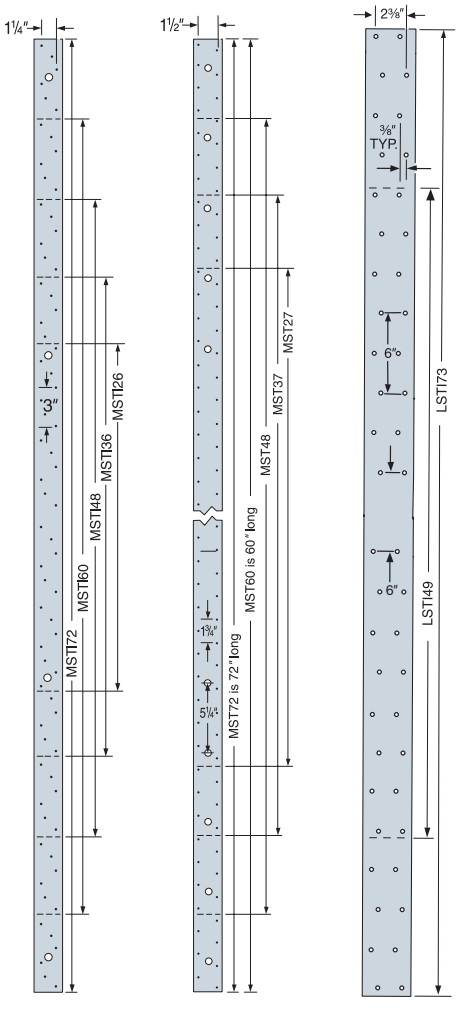
Install Strap Ties where top or bottom plates are cut, at wall intersections, and as ridge ties. Reduce the allowable load based on the size and quantity of fasteners used.

Refer to applicable code for minimum edge and end distances.

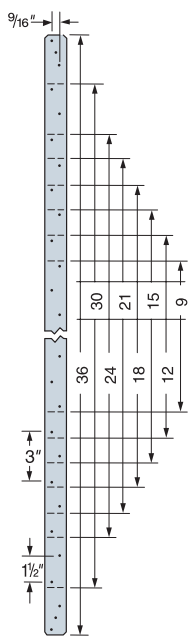
Finish: PS–hot-dip galvanized (HDG); all others–galvanized. Some products are available in stainless steel or ZMAX®; see Corrosion Information, pages 17-20.

Installation: Use all specified fasteners. See General Notes.

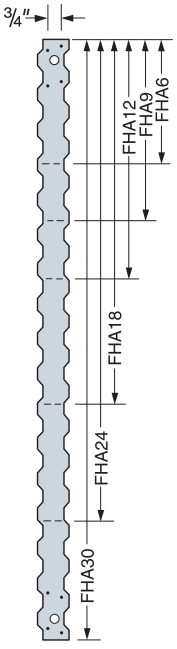
Codes: See page 11 for Code Report Reference Key Chart.



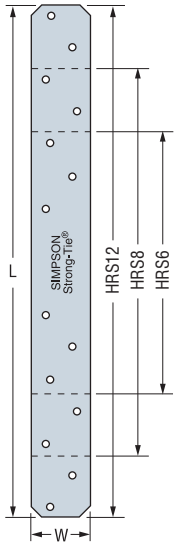
MSTI MST LSTI



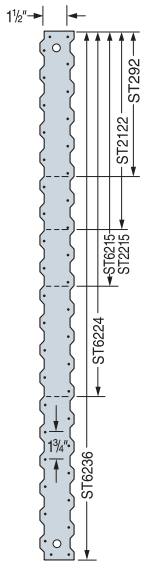
LSTA and MSTA
(Pilot holes not shown)



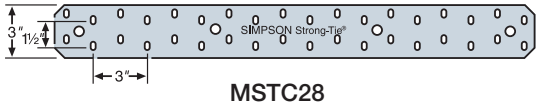
FHA



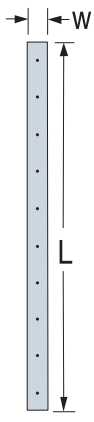
HRS



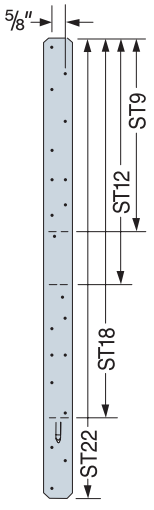
ST



MSTC28



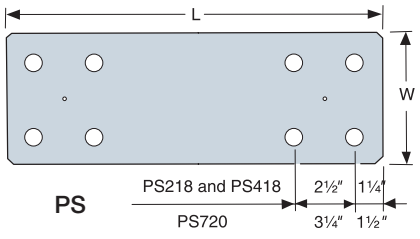
ST2115



ST9, ST12, ST18, ST22

Model No.	Connector Material Thickness mil (ga.)	Dim. (in.)		Bolts		Code Ref.
		W	L	Qty	Dia.	
PS218	171 mil (7 ga)	2	18	4	⅝	180
PS418		4	18	4	⅝	
PS720		6¾	20	8	½	

1. PS strap design loads must be determined by the Designer for each illustration. Hole diameter in the part may be oversized to accommodate the HDG. Designer must determine if the oversize creates an unacceptable installation.



PS

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HRS/ST/FHA/PS/LSTA/LSTI/S/MST/MSTA/MSTC/MSTI Strap Ties

Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Connector Material Thick. mil (ga.)	Dimensions (in.)		Fasteners[4] (Total)			Allowable ASD Tension Loads (lbs.)			Code Ref.
				Rafter/Stud/Joist Thickness			33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	
		W	L	33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)				
LSTA9	33 (20 ga)	1¼	9	8- #10	8- #10	8- #10	705	1120	1190	IP1, L2, F4
LSTA12		1¼	12	10- #10	10- #10	8- #10	885	1190	1190	
LSTA15		1¼	15	12- #10	12- #10	10- #10	1060	1190	1190	
LSTA18		1¼	18	14- #10	12- #10	10- #10	1190	1190	1190	
LSTA21		1¼	21	14- #10	12- #10	10- #10	1190	1190	1190	
LSTA24		1¼	24	14- #10	12- #10	10- #10	1190	1190	1190	
ST292		2 1/16	9 5/16	12- #10	10- #10	10- #10	1060	1240	1240	
ST2122		2 1/16	12 13/16	16- #10	12- #10	10- #10	1415	1502	1502	
ST2115		¾	16 5/16	8- #10	6- #10	4- #10	630	630	630	
ST2215		2 1/16	16 5/16	20- #10	14- #10	10- #10	1765	1825	1825	
LSTA30	43 (18 ga)	1¼	30	18- #10	12- #10	10- #10	1555	1555	1555	
LSTA36		1¼	36	18- #10	16- #10	14- #10	1555	1555	1555	
LSTI49		3¾	49	32- #10	32- #10	20- #10	2830	4050	4050	
LSTI73		3¾	73	46- #10	32- #10	20- #10	4050	4050	4050	
MSTA9		1¼	9	8- #10	8- #10	8- #10	705	1050	1555	
MSTA12		1¼	12	10- #10	10- #10	8- #10	885	1315	1555	
MSTA15		1¼	15	12- #10	12- #10	10- #10	1060	1555	1555	
MSTA18		1¼	18	14- #10	12- #10	10- #10	1235	1555	1555	
MSTA21		1¼	21	16- #10	12- #10	10- #10	1415	1555	1555	
MSTA24		1¼	24	18- #10	12- #10	10- #10	1555	1555	1555	
MSTA30	54 (16 ga)	1¼	30	22- #10	16- #10	12- #10	1945	1950	1950	
MSTA36		1¼	36	24- #10	18- #10	16- #10	1950	1950	1950	
ST6215		2 1/16	16 5/16	20- #10	16- #10	10- #10	1765	2025	2025	
ST6224		2 1/16	23 5/16	28- #10	20- #10	12- #10	2455	2455	2455	
ST9		1¼	9	8- #10	8- #10	8- #10	705	1050	1350	
ST12		1¼	11⅞	10- #10	10- #10	8- #10	885	1315	1350	
ST18		1¼	17¾	14- #10	12- #10	12- #10	1235	1350	1350	
ST22		1¼	21⅝	20- #10	20- #10	20- #10	1350	1350	1350	
MSTC28		3	28¼	36- #10	36- #10	30- #10	3180	4600	4600	
MSTC40		3	40¼	52- #10	46- #10	46- #10	4595	4600	4600	
MSTC52		3	52¼	54- #10	42- #10	42- #10	4600	4600	4600	
MSTC66	68 (14 ga)	3	65¾	66- #10	46- #10	30- #10	5795	5795	5795	
MSTC78		3	77¾	66- #10	46- #10	30- #10	5795	5795	5795	
ST6236		2 1/16	33 13/16	40- #10	30- #10	18- #10	3535	3760	3760	
HRS6	97 (12 ga)	1⅜	6	6- #10	6- #10	6- #10	530	790	1600	
HRS8		1⅜	8	10- #10	10- #10	10- #10	885	1315	2670	
HRS12		1⅜	12	14- #10	14- #10	12- #10	1235	1840	2710	
FHA6		1 7/16	6⅜	8- #10	8- #10	8- #10	705	1050	2045	
FHA9		1 7/16	9	8- #10	8- #10	8- #10	705	1050	2045	
FHA12		1 7/16	11⅞	8- #10	8- #10	8- #10	705	1050	2045	
FHA18		1 7/16	17¾	8- #10	8- #10	8- #10	705	1050	2045	
FHA24		1 7/16	23⅞	8- #10	8- #10	8- #10	705	1050	2045	
FHA30		1 7/16	30	8- #10	8- #10	8- #10	705	1050	2045	
MSTI26		2 1/16	26	26- #10	26- #10	22- #10	2300	3420	5025	
MSTI36		2 1/16	36	36- #10	36- #10	22- #10	3180	4735	5025	
MSTI48		2 1/16	48	48- #10	40- #10	22- #10	4240	5025	5025	
MSTI60		2 1/16	60	58- #10	40- #10	22- #10	5025	5025	5025	
MST27		2 1/16	27	30- #10	30- #10	22- #10	2650	3945	5025	170
MST37		2 1/16	37	42- #10	40- #10	34- #10	3710	5025	5025	
MST48		2 1/16	48	54- #10	54- #10	46- #10	4770	5155	5155	
MST60	118 (10 ga)	2 1/16	60	68- #10	68- #10	62- #10	5820	6420	6650	
MST72		2 1/16	72	80- #10	72- #10	64- #10	6650	6650	6650	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Use half of the fasteners in each member being connected to achieve the listed loads.
2. Loads are based on lesser of steel capacity or fastener calculation.
3. Not all fastener holes need to be filled, as additional fastener holes are provided. Install fasteners symmetrically.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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CS/CMST Coiled Straps

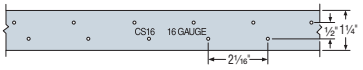
CMSTC provides countersunk fastener slots that provide a lower screw head profile. CS, CMST and CMSTC are continuous utility straps which can be cut to length on the job site. Packaged in lightweight cartons (about 40 pounds).

Finish: Galvanized. Some products available in ZMAX® coating; see Corrosion Information, pages 17-20.

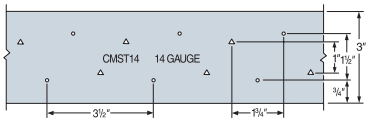
Installation:

- Use all specified fasteners. See General Notes.
- Refer to the applicable code for minimum edge and end distances.
- The table shows the maximum allowable loads and the screws required to obtain them. See footnote #1. Fewer screws may be used; reduce the allowable load by the code lateral load for each fastener subtracted from each end.

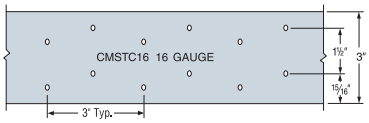
Codes: See page 11 for Code Report Reference Key Chart.



CS16 Hole Pattern
(all other CS straps similar)

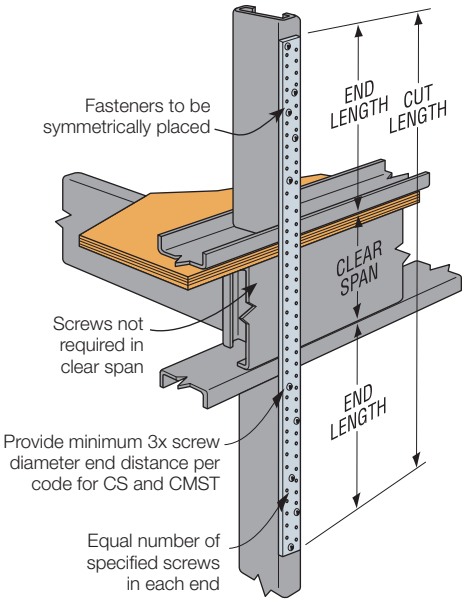


CMST14 Hole Pattern
(CMST12 similar)



CMSTC16 Hole Pattern

Gauge stamped on part for easy identification



Typical CS Installation as a Floor-to-Floor Tie

Model No.	Total Length	Connector Material Thickness mil (ga.)	Width (in.)	Fasteners[8] (Total)			Allowable Tension Loads	Code Ref.
				Rafter/Stud/Joist Thickness			33 mil (20 ga.) 43 mil (18 ga.) 54 mil (16 ga.)	
				33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)		
CMST12[2]	40'-3"	97 (12 ga)	3	104- #10	70- #10	40- #10	9080	IP1, L2, F4
CMST14[2]	52'-6"	68 (14 ga)	3	72- #10	50- #10	28- #10	6365	
CMSTC16[3]	54'	54 (16 ga)	3	54- #10	36- #10	30- #10	4600	
CS14	100'	68 (14 ga)	1¼	28- #10	18- #10	12- #10	2305	
CS16	150'	54 (16 ga)	1¼	18- #10	12- #10	8- #10	1550	
CS18S	100'	43 (18 ga)	1¼	14- #10	10- #10	6- #10	1235	
CS18	200'		1¼	14- #10	10- #10	6- #10	1235	
CS20	250'	33 (20 ga)	1¼	12- #10	8- #10	6- #10	945	
CS22	300'	27 (22 ga)	1¼	10- #10	6- #10	6- #10	775	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. Use half of the fasteners in each member being connected to achieve the listed loads.
2. For CMST straps: End Length (inches) = ½ total fasteners x ⅞" + 1" when all holes filled. Double length if only round holes filled.
3. For CMSTC16 straps: End Length (inches) = ½ total fasteners x ¾" + 1" when all holes filled. Double length if only round holes filled.
4. For CS straps: End Length (inches) = ½ total fasteners + 1".
5. Total Cut Length = End Length + Clear Span + End Length.
6. Calculate the connector value for a reduced number of screws as follows: Allowable Load = $\frac{\text{No. of Screws Used}}{\text{No. of Screws in Table}}$ x Table Load

   Example: CMSTC16 on 54 mil with 24 screws: $\frac{\text{24 Screws (Used)}}{\text{30 Screws (Table)}}$ x 4600 lbs. = 3680 lbs.
7. Loads are based on lesser of steel strap capacity and AISI S100 fastener calculation.
8. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

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LTP5 Framing Anchor

The LTP5 Framing Anchor spans subfloor at the top of the blocking or rim joist. The embossments enhance performance and allow for design flexibility.

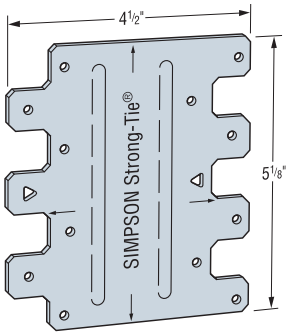
Material: 33 mil (20 ga.)

Finish: Galvanized

Installation:

- Use all specified fasteners. See General Notes.

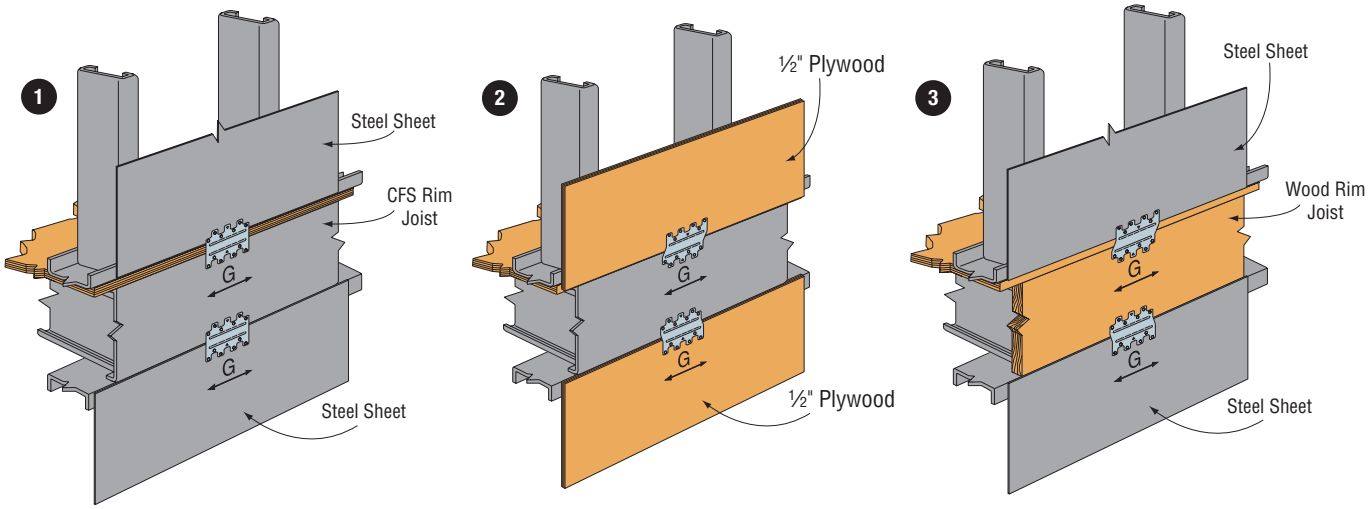
Codes: See page 11 for Code Report Reference Key Chart.



LTP5

Model No.	Type of Connection	Direction of Load	Fasteners[4]		Allowable Loads 43 mil (18 ga.) (lbs.)	Code Ref.
			To Rim Joist	To Sheathing and Track		
LTP5	1	G	7- #10	7- #10	1045	IP1, L2, F4
	2		7- #10	7- #10	1110	
	3		7-8d x 1½	7- #10	730	

1. Allowable loads are for one anchor.
2. Allowable loads are based on steel (stud & sheet) of 43 mil (18 ga) minimum.
3. Allowable load for Type 3 connection assumes C_D = 1.60.
4. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.



Note: When attaching an LTP5 Framing Anchor over sheathing, the screws must penetrate and engage the steel framing. A minimum of 3 threads shall penetrate past the steel.

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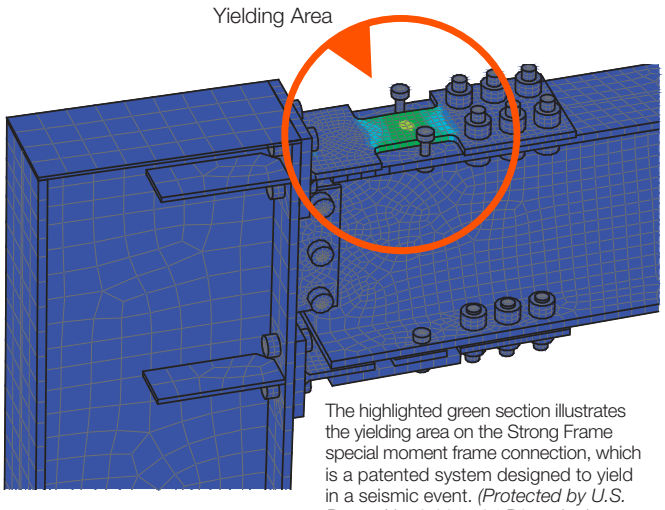
Strong Frame® Moment Frames

For years, moment frames have been a common method of providing high lateral-force resistance when limited wall space and large openings control the structural design. Traditionally, the disadvantage with moment frames has been that they are time-intensive to design and labor-intensive to install. Simpson Strong-Tie has taken these factors into consideration and has created a cost-effective alternative to traditional frames – the Strong Frame. For CFS applications, the Strong Frame is available without the pre-installed wood nailers.

The "Special" Behind the Special Moment Frame

The new Strong Frame® Special Moment Frame provides high lateral-force resistance to seismic events. Our innovative Yield-Link™ structural fuse is designed so the connection response remains ductile under load, providing more predictable performance. Little, if any, deformation is expected from the members.



The highlighted green section illustrates the yielding area on the Strong Frame special moment frame connection, which is a patented system designed to yield in a seismic event. *(Protected by U.S. Patent No. 8,001,734 B2 and other pending and granted foreign patents.)*

FEATURES:

- **Pre-designed moment frame solutions.** Designers can choose from over 500 engineered special and ordinary moment frames, in sizes up to 24 feet wide and 35 feet tall, rather than having to spend hours designing one.
- **100% bolted connections.** Install frames faster with no field welding required. No need to have a welder on site, or a welding inspector.
- **Frames fit in a standard 2x6 or 2x8 wall.** No thicker-wall additional framing or furring required.
- **Greater quality control.** Frames are manufactured in a quality-controlled environment and all specialty field-bolted connections are inspected in the factory.
- **Convenient to store, ship and handle.** Disassembled frames are more compact, minimizing deliveries and simplifying handling on the jobsite. Assembled frames available.
- **Pre-assembled anchor-bolt assemblies.** Anchor bolts are pre-assembled on a shear-lug plate that mounts on the form. This helps ensures correct anchor placement and creates more efficient anchor performance.
- **Streamlined anchorage design.** No more tedious anchorage calculations – select an anchorage solution for your footing geometry from the Strong Frame Selector Software.
- **Custom sizes available with fast lead times.** Multi-story, multi-bay, and retrofit solutions are available. Contact Simpson Strong-Tie for more information.
- **Code listed:** OMF – IAPMO ES ER-164; SMF – ICC-ES ESR-2802

Strong Frame® Moment Frames Catalog

All of the information you need on our latest lateral force-resisting solution is contained in the *Strong Frame Moment Frames* catalog. Frame and anchorage design information, installation instructions, prescriptive wall bracing requirements and installation details are all included in this useful tool. Visit ***www.strongtie.com*** to download or request a copy or call (800) 999-5099.

Strong Frame® Selector Software

The Simpson Strong-Tie® Strong Frame® Selector software is designed to help the Designer select an appropriate frame for their given geometry and loading. Only minimum inputs are required for the software to select an appropriate frame for the available space. Based on input geometry, the Strong Frame Selector software will narrow down from the more than 500 available stock frames to a handful of possible solutions. It can also help with custom frame designs. Download your free copy at ***www.strongtie.com/strongframe***.

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Steel Strong-Wall® Shearwall

Working with specifiers, builders and contractors has given Simpson Strong-Tie insight into the needs of the various players in the design and construction process. This insight has enabled Simpson Strong-Tie to design a composite shearwall that features some of the highest allowable loads in the industry while offering the easiest and fastest installation: The Steel Strong-Wall® shearwall.

Code Listed
New ICC-ES ESR-1679 code report evaluated to the 2012 IRC/IBC

Less Labor = Increased Production
Fewer anchor bolts and fasteners coupled with easy access to the top and bottom of the wall result in more efficient installation

Easier for All Trades
An easy-to-use anchor-bolt template for concrete contractors, available pre-attached CFS studs and predrilled holes where electricians need them for wiring

Support and Service
Simpson Strong-Tie provides the best engineering technical support and experienced field representation available

The Steel Strong-Wall product line has grown to address more applications:

- Standard installations on concrete
- Garage portal system
- Anchorage solutions
- Raised floor solutions
- Two-story stacked shearwalls
- Cold-formed steel applications

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Steel Strong-Wall® Cold-Formed Steel on Concrete Foundations

The Steel Strong-Wall® provides high-capacity, narrow-wall solutions for cold-formed steel framing. The wall installs easily in cold-formed steel framing, and pre-attached steel studs allow easy attachment of interior and exterior finishes.

Material: Vertical Panel—118 mil (10 ga)

Finish: Vertical Panel—Galvanized
Top and Base Plates—Simpson Strong-Tie® gray paint (cold galvanizing available, contact Simpson Strong-Tie)

Notes: For top-of-wall attachment, use ¼" or #14 self-drilling screws (not provided) extended through the connection with 3 exposed threads minimum. Fill all screw holes.

Codes: ICC-ES ESR-1679; City of L.A. RR 25625; State of Florida FL5113

Naming Scheme:

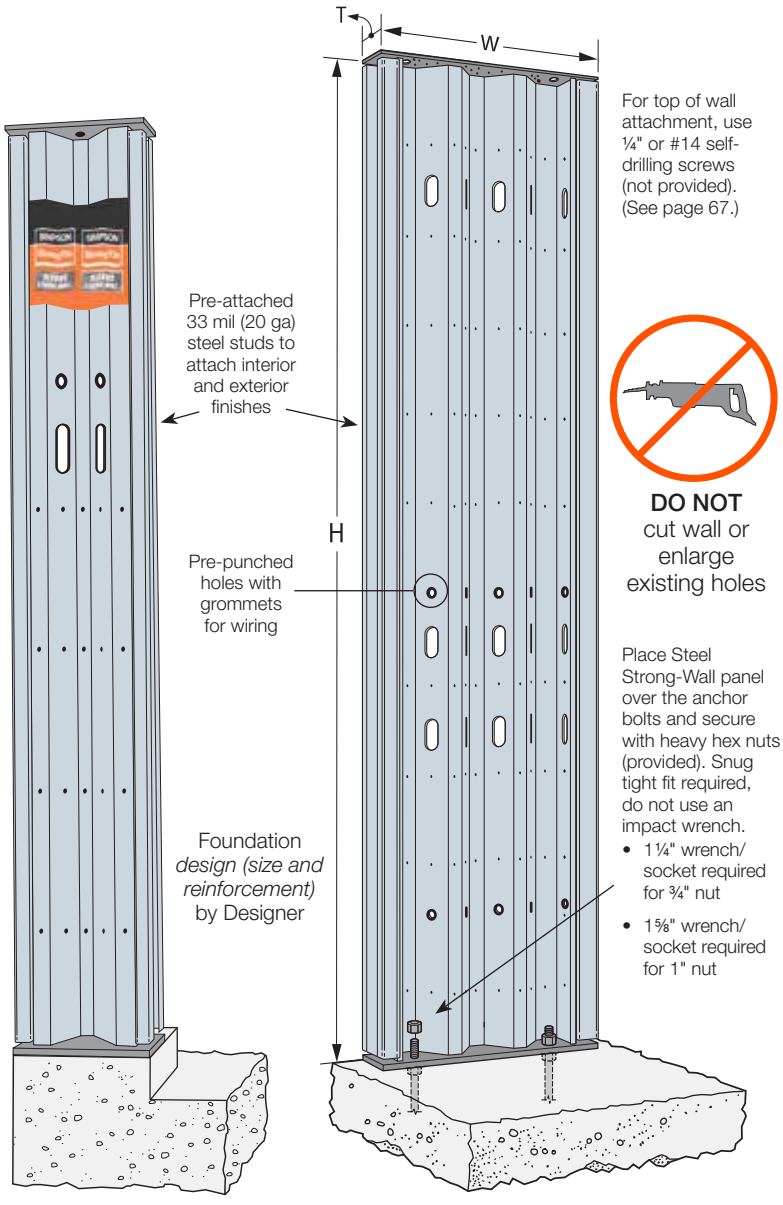
S/SSW24x8X

- **Steel Strong-Wall for Cold-Formed Steel**
- **Width (in.)**
- **Height Modification Option (in.)**
- **Nominal Height (ft.)**

Steel Strong-Wall for Cold-Formed Steel Product Data

Model No.	W (in.)	H (in.)	T (in.)	Anchor Bolts		Number of Screws in Top of Wall
				Qty.	Dia.	
S/SSW12x8	12	96⅝	3½	2	¾"	4
S/SSW15x8	15	96⅝	3½	2	1"	6
S/SSW18x8	18	96⅝	3½	2	1"	9
S/SSW21x8	21	96⅝	3½	2	1"	12
S/SSW24x8	24	96⅝	3½	2	1"	14
S/SSW12x9	12	108⅝	3½	2	¾"	4
S/SSW15x9	15	108⅝	3½	2	1"	6
S/SSW18x9	18	108⅝	3½	2	1"	9
S/SSW21x9	21	108⅝	3½	2	1"	12
S/SSW24x9	24	108⅝	3½	2	1"	14
S/SSW15x10	15	120⅝	3½	2	1"	6
S/SSW18x10	18	120⅝	3½	2	1"	9
S/SSW21x10	21	120⅝	3½	2	1"	12
S/SSW24x10	24	120⅝	3½	2	1"	14

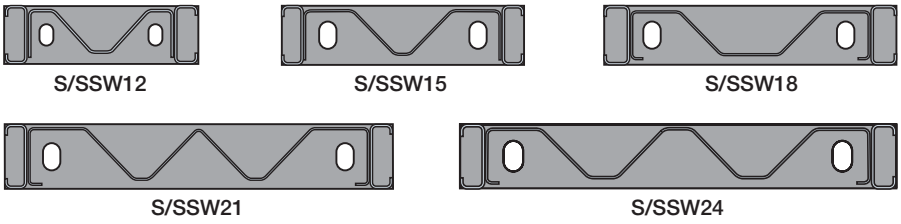
1. S/SSW models may be ordered in custom heights. To order, add "X" to model and specify height (example: S/SSW12x8X, H = 95").



S/SSW12x8
U.S. Patent 8,281,551
Canadian Patent 2,489,845

S/SSW24x10
U.S. Patent 8,281,551
Canadian Patent 2,489,845

Wall Profiles



S/SSW12 S/SSW15 S/SSW18

S/SSW21 S/SSW24

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Steel Strong-Wall® Cold-Formed Steel on Concrete Foundations

2012 International Building Code®

S/SSW Model	Max. H (in.)	Allowable Axial Load (lbs.)	Seismic[2]			Wind		
			Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)	Anchor Tension at Allowable Shear[6] (lbs.)	Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)	Anchor Tension at Allowable Shear[6] (lbs.)
S/SSW12x8	96⅝	1000	645	0.42	7710	820	0.54	10360
		4000	645	0.42	7710	775	0.51	9640
		7500	610	0.40	7220	610	0.40	7220
S/SSW15x8	96⅝	1000	1280	0.42	12390	1415	0.47	14090
		4000	1250	0.41	12025	1250	0.41	12025
		7500	1070	0.35	9955	1070	0.35	9955
S/SSW18x8	96⅝	1000	2140	0.41	16895	2785	0.54	24565
		4000	2140	0.41	16895	2680	0.52	23130
		7500	2140	0.41	16895	2460	0.48	20400
S/SSW21x8	96⅝	1000	3265	0.41	21905	3870	0.48	27930
		4000	3265	0.41	21905	3765	0.47	26790
		7500	3265	0.41	21905	3460	0.43	23715
S/SSW24x8	96⅝	1000	4540	0.39	26335	4985	0.43	30045
		4000	4540	0.39	26335	4890	0.42	29220
		7500	4540	0.39	26335	4555	0.39	26455
S/SSW12x9	108⅝	1000	545	0.48	7255	695	0.61	9735
		4000	545	0.48	7255	605	0.53	8210
		7500	445	0.39	5755	445	0.39	5755
S/SSW15x9	108⅝	1000	1090	0.48	11725	1180	0.52	12955
		4000	1025	0.45	10875	1025	0.45	10875
		7500	850	0.37	8720	850	0.37	8720
S/SSW18x9	108⅝	1000	1835	0.47	16105	2365	0.61	22835
		4000	1835	0.47	16105	2365	0.61	22835
		7500	1835	0.47	16105	2150	0.55	19890
S/SSW21x9	108⅝	1000	2800	0.46	20855	3275	0.54	25900
		4000	2800	0.46	20855	3025	0.50	23140
		7500	2735	0.45	20220	2735	0.45	20220
S/SSW24x9	108⅝	1000	4005	0.46	26025	4220	0.48	27970
		4000	3950	0.45	25540	3950	0.45	25540
		7500	3630	0.41	22855	3630	0.41	22855
S/SSW15x10	120⅝	1000	945	0.53	11185	990	0.56	11845
		4000	835	0.47	9645	835	0.47	9645
		7500	665	0.37	7425	665	0.37	7425
S/SSW18x10	120⅝	1000	1605	0.53	15515	2045	0.67	21490
		4000	1605	0.53	15515	1960	0.64	20225
		7500	1605	0.53	15515	1715	0.56	16890
S/SSW21x10	120⅝	1000	2440	0.52	19970	2650	0.56	22275
		4000	2405	0.51	19600	2405	0.51	19600
		7500	2120	0.45	16730	2120	0.45	16730
S/SSW24x10	120⅝	1000	3425	0.50	24275	3425	0.50	24275
		4000	3160	0.46	21875	3160	0.46	21875
		7500	2855	0.42	19275	2855	0.42	19275

NOTE:

For models with an "X" suffix, specify height when ordering (example: S/SSW12x8X, h = 95").

1. Allowable shear loads and anchor tension forces are applicable to installation on concrete with minimum f'_c = 2500 psi using the ASD basic (Section 1605.3.1) or the alternative basic (Section 1605.3.2) load combinations. Load values include evaluation of bearing stresses.
2. For seismic designs based on the 2012 IBC using R = 6.5. For other codes, use the seismic coefficients corresponding to light-frame bearing walls with wood structural panels or sheet steel panels.
3. Top-of-wall screws for the S/SSW shall be approved ¼" or #14 self-drilling screws (see page 67) with a minimum nominal shear strength (P_{ss}) of 2000 lbs. Top of panel shall be connected to a minimum 43 mil (18 ga) thick steel member typical. S/SSW18 and wider panels up to 97 inches tall require connection to a minimum 54 mil (16 ga) thick steel member. When connected to a minimum 43 mil (18 ga) thick steel member, the allowable load shall be limited to 2720 lbs. for S/SSW18, 3625 lbs. for S/SSW21, and 4230 lbs. for S/SSW24.
4. Allowable shear, drift and anchor tension values may be interpolated for intermediate height or axial loads. See example on page 148.
5. High-strength anchor bolts are required for anchor tension forces exceeding the allowable load for standard-strength bolts tabulated on pages 156-157. High strength anchor bolts are required for S/SSW12 when seismic shear X panel height exceeds 61.6k-in. See pages 156-163 for SSWAB anchor bolt information and anchorage solutions.
6. Tabulated anchor tension loads assume no resisting axial load. For anchor tension loads at design shear values and including the effect of axial load, refer to the Strong-Wall Selector™ software or use the equations on page 149. Drifts at lower design shear may be linearly reduced.
7. See page 148 for allowable out-of-plane loads and axial loads.

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Steel Strong-Wall® Cold-Formed Steel on Concrete Foundations

Allowable Out-of-Plane Loads (PSF)[1,3]

Model Width	Axial Load (lbs.)[2,4]	Nominal Height of Panel (feet)		
		8	9	10
12" wide	1000	195	140	100
	4000	145	100	70
	7500	85	50	25
15" wide	1000	160	125	100
	4000	130	95	70
	7500	90	65	45
18" wide	7500	300	210	155
21" wide	7500	255	180	130
24" wide	7500	265	190	135

1. Loads shown are at ASD level in pounds per square foot (psf) of wall with no further increase allowed and are applicable to either the ASD Basic or Alternative Basic load combinations.
2. Axial load denotes maximum gravity load permitted on entire panel acting in combination with the out-of-plane load.
3. Load considers a deflection limit of h/240.
4. Allowable out-of-plane loads for the 12- and 15-inch walls may be linearly interpolated between the axial loads shown.

Allowable Axial Loads on Concrete

Model Width	Compression Capacity (lbs.) with No Lateral Load[1,2,3]			
	Nominal Height of Panel (feet)			
	7	8	9	10
12" wide	20200	16300	13700	11100
15" wide	25300	21800	19200	16600
18" wide	42500	36000	31400	27000
21" wide	43700	35800	30300	25100
24" wide	51600	42900	36900	31100

1. Allowable compression is lesser of wall-buckling capacity or 2500 psi uniform concrete bearing.
2. Allowable compression of wall assumes concentric loading with no lateral loads present. See allowable in-plane or out-of-plane shear load tables for combined lateral and axial loading conditions.
3. Loads are applicable to either the ASD Basic or Alternative Basic load combinations.

S/SSW Shear Load Interpolation Example

Given:

Seismic, 2500 psi Concrete

Shear Load = 2000 lbs.

Axial = 4000 lbs.

S/SSW Wall Height Required: 8'-6" = 102"

Interpolate (See table on page 147):

S/SSW18x8 V_1 = 2140 lbs., h_1 = 96⅝"

S/SSW18x9 V_2 = 1835 lbs., h_2 = 108⅝"

Equation: $$V_{allow} = \left(\frac{V_1 - V_2}{h_1 - h_2}\right)(h_{required} - h_1) + V_1$$

$$V_{allow} = \left(\frac{2140 \text{ lbs.} - 1835 \text{ lbs.}}{96⅝" - 108⅝"}\right)(102" - 96⅝") + 2140 \text{ lbs.} = 2003 \text{ lbs. @ } 102"$$

V_{allow} = 2003 lbs. > 2000 lbs. OK

➡ **Use S/SSW18x9X H = 102"**

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Steel Strong-Wall® Uplift Equations

Equations For Calculating Uplift Forces At Base Of First-Story Wall

(Based on limiting concrete bearing on a 3½" wide base plate at the edge of the concrete)

These equations may be used to calculate uplift forces at the base of the 1st-story wall to aid Designers in developing anchorage solutions other than those shown on pages 156-160.

12 in. wall $$T = \left[11.2f_c' - \sqrt{126f_c'^2 - 2.38f_c'(3.44P + Vh)}\right] - P$$

15 in. wall $$T = \left[14.4f_c' - \sqrt{208f_c'^2 - 2.38f_c'(4.63P + Vh)}\right] - P$$

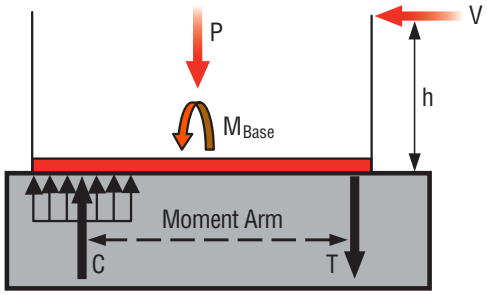
18 in. wall $$T = \left[18.0f_c' - \sqrt{324f_c'^2 - 2.38f_c'(6.13P + Vh)}\right] - P$$

21 in. wall $$T = \left[21.6f_c' - \sqrt{465f_c'^2 - 2.38f_c'(7.63P + Vh)}\right] - P$$

24 in. wall $$T = \left[25.1f_c' - \sqrt{632f_c'^2 - 2.38f_c'(9.13P + Vh)}\right] - P$$

Notes:

1. Equations may be used to calculate uplift forces at the base of first-story walls on concrete foundations.
2. Equations are based on the design methodology contained in AISC Steel Design Guide 1 – Base Plate and Anchor Rod Design, second edition using a rectangular compression stress block.



Forces at Base of Wall

T = Resulting anchorage tension (uplift) force (kips)

V = Design shear (kips)

P = Total vertical load (kips)

h = Wall height (inches)

f'_c = Concrete compressive strength (ksi)

For two-story stacked applications, substitute M_{base} for V_h:

$$Vh = M_{base}\left(\frac{12}{1000}\right) \text{kip - in}$$

Where M_{base} = Design moment at base of wall (ft-lbs)

EXAMPLE 1 – Single-Story S/SSW

Given:

- S/SSW18x9X wall on 2.5 ksi concrete
- Seismic
- Design Shear (V) = 1.5 kips < 1.835 kips ($V_{allowable}$)
- P (Vertical Load) = 1.0 kip
- h = Wall height = 109"

$$T = \left[18.0\ f'_c - \sqrt{324\ f'^2_c - 2.38\ f'_c\ (6.13P + Vh)}\right] - P$$

$$T = \left[18.0\ (2.5) - \sqrt{324\ (2.5)^2 - 2.38\ (2.5)\ (6.13 \times 1 + 1.5 \times 109)}\right] - 1.0 = \underline{12.1\ \text{kips}}$$

EXAMPLE 2 – Two-Story Stacked S/SSW Condition

Given:

- See Two-Story Design Example on page 155
- S/SSW18x9X-STK wall on 2.5 ksi concrete
- Wind
- M_{base} = 17,550 ft-lbs. (Moment at base of two-story stacked wall)
- Vh = 17,550 x $\left(\frac{12}{1000}\right)$ kip-in = 210.6 kip-in
- P (Vertical Load) = 2.0 kips

$$T = \left[18.0\ f'_c - \sqrt{324\ f'^2_c - 2.38\ f'_c\ (6.13P + Vh)}\right] - P$$

$$T = \left[18.0\ (2.5) - \sqrt{324\ (2.5)^2 - 2.38\ (2.5)\ (6.13 \times 2 + 210.6)}\right] - 2 = \underline{16.6\ \text{kips}}$$

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Steel Strong-Wall® Cold-Formed Steel 1st-Story Floor Systems

Steel Strong-Wall® panels designed for use on concrete foundations can be used with cold-formed steel floor systems by extending the anchor bolts and installing compression nuts and stud blocking below the wall.

Material & Finish: See page 146.

For product data and naming scheme information, see page 146.

For a complete set of wall profile drawings, see page 146.

CFS First-Floor Wall Connection Kit

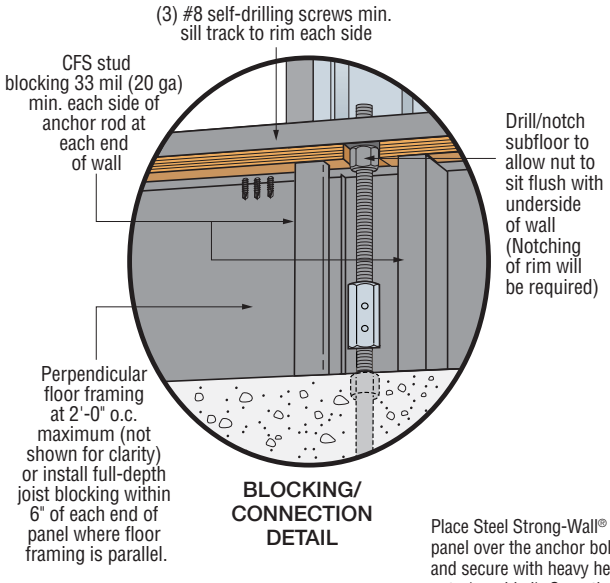
Wall Width (in.)	Model No.	Contents
12	SSW12-1KT	(1) Shear-Transfer Plate (with #14 self-drilling screws) (2) ¾" or 1"x18" Threaded Rods F1554 Grade 36 (2) Coupler Nuts (2) Heavy Hex Nuts Installation Instructions
15	SSW15-1KT	
18	SSW18-1KT	
21	SSW21-1KT	
24	SSW24-1KT	

1. Two heavy hex nuts included with each wall.

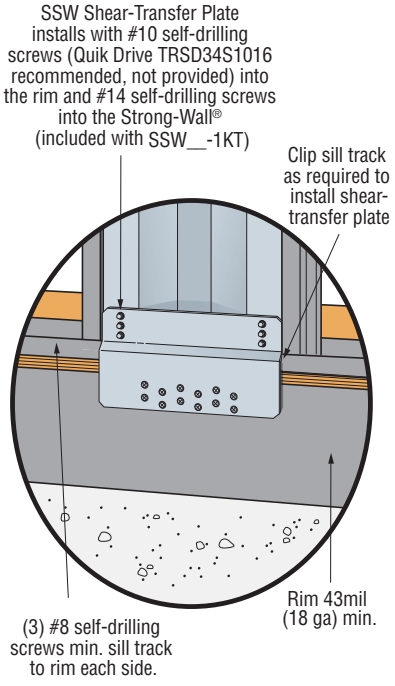
DO NOT cut wall or enlarge existing holes

Shear-Transfer Plate Fasteners for Raised-Floor Applications

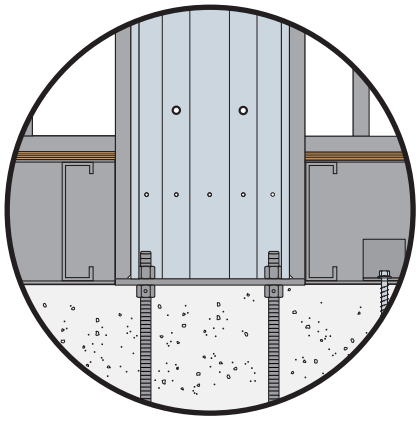
Strong-Wall Width	Fastener #14 Screws	Quantity #10 Screws
12" Wall	4	6
15" Wall	4	10
18" Wall	6	12
21" Wall	6	16
24" Wall	7	18



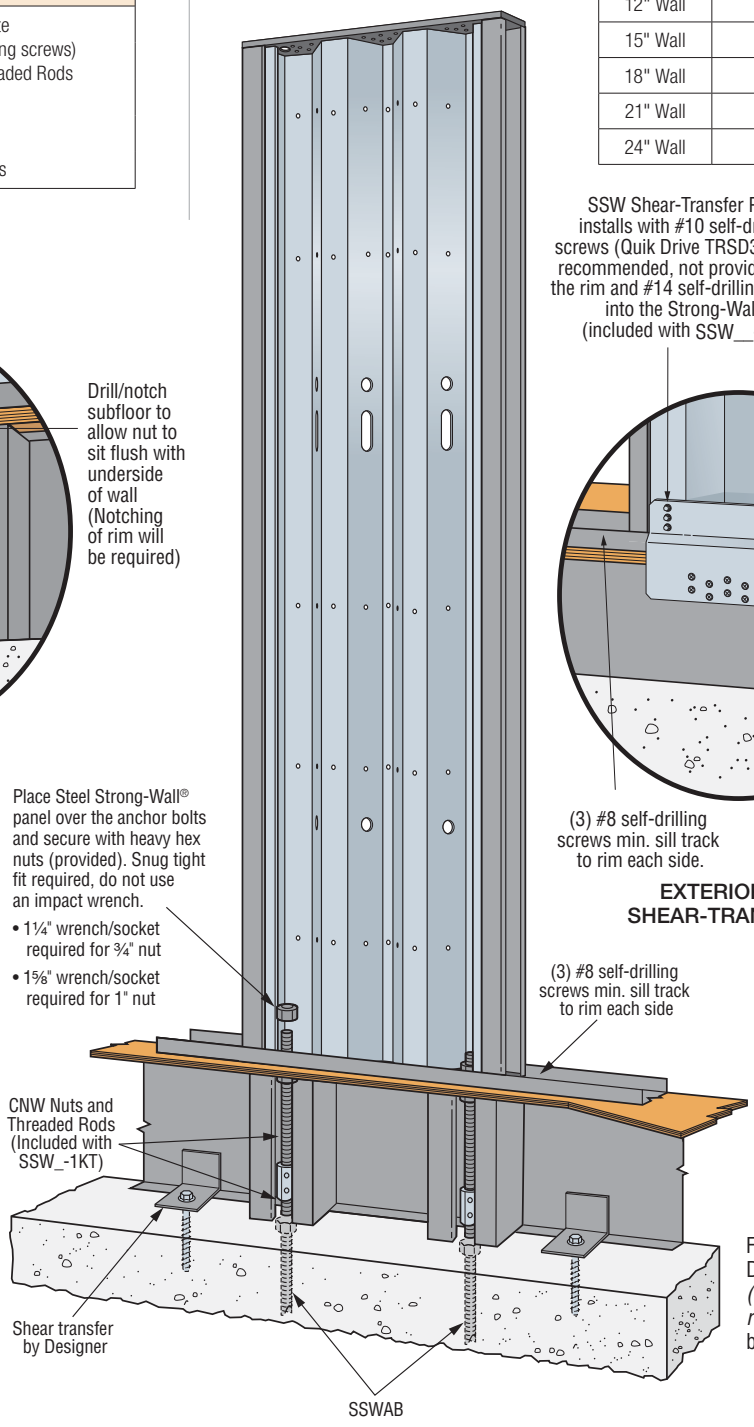
BLOCKING/ CONNECTION DETAIL



EXTERIOR VIEW OF SHEAR-TRANSFER PLATE



Alternate 1st-Floor Installation
Specify taller wall model to allow for floor framing and use load values for installation on concrete; see pages 146–147.



Cold-Formed Steel 1st-Story Floor System
U.S. Patent 8,281,551; Canadian Patent 2,489,845

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Steel Strong-Wall® Cold-Formed Steel 1st-Story Floor Systems

2012 International Building Code®

S/SSW Model	Seismic[2]			Wind		
	Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)	Anchor Tension at Allowable Shear[4] (lbs.)	Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)	Anchor Tension at Allowable Shear[4] (lbs.)
S/SSW12x8	435	0.40	6135	435	0.40	6135
S/SSW15x8	1050	0.42	11010	1150	0.46	12060
S/SSW18x8	1525	0.36	12075	1525	0.36	12075
S/SSW21x8	1900	0.29	12085	1900	0.29	12085
S/SSW24x8	2270	0.24	12065	2270	0.24	12065
S/SSW12x9	390	0.47	6185	390	0.47	6185
S/SSW15x9	900	0.48	10605	1025	0.54	12080
S/SSW18x9	1355	0.42	12055	1355	0.42	12055
S/SSW21x9	1690	0.34	12080	1690	0.34	12080
S/SSW24x9	2020	0.28	12065	2020	0.28	12065
S/SSW15x10	785	0.53	10270	925	0.63	12100
S/SSW18x10	1220	0.48	12050	1220	0.48	12050
S/SSW21x10	1520	0.39	12060	1520	0.39	12060
S/SSW24x10	1820	0.32	12065	1820	0.32	12065

1. Loads are applicable to 1st-Story Cold-Formed Steel Raised-Floor installations supported on concrete or masonry foundations using the ASD basic (Section 1605.3.1) or the alternative basic (Section 1605.3.2) load combinations. Load values include evaluation of anchor rod compression capacity and do not require further evaluation by the Designer.
2. For seismic designs based on the 2012 IBC using R = 6.5. For other codes, use the seismic coefficients corresponding to light-frame bearing walls with wood structural panels or sheet steel panels.
3. Minimum standard-strength anchor bolts required. See pages 156-163 for SSWAB anchor bolt information and anchorage solutions. Tabulated anchor tension loads assume no resisting axial load. Anchor rod tension at design shear load and including the effect of axial load may be determined using the Strong-Wall Selector™ software or the following equation:
   T = [(V x h) / B] - P/2, where: T = Anchor rod tension load (lbs.)
   V = design shear load (lbs.)
   h = Strong-Wall® height per page 146 (in.)
   P = applied axial load (lbs.)
   B = Anchor bolt centerline dimension (in.)
   (6⅞" for S/SSW12, 9¼" for S/SSW15, 12¼" for S/SSW18, 15¼" for S/SSW21, and 18¼" for S/SSW24)
4. Allowable shear loads assume a maximum first-floor joist depth of 12".
5. Allowable shear loads are based on 1000 lbs. total uniformly distributed axial load acting on the entire panel in combination with the shear load. For allowable shear loads at 2000 lbs. uniformly distributed axial load, multiply table values by 0.92 for S/SSW12x models, and 0.96 for other S/SSW widths.
6. Top-of-wall screws for the S/SSW shall be approved ¼" or #14 self-drilling screws with a minimum nominal shear strength (P_{SS}) of 2000 lbs. Top of panel shall be connected to a minimum 43 mil (18 ga) thick steel member typical.

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Steel Strong-Wall® Cold-Formed Steel Two-Story Stacked on Concrete Foundation

A complete stacked-wall solution for two-story applications. The Steel Strong-Wall® option for two-story cold-formed steel installations combines simplified installation with superior performance.

- Some of the highest loads in the industry, and design procedures that account for cumulative overturning.
- Complete concrete anchorage designs for two-story applications (foundation design by Designer).
- No bearing plates to install. Walls can be placed flush against a corner.
- Same anchor bolt template as single-story installation.
- Compression loads transferred by nut/rod.

Material & Finish: See page 146.

For a complete set of wall profile drawings, see page 146.

Naming Scheme:

Top Wall:

S/SSW18x8

- **Steel Strong-Wall for Cold-Formed Steel**
- **Width (in.)**
- **Nominal Height (ft.)**

Bottom Wall:

S/SSW18x10-STK

- **Steel Strong-Wall for Cold-Formed Steel**
- **Width (in.)**
- **Nominal Height (ft.)**
- **Stacked Wall (For Bottom Walls Only)**

Cold-Formed Steel Two-Story Stacked-Wall Product Data - Bottom Wall

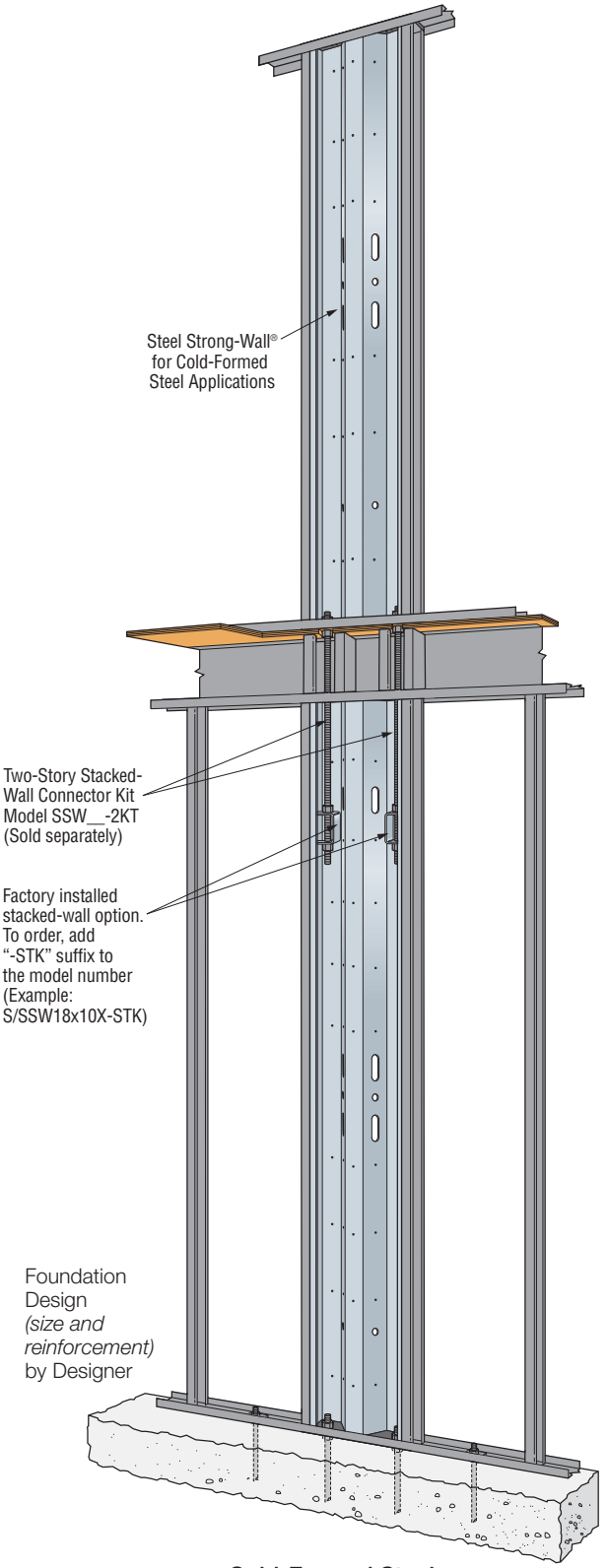
Model No.	W	H	T	Anchor Bolts		Number of Screws in Top of Wall
	(in.)	(in.)	(in.)	Qty.	Dia.	
S/SSW15x8-STK	15"	96⅝	3½"	2	1"	6
S/SSW18x8-STK	18"	96⅝	3½"	2	1"	9
S/SSW21x8-STK	21"	96⅝	3½"	2	1"	12
S/SSW24x8-STK	24"	96⅝	3½"	2	1"	14
S/SSW15x9-STK	15"	108⅝	3½"	2	1"	6
S/SSW18x9-STK	18"	108⅝	3½"	2	1"	9
S/SSW21x9-STK	21"	108⅝	3½"	2	1"	12
S/SSW24x9-STK	24"	108⅝	3½"	2	1"	14
S/SSW15x10-STK	15"	120⅝	3½"	2	1"	6
S/SSW18x10-STK	18"	120⅝	3½"	2	1"	9
S/SSW21x10-STK	21"	120⅝	3½"	2	1"	12
S/SSW24x10-STK	24"	120⅝	3½"	2	1"	14

1. Specify height when ordering "X-STK" models.
2. See page 146 for product data on top wall.

Two-Story Stacked-Wall Connection Kit

Wall Width (in.)	Model No.	Contents
15	SSW15-2KT	(1) Shear-Transfer Plate (with #14 self-drilling screws, included) (2) 1"x48" Threaded Rods F1554 Grade 36 (6) Heavy Hex Nuts Installation Instructions
18	SSW18-2KT	
21	SSW21-2KT	
24	SSW24-2KT	

1. Two heavy hex nuts included with each wall.



Cold-Formed Steel
Two-Story Stacked on Concrete Foundation
U.S. Patents 8,281,551 and 8,689,518; Canadian Patent 2,489,845

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Steel Strong-Wall® Cold-Formed Steel Two-Story Stacked on Concrete Foundation

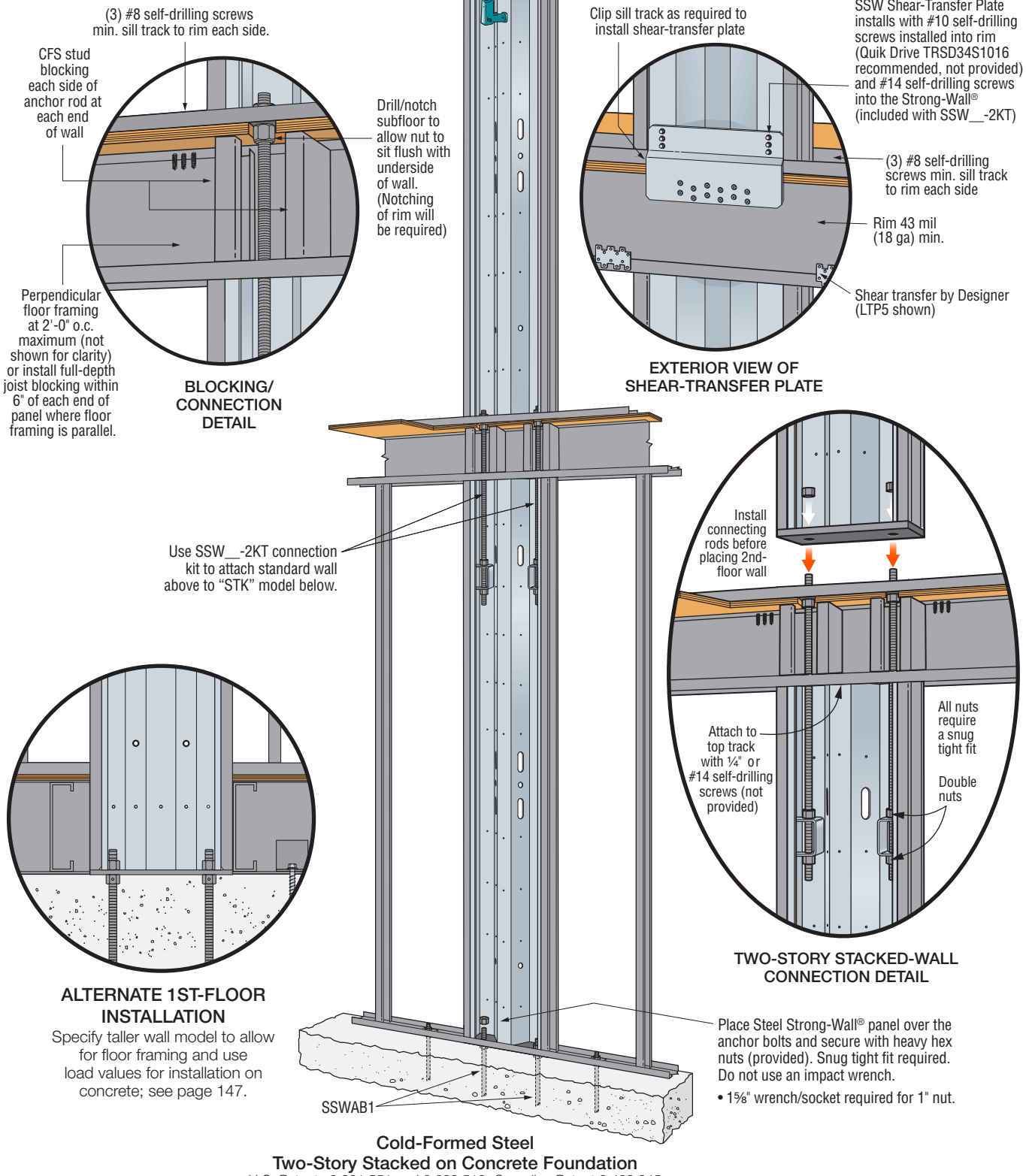
SIMPSON Strong-Tie®

Installation

- Do not cut the Steel Strong-Wall® or enlarge existing holes. Doing so will compromise the performance of the wall.
- Do not use an impact wrench to tighten nuts on the anchor bolts.
- Drill or notch the subfloor to allow the compression nut to sit flush with the underside of the 2nd-story wall (notching of the rim will be required).

Shear-Transfer Plate Fasteners

Strong-Wall Width	Fastener Quantity	
	#14 Screws	#10 Screws
15" Wall	4	10
18" Wall	6	12
21" Wall	6	16
24" Wall	7	18



Cold-Formed Steel
Two-Story Stacked on Concrete Foundation
U.S. Patents 8,281,551 and 8,689,518; Canadian Patent 2,489,845

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Steel Strong-Wall® Cold-Formed Steel Two-Story Stacked on Concrete Foundation

Second-Story Walls [6,8]

Second-Story Wall Models	Seismic [2]		Wind	
	Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)	Allowable ASD Shear Load V (lbs.)	Drift at Allowable Shear (in.)
S/SSW15x8	550	0.29	550	0.29
S/SSW18x8	995	0.31	1275	0.39
S/SSW21x8	1515	0.30	1650	0.33
S/SSW24x8	1970	0.27	1970	0.27
S/SSW15x9	510	0.35	510	0.35
S/SSW18x9	940	0.38	1180	0.47
S/SSW21x9	1435	0.37	1465	0.38
S/SSW24x9	1755	0.31	1755	0.31
S/SSW15x10	475	0.41	475	0.41
S/SSW18x10	890	0.45	1060	0.54
S/SSW21x10	1300	0.42	1300	0.42
S/SSW24x10	1580	0.36	1580	0.36

1. Allowable base moment and anchor tension forces are applicable to installation on concrete foundations with minimum f'_c = 2,500 psi using the ASD basic (Section 1605.3.1) or the alternative basic (Section 1605.3.2) load combinations. Load values include evaluation of anchor rod compression at second story and bearing stresses at foundation.
2. For seismic designs based on the 2012 IBC using R = 6.5. For other codes, use the seismic coefficients corresponding to light-frame bearing walls with wood structural panels or sheet steel panels.
3. Two-Story Stacked-Wall installations may consist of any height combination of equal width wall models listed in these tables.
4. Loads are based on a 1000 lb. maximum uniformly distributed total axial load acting on the second-story panel and a 2000 lb. maximum uniformly distributed total axial load acting on the first-story panel in combination with the tabulated shear load and base moment.
5. The designer must verify that the cumulative overturning moment at the base of the first-story Steel Strong-Wall does not exceed the allowable base moment capacity. See design example on page 155 for procedure.
6. The allowable second-story shear loads assume a maximum floor joist depth of 14".
7. Allowable shear, drift and base moment values may be interpolated for intermediate heights.
8. Minimum ASTM F 1554 Grade 36 threaded rods are required at the second-story wall anchorage.
9. High-strength anchor bolts are required at the first-story wall for anchor tension forces exceeding the allowable load for standard strength bolts tabulated on pages 156-157. See pages 156-163 for SSWAB anchor bolt information and anchorage solutions.
10. Tabulated anchor tension loads assume no resisting axial load. For anchor tension loads at design shear values and including the effect of axial load, refer to the Strong-Wall Selector software or use the equations on page 149. Drifts at lower design shear or base moment may be linearly reduced.
11. Top-of-wall screws for the S/SSW shall be approved ¼" or #14 self-drilling screws with a minimum nominal shear strength (P_{ss}) of 2000 lbs. Top of panel shall be connected to a minimum 43 mil (18 ga) thick steel member typical. First-Story S/SSW 24x8-STK requires connection to a minimum 54 mil (16 ga) thick steel member where the total applied shear load exceeds 4230 lbs.

First-Story Walls On Concrete Foundations [5,9,11]

First-Story Wall Models	Seismic [2]			Wind		
	Allowable ASD Base Moment (ft-lbs.)	Drift at Allowable Base Moment (in.)	Anchor Tension at Allowable Base Moment [10] (lbs.)	Allowable ASD Base Moment (ft-lbs.)	Drift at Allowable Base Moment (in.)	Anchor Tension at Allowable Base Moment [10] (lbs.)
S/SSW15x8-STK	10130	0.41	12065	10130	0.41	12065
S/SSW18x8-STK	17300	0.41	16895	22230	0.53	24075
S/SSW21x8-STK	26390	0.41	21905	31000	0.48	27545
S/SSW24x8-STK	36700	0.39	26335	40040	0.43	29770
S/SSW15x9-STK	9705	0.47	11440	9945	0.48	11790
S/SSW18x9-STK	16670	0.47	16110	21480	0.61	22835
S/SSW21x9-STK	25435	0.46	20855	28990	0.53	24950
S/SSW24x9-STK	36210	0.45	25860	37515	0.47	27145
S/SSW15x10-STK	9160	0.51	10665	9460	0.53	11090
S/SSW18x10-STK	16185	0.53	15515	20335	0.66	21060
S/SSW21x10-STK	24485	0.52	19845	25895	0.55	21355
S/SSW24x10-STK	33645	0.49	23460	33645	0.49	23460

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Steel Strong-Wall® Two-Story Design Example

Example: Cold-Formed Steel Two-Story Wall Design

Given:

Wind, f'_c = 2500 psi

$V_{2nd\text{-}story\ wall}$ = 650 lbs.

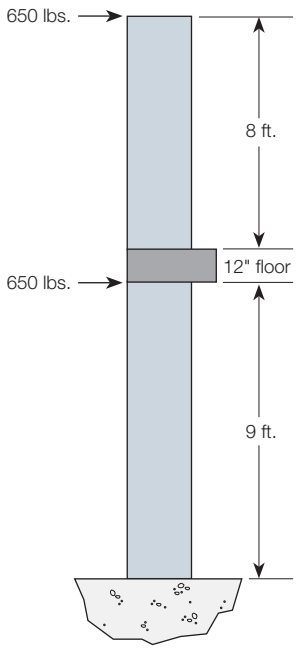
$V_{1st\text{-}story\ wall}$ = 650 lbs.

V_{total} = 650 lbs. + 650 lbs. = 1,300 lbs.

M_{allow} = Allowable ASD Base Moment (ft-lbs.)
(See Cold-Formed Steel Two-Story Stacked Tables)

V_{allow} = Allowable ASD Shear Load V (lbs.)
(See Cold-Formed Steel Two-Story Stacked Tables)

APPLIED LOADS



STEP 1 – Select First-Story Wall (See tables on page 154)

M_{base} = (650 lbs. x 18 ft.) + (650 lbs. x 9 ft.) = 17,550 ft-lbs.

Using First-Story Wall Table, select a 9-foot wall with $M_{allow} \geq M_{base}$

Select S/SSW18x9-STK

M_{allow} = 21,480 ft-lbs. > 17,550 ft-lbs. **OK**

STEP 2 – Check Second-Story Wall

Using the Second-Story Wall Table on page 154, check the capacity of an 8-foot wall with the same width as the First-Story Wall selected in Step 1:

Select S/SSW18x8

V_{allow} = 1,275 lbs. > 650 lbs. **OK**

➡ **Use S/SSW18x8 over S/SSW18x9-STK**

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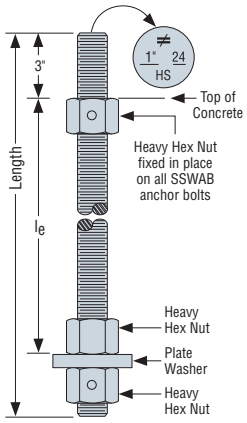
Steel Strong-Wall® Anchorage Solutions

SSWAB Anchor Bolts

SSWAB anchor bolts in ¾" and 1" diameters offer flexibility to meet specific project demands. Inspection is easy; the head is stamped with a "No Equal" symbol for identification, bolt length, bolt diameter, and optional "HS" for High Strength if specified.

Material: ASTM F1554 Grade 36; High-Strength (HS) ASTM A449

An additional nut for template installation is provided with each SSWAB. It may also be used for SSW installation.

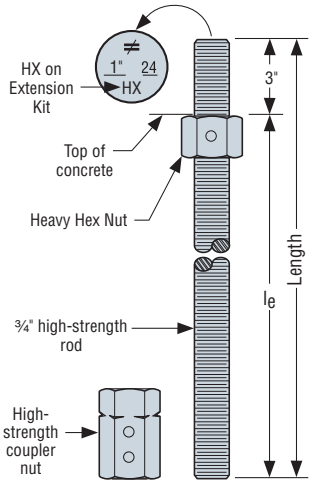


SSWAB

Steel Strong-Wall Width (in.)	Model No.	Dia. (in.)	Total Length (in.)	le (in.)
12" Model	SSWAB¾x24	¾	24	19
	SSWAB¾x24HS	¾	24	19
	SSWAB¾x30	¾	30	25
	SSWAB¾x30HS	¾	30	25
	SSWAB¾x36HS	¾	36	31
15", 18", 21", 24" Models	SSWAB1x24	1	24	19
	SSWAB1x24HS	1	24	19
	SSWAB1x30	1	30	25
	SSWAB1x30HS	1	30	25
	SSWAB1x36HS	1	36	31

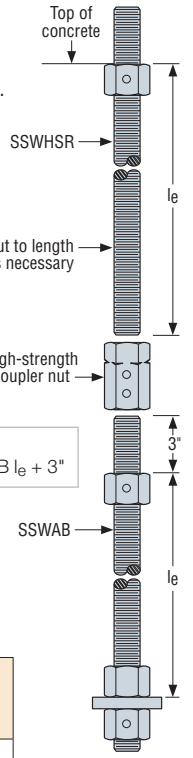
SSWHSR Extension Kit

SSWHSR allows for anchorage in tall stemwall applications where full embedment of an SSWAB into the footing is required. The head is stamped for identification like an SSWAB. Kit includes ASTM A449 high-strength rod with heavy hex nut fixed in place and high-strength coupler nut. Do not use in place of SSWAB.



SSWHSR_KT

Total l_e = SSWHSR l_e + SSWAB l_e + 3"



SSWHSR and SSWAB Assembly

Steel Strong-Wall Width (in.)	Model No.	Dia. (in.)	Total Length (in.)	le (in.)
12" Model	SSWHSR¾x2KT	¾	24	21
	SSWHSR¾x3KT	¾	36	33
15", 18", 21", 24" Models	SSWHSR1x2KT	1	24	21
	SSWHSR1x3KT	1	36	33

Steel Strong-Wall® Anchorage Solutions – 2500 psi Concrete[1,2,6]

Design Criteria	Concrete Condition	Anchor Strength[3]	SSWAB ¾" Anchor Bolt			SSWAB 1" Anchor Bolt		
			ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)	ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)
Seismic[4]	Cracked	Standard	8,800	22	8	16,100	33	11
			9,600	24	8	17,100	35	12
		High Strength	18,500	36	12	33,000	51	17
			19,900	38	13	35,300	54	18
	Uncracked	Standard	8,800	19	7	15,700	28	10
			9,600	21	7	17,100	30	10
		High Strength	18,300	31	11	32,300	44	15
			19,900	33	11	35,300	47	16
Wind[5]	Cracked	Standard	5,100	14	6	6,200	16	6
			7,400	18	6	11,400	24	8
			9,600	22	8	17,100	32	11
		High Strength	11,400	24	8	21,100	36	12
			13,600	27	9	27,300	42	14
			15,900	30	10	31,800	46	16
			19,900	35	12	35,300	50	17
	Uncracked	Standard	5,000	12	6	6,400	14	6
			7,800	16	6	12,500	22	8
			9,600	19	7	17,100	28	10
		High Strength	12,500	22	8	21,900	32	11
			14,300	24	8	26,400	36	12
			17,000	27	9	31,500	40	14
			19,900	30	10	35,300	43	15

1. See pages 159-160 for foundation illustrations showing W and d_e dimensions.
2. Anchorage designs conform to ACI 318-11 Appendix D with no supplementary reinforcement and cracked or uncracked concrete as noted.
3. Anchor strength indicates required grade of SSWAB anchor bolt. Standard or High-Strength (HS).
4. Seismic indicates Seismic Design Category C through F. Detached 1 and 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 Section D.3.3.4.
5. Wind includes Seismic Design Category A and B.
6. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by Designer. The registered design professional may specify alternate embedment, footing size or anchor bolt.

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Steel Strong-Wall® Anchorage Solutions

Steel Strong-Wall® Anchorage Solutions – 3500 Psi Concrete[1,2,6]

Design Criteria	Concrete Condition	Anchor Strength[3]	SSWAB ¾" Anchor Bolt			SSWAB 1" Anchor Bolt		
			ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)	ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)
Seismic[4]	Cracked	Standard	9,000	20	7	15,700	29	10
			9,600	21	7	17,100	31	11
		High Strength	18,200	32	11	32,900	46	16
			19,900	34	12	35,300	48	16
	Uncracked	Standard	8,800	17	6	15,700	25	9
			9,600	19	7	17,100	27	9
		High Strength	18,600	28	10	32,600	40	14
			19,900	30	10	35,300	42	14
Wind[5]	Cracked	Standard	6,000	14	6	7,300	16	6
			7,300	16	6	13,500	24	8
			9,600	20	7	17,100	29	10
		High Strength	11,800	22	8	22,700	34	12
			13,500	24	8	27,400	38	13
			17,000	28	10	32,300	42	14
			19,900	32	11	35,300	45	15
	Uncracked	Standard	6,000	12	6	7,500	14	6
			7,500	14	6	12,800	20	7
			9,600	17	6	17,100	25	9
		High Strength	12,800	20	7	21,300	28	10
			14,800	22	8	26,000	32	11
			16,900	24	8	31,300	36	12
			19,900	27	9	35,300	39	13

1. See pages 159-160 for foundation illustrations showing W and d_e dimensions.
2. Anchorage designs conform to ACI 318-11 Appendix D with no supplementary reinforcement and cracked or uncracked concrete as noted.
3. Anchor strength indicates required grade of SSWAB anchor bolt. Standard or High-Strength (HS).
4. Seismic indicates Seismic Design Category C through F. Detached 1 and 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 Section D.3.3.4.
5. Wind includes Seismic Design Category A and B.
6. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by Designer. The registered design professional may specify alternate embedment, footing size or anchor bolt.

Steel Strong-Wall® Anchorage Solutions – 4500 Psi Concrete[1,2,6]

Design Criteria	Concrete Condition	Anchor Strength[3]	SSWAB ¾" Anchor Bolt			SSWAB 1" Anchor Bolt		
			ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)	ASD Allowable Tension (lbs.)	W (in.)	d_e (in.)
Seismic[4]	Cracked	Standard	8,700	18	6	16,000	27	9
			9,600	20	7	17,100	29	10
		High Strength	17,800	29	10	32,100	42	14
			19,900	32	11	35,300	45	15
	Uncracked	Standard	9,100	16	6	15,700	23	8
			9,600	17	6	17,100	25	9
		High Strength	17,800	25	9	32,500	37	13
			19,900	27	9	35,300	39	13
Wind[5]	Cracked	Standard	5,400	12	6	6,800	14	6
			8,300	16	6	11,600	20	7
			9,600	18	6	17,100	26	9
		High Strength	11,600	20	7	21,400	30	10
			13,400	22	8	25,800	34	12
			17,300	26	9	31,000	38	13
			19,900	29	10	35,300	42	14
	Uncracked	Standard	6,800	12	6	6,800	12	6
			8,500	14	6	12,400	18	6
			9,600	16	6	17,100	23	8
		High Strength	12,400	18	6	21,600	26	9
			14,500	20	7	26,700	30	10
			16,800	22	8	32,200	34	12
			19,900	25	9	35,300	36	12

1. See pages 159-160 for foundation illustrations showing W and d_e dimensions.
2. Anchorage designs conform to ACI 318-11 Appendix D with no supplementary reinforcement and cracked or uncracked concrete as noted.
3. Anchor strength indicates required grade of SSWAB anchor bolt. Standard or High-Strength (HS).
4. Seismic indicates Seismic Design Category C through F. Detached 1 and 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 Section D.3.3.4.
5. Wind includes Seismic Design Category A and B.
6. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by Designer. The registered design professional may specify alternate embedment, footing size or anchor bolt.

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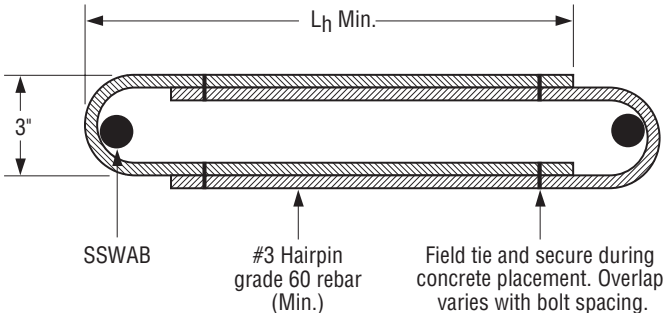
Steel Strong-Wall® Shear Anchorage

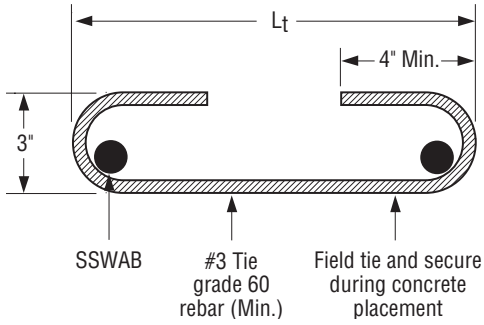
Foundation shear reinforcement to resist shear forces from Strong-Wall® panels located at the edge of concrete is shown in the table below. The S/SSW12 and S/SSW15 used in wind applications do not require shear reinforcement when the panel design shear force is less than the anchorage allowable shear load shown in the table below.

Model	L_t or L_h (in.)	SEISMIC[3]		WIND[4]					
		Shear Reinforcement	Minimum Curb/Stemwall Width (in.)	Shear Reinforcement	Minimum Curb/Stemwall Width (in.)	ASD Allowable Shear Load V[6] (lbs.)			
						6" Minimum Curb/Stemwall		8" Minimum Curb/Stemwall	
						Uncracked	Cracked	Uncracked	Cracked
S/SSW12	9	(1) #3 Tie	6	See note 6	—	1230	880	1440	1030
S/SSW15	12	(2) #3 Ties	6	See note 6	—	1590	1135	1810	1295
S/SSW18	14	(1) #3 Hairpin	8[5]	(1) #3 Hairpin	6	Hairpin reinforcement achieves maximum allowable shear load of the Steel Strong-Wall® panel.			
S/SSW21	15	(2) #3 Hairpins	8[5]	(1) #3 Hairpin	6				
S/SSW24	17	(2) #3 Hairpins	8[5]	(1) #3 Hairpin	6				

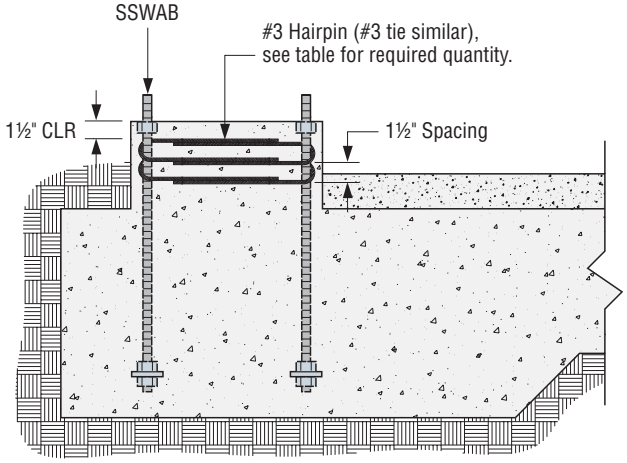
1. Shear anchorage designs conform to ACI 318-11 and assume minimum f'_c = 2500 psi concrete. See pages 156-157 for tension anchorage.
2. Shear reinforcement is not required for panels installed on a cold-formed steel floor, interior foundation applications (panel installed away from edge of concrete) or braced-wall panel applications.
3. Seismic indicates Seismic Design Category C through F. Detached 1 and 2 family dwellings in SDC C may use wind anchorage solutions. Seismic shear reinforcement designs conform to ACI 318-11 Section D.3.3.5.
4. Wind includes Seismic Design Category A and B.
5. Where noted, minimum curb/stemwall width is 6" when standard-strength SSWAB is used.
6. Use (1) #3 tie for S/SSW12 and S/SSW15 when the Steel Strong-Wall® panel design shear force exceeds the tabulated anchorage allowable shear load.
7. The registered design professional may specify alternate shear anchorage.



Hairpin Shear Reinforcement



Tie Shear Reinforcement



Hairpin Installation
(Garage curb shown, other footing types similar)

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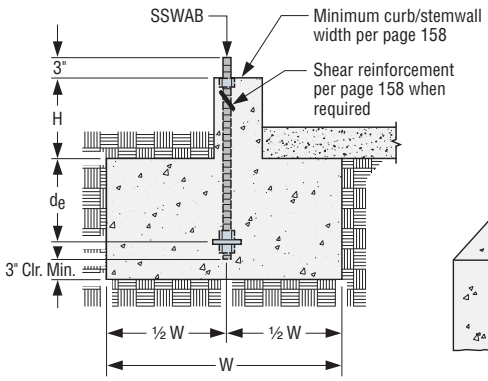
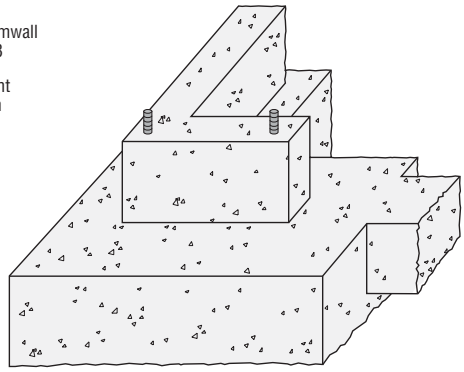
Steel Strong-Wall® Anchorage Solutions

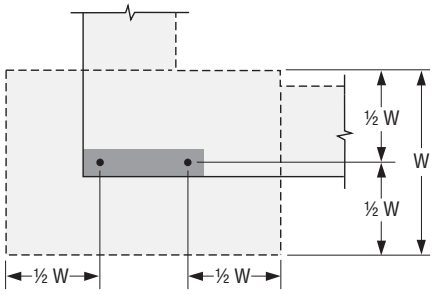
CURB OR STEMWALL INSTALLATION



Curb or Stemwall Section View

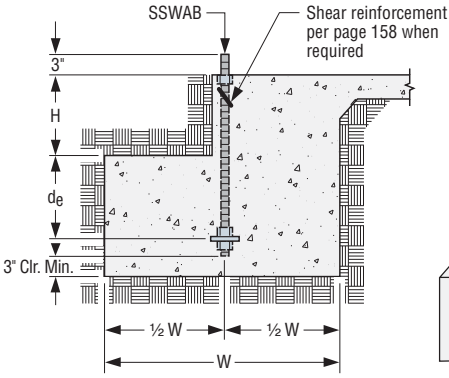


Perspective View
(Slab not shown for clarity)

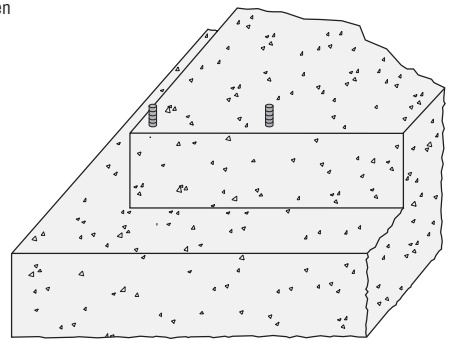


Footing Plan

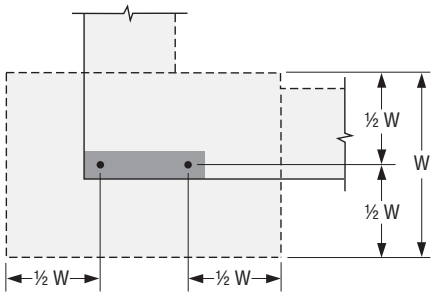
SLAB-ON-GRADE INSTALLATION



Slab-on-Grade Section View

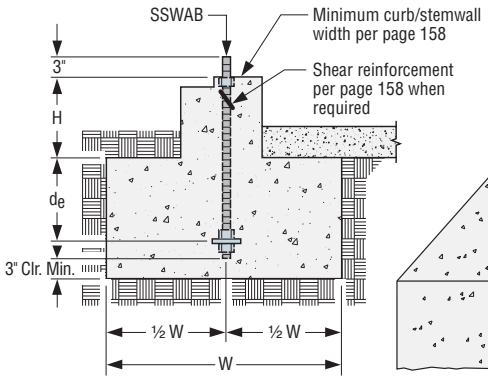


Perspective View

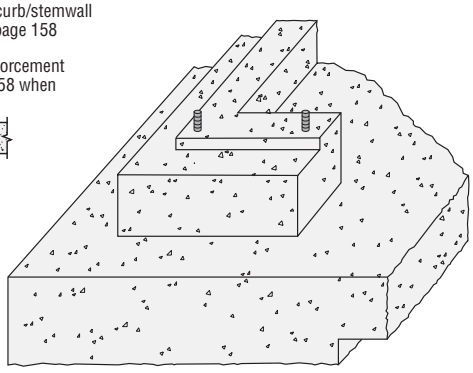


Footing Plan

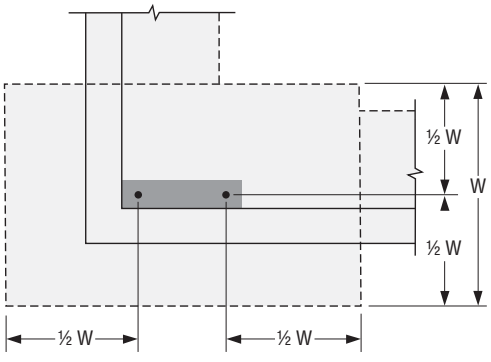
BRICK LEDGE INSTALLATION



Brick Ledge Section View



Perspective View



Footing Plan

Anchorage Solutions General Notes

1. The Designer may specify alternate embedment, footing size or bolt grade.
2. Footing dimensions and rebar requirements are for anchorage only.

Foundation design *(size and reinforcement)* by Designer.

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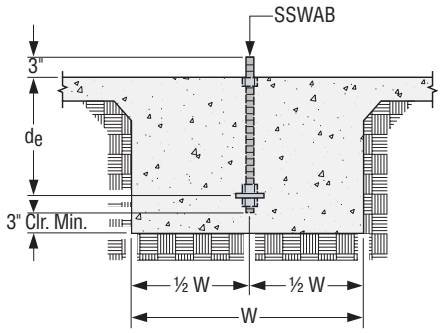
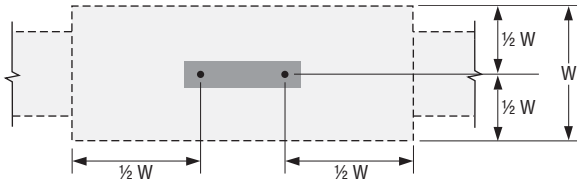
Steel Strong-Wall® Anchorage Solutions

INTERIOR INSTALLATION

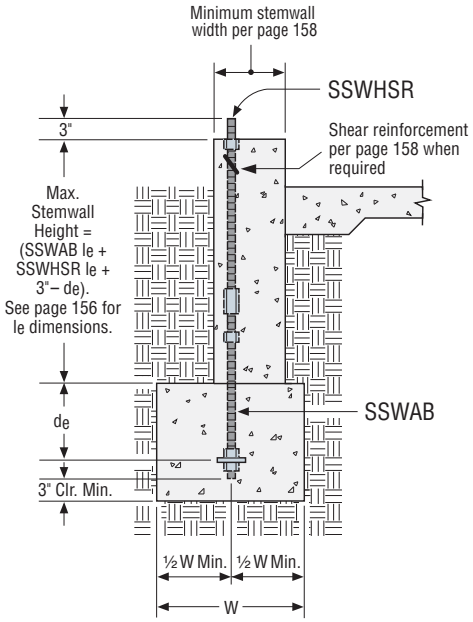


Interior Section View



Footing Plan

STEMWALL EXTENSION INSTALLATION



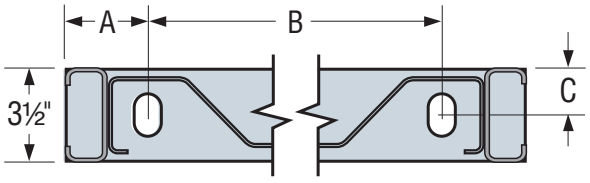
Section at Stemwall SSWAB and SSWHSR Extension Application

Anchorage Solutions General Notes

1. The Designer may specify alternate embedment, footing size or bolt grade.
2. Footing dimensions and rebar requirements are for anchorage only.

Steel Strong-Wall® Anchor Bolt Layout

Wall Model	Distance From End of Wall to Center of SSWAB's (A)	Distance From Center to Center of SSWAB's (B)	Distance From Exterior Face of Wall to Center of All SSWAB's (C)
S/SSW12	2 9/16"	6 7/8"	2"
S/SSW15	2 7/8"	9 1/4"	1 7/8"
S/SSW18	2 7/8"	12 1/4"	1 7/8"
S/SSW21	2 7/8"	15 1/4"	1 7/8"
S/SSW24	2 7/8"	18 1/4"	1 7/8"



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Steel Strong-Wall® Grade Beam Anchorage Solutions

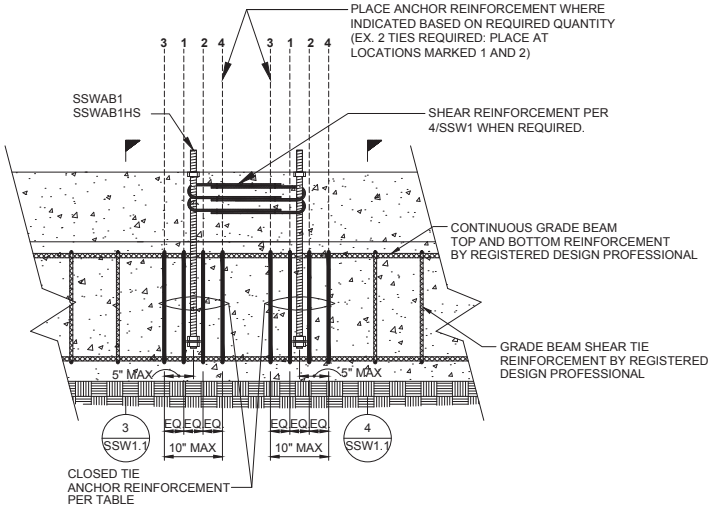
Simpson Strong-Tie now provides grade beam anchorage solutions for the Steel Strong-Wall®, which have been calculated to conform to ACI 318-11, Appendix D. Through funding from the Structural Engineers Association of Northern California, initial testing at Scientific Construction Laboratories Inc. confirmed the need to comply with Appendix D requirements to prevent plastic hinging at anchor locations (D.3.3.2). Follow-on testing at the Simpson Strong-Tie Tyrell Gilb Research Laboratory was then used to confirm these findings and validate performance. The testing consisted of specimens with closed tie anchor reinforcement, non-closed u-stirrups and control specimens without anchor reinforcement. Flexural and shear reinforcement were designed to resist Appendix D amplified anchorage forces and compared to test beams designed for non-amplified strength level forces. The test program has proven the performance of the anchor reinforcement details developed by Simpson Strong-Tie.

Significant Findings From Testing:

Grade beam flexural and shear capacity is critical to anchor performance and must be designed to exceed the demands created by the attached structure. In wind load applications, this demand includes the factored demand from the Steel Strong-Wall (S/SSW) shearwall. In seismic applications, testing and analysis has shown that in order to achieve the anchor performance expected by Appendix D design methodologies, the concrete member design strength needs to resist the amplified anchor design demand from Appendix D Section D.3.3.4.3. To help designers achieve this, Simpson Strong-Tie recommends Designers apply the seismic design moment listed in the table below at the S/SSW location when evaluating the grade beam design strength under seismic loads. The tabulated moment correlates to the lowest of the anchor tension design limits of Appendix D Section D.3.3.4.3 as they relate to each S/SSW model.

Closed tie anchor reinforcement is critical to maintain the integrity of the reinforced core where the anchor is located. Testing with u-stirrups that did not include complete closed ties showed premature splitting failure of the grade beam.

Grade Beam Test Photo



S/SSW Grade Beam Anchorage Detail

See **www.strongtie.com** for additional grade beam anchor reinforcement details and requirements

Steel Strong-Wall Grade Beam Anchorage Solutions

Steel Strong-Wall Model	Anchor Bolt Model No.	Anchor Diameter (in.)	Anchor Reinforcement for Wind and Seismic		LRFD Applied Seismic Design Moment for Grade Beam Design (ft.-lbs.)	
			Standard-Strength SSWAB	High-Strength SSWABHS	Standard-Strength SSWAB	High-Strength SSWABHS
S/SSW12	SSWAB¾	¾	2- #4 Closed Ties / Wall	5- #4 Closed Ties / Wall	16000	23000
S/SSW15	SSWAB1	1	4- #4 Closed Ties / Wall	7- #4 Closed Ties / Wall	36000	44000
S/SSW18			2- #4 Closed Ties / Anchor	4- #4 Closed Ties / Anchor	48000	61000
S/SSW21					59000	77000
S/SSW24					71000	87000

1. Anchor reinforcement conforms to ACI 318-11, section D.5.2.9 and performance was validated through full scale testing.
2. Minimum concrete compressive strength, f'c = 2500 psi.
3. Closed tie anchor reinforcement to be ASTM A615 Grade 60 (min.) #4 rebar.
4. Grade beam longitudinal and tie reinforcement shall be specified by the registered design professional for flexure and shear loading. Design should consider project specific design loads and allowable soil pressure.
5. Simpson Strong-Tie recommends using the tabulated minimum LRFD-applied seismic design moment to ensure grade-beam design flexure and shear strength is adequate to prevent plastic hinge formation under demands associated with anchorage forces corresponding to ACI 318-11, Section D.3.3.4.3.
6. Designer may use reduced moment due to applied S/SSW lateral load. Minimum moment shall be the lesser of the tabulated moment or the amplified LRFD design moment for seismic: (ASD Shear/0.7) x Ω_o x S/SSW height for grade beam design.
7. Minimum grade beam design moment for wind and seismic in Seismic Design Category A and B and detached one- and two-family dwellings in SDC C: (ASD Shear/0.6) x S/SSW height.
8. Closed tie may be single piece hoop or two piece assembly with a u-stirrup with 135 degree hooks and a top cross tie cap.
9. Closed tie anchor reinforcement quantity is per wall for the 12" and 15" wall models, and per anchor for the 18", 21" and 24" models.

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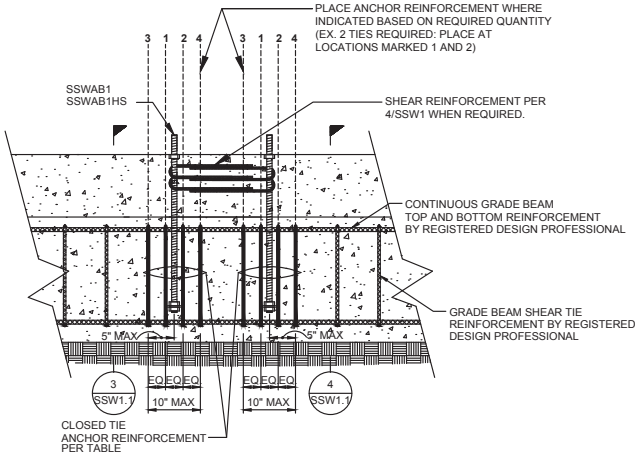
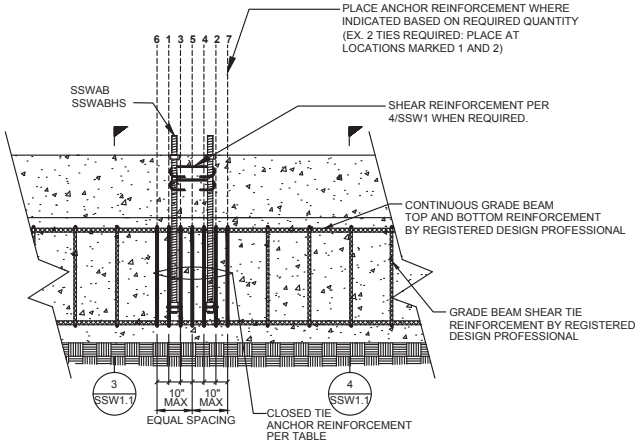
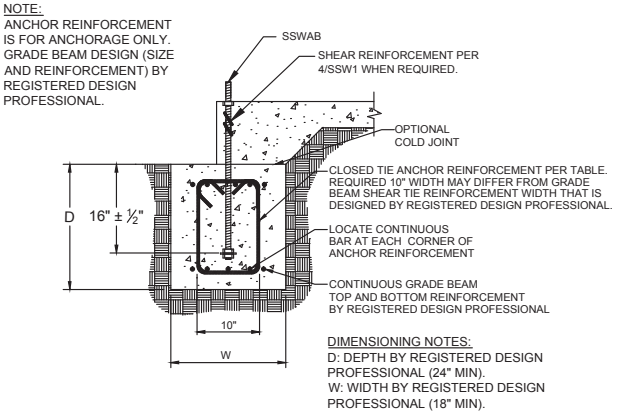
Steel Strong-Wall® Anchorage Details



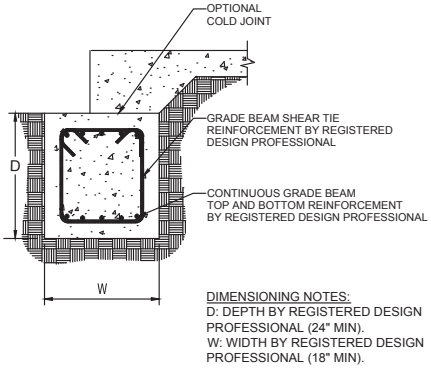
GRADE BEAM ELEVATION AT 18", 21" AND 24" WALL MODELS | 1/SSW1.1



GRADE BEAM ELEVATION AT 12" AND 15" WALL MODELS | 2/SSW1.1



GRADE BEAM SECTION AT ANCHOR REINFORCEMENT | 3/SSW1.1



GRADE BEAM SECTION AWAY FROM ANCHOR REINFORCEMENT | 4/SSW1.1

SSW GRADE BEAM ANCHOR REINFORCEMENT

STEEL STRONG-WALL WIDTH (in.)	ANCHOR MODEL NO.	ANCHOR DIAMETER (in.)	ANCHOR REINFORCEMENT FOR WIND AND SEISMIC [3,8,9]		LRFD APPLIED DESIGN SEISMIC MOMENT (ft.-lbs.) [4,5,6,7]	
			STANDARD STRENGTH SSWAB	HIGH STRENGTH (HS) SSWAB	STANDARD STRENGTH SSWAB	HIGH STRENGTH (HS) SSWAB
12" MODEL	SSWAB3/4 SSWAB3/4HS	3/4	2- #4 CLOSED TIES PER 2/SSW1.1	5- #4 CLOSED TIES PER 2/SSW1.1	16,000	23,000
15" MODEL	SSWAB1 SSWAB1HS	1	4- #4 CLOSED TIES PER 2/SSW1.1	7- #4 CLOSED TIES PER 2/SSW1.1	36,000	44,000
18" MODEL			2- #4 CLOSED TIES PER 1/SSW1.1	4- #4 CLOSED TIES PER 1/SSW1.1	48,000	61,000
21" MODEL					59,000	77,000
24" MODEL					71,000	87,000

NOTES:
1. ANCHOR REINFORCEMENT CONFORMS TO ACI 318-11, SECTION D.5.2.9 AND PERFORMANCE WAS VALIDATED THROUGH FULL SCALE TESTING.
2. MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'c = 2500 psi.
3. CLOSED TIE ANCHOR REINFORCEMENT TO BE ASTM A615 GRADE 60 (MIN) #4 REBAR.
4. GRADE BEAM LONGITUDINAL AND TIE REINFORCEMENT SHALL BE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL FOR FLEXURE AND SHEAR LOADING. DESIGN SHOULD CONSIDER PROJECT SPECIFIC DESIGN LOADS AND ALLOWABLE SOIL PRESSURE.
5. SIMPSON STRONG-TIE RECOMMENDS USING THE TABULATED MINIMUM LRFD APPLIED SEISMIC DESIGN MOMENT TO ENSURE GRADE BEAM DESIGN FLEXURE AND SHEAR STRENGTH IS ADEQUATE TO PREVENT PLASTIC HINGE FORMATION UNDER DEMANDS ASSOCIATED WITH ANCHORAGE FORCES CORRESPONDING TO ACI 318-11, SECTION D.3.3.4.3.
6. DESIGNER MAY USE REDUCED MOMENT DUE TO APPLIED SSW LATERAL LOAD. MINIMUM MOMENT SHALL BE THE LESSER OF THE TABULATED MOMENT OR THE AMPLIFIED LRFD DESIGN MOMENT FOR SEISMIC: (ASD SHEAR/0.7) x Ωo x SSW HEIGHT FOR GRADE BEAM DESIGN.
7. MINIMUM GRADE BEAM DESIGN MOMENT FOR WIND AND SEISMIC IN SEISMIC DESIGN CATEGORY A AND B AND DETACHED 1 AND 2 FAMILY DWELLINGS IN SDC C: (ASD SHEAR/0.6) x SSW HEIGHT.
8. CLOSED TIE MAY BE SINGLE PIECE HOOP OR TWO PIECE ASSEMBLY WITH A U-STIRRUP WITH STANDARD 135 DEGREE HOOKS AND A TOP CROSS TIE CAP. SEE DETAIL 6/SSW1.1.
9. SEE DETAILS FOR GRADE BEAM ANCHOR REINFORCEMENT PLACEMENT, INSTALLATION AND SPACING REQUIREMENTS. CLOSED TIE ANCHOR REINFORCEMENT QUANTITY IS PER WALL FOR THE12" AND 15" WALL MODELS, AND PER ANCHOR FOR THE 18", 21" AND 24" MODELS.

SSWAB ANCHOR GRADE BEAM REINFORCEMENT AND DESIGN MOMENTS | 5/SSW1.1

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Steel Strong-Wall® Anchor Bolt Templates

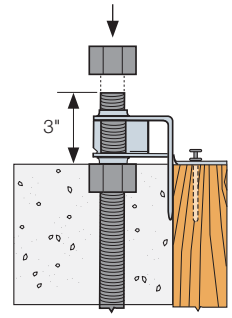
Simpson Strong-Tie now offers anchor bolt stabilizers that may be used with all anchor template models. The bolt stabilizer enables the Steel Strong-Wall anchorage to be installed without being tied to the footing rebar cage by helping to eliminate movement of the anchor bolts during concrete placement. Two bolt stabilizers are used for each SSW anchor assembly; one at the embedded plate washer and the other above the template. Half-inch diameter dowels (not supplied) are then driven down through the bolt stabilizers and into the ground to ensure plumb installation of the anchors and prevent movement during concrete placement. Immediately following concrete placement, the dowels are removed and reused in other locations.

Steel Strong-Wall® Anchor Bolt Templates

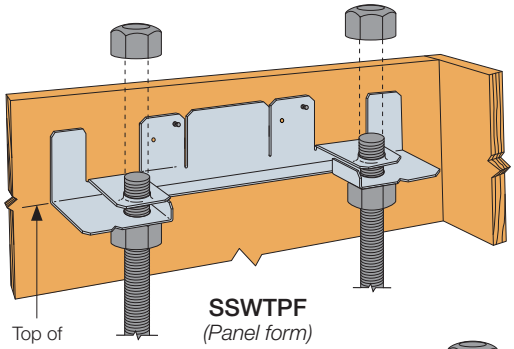
Steel Strong-Wall Model	Width (in.)	Anchor Bolt Stabilizer Model	Steel Strong-Wall Template Model			
			Reversible	Panel Form	Brick Ledge	Extended Leg
S/SSW12	12	SSWBS12	SSWT12	SSWTPF12	SSWTBL12	SSWTEL12
S/SSW15	15	SSWBS15	SSWT15	SSWTPF15	SSWTBL15	SSWTEL15
S/SSW18	18	SSWBS18	SSWT18	SSWTPF18	SSWTBL18	SSWTEL18
S/SSW21	21	SSWBS21	SSWT21	SSWTPF21	SSWTBL21	SSWTEL21
S/SSW24	24	SSWBS24	SSWT24	SSWTPF24	SSWTBL24	SSWTEL24

1. The height of the garage curb above the garage slab is critical for rough header opening at garage return walls.
2. Templates are recommended and are required in some jurisdictions.
3. Foundation design by Designer.
4. Reversible, panel form and bridge ledge templates are the same for 4" or 6" thick walls.

An additional nut for template installation is provided with each SSWAB. It may also be used for SSW installation.

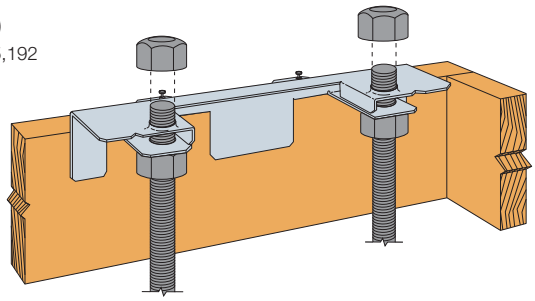


Anchor Bolt Height

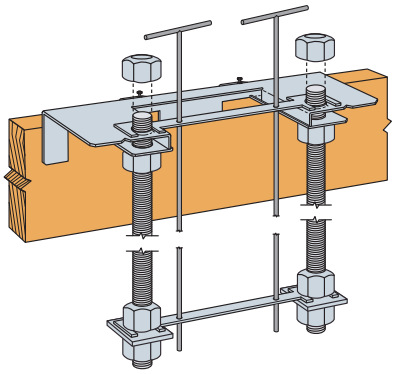


SSWTPF
(Panel form)
U.S. Patent 7,445,192

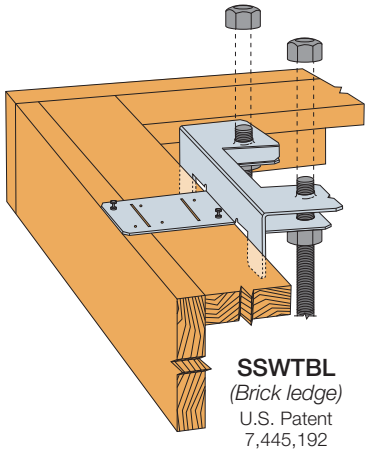
*SSWT templates are reversible. Use the same template for interior or exterior applications.



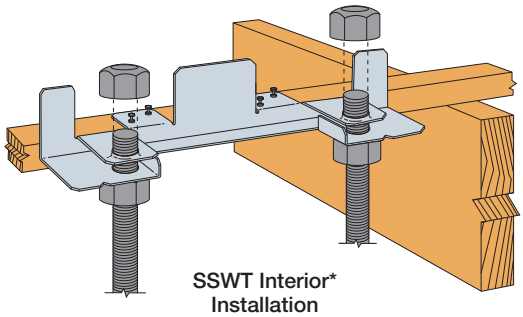
SSWT Exterior Installation*
(May be used for steel form systems)
U.S. Patent 7,445,192



SSWTEL with Anchor Bolt Stabilizers
(Extended Leg)
Allows for placement of Steel Strong-Wall flush with inside face of 2x6 framed exterior wall
U.S. Patent 7,445,192



SSWTBL
(Brick ledge)
U.S. Patent 7,445,192



SSWT Interior* Installation
U.S. Patent 7,445,192

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LCE Post Cap

The universal design of the LCE4 provides high capacity while eliminating the need for rights and lefts. For use with 3½" to 6" framing members.

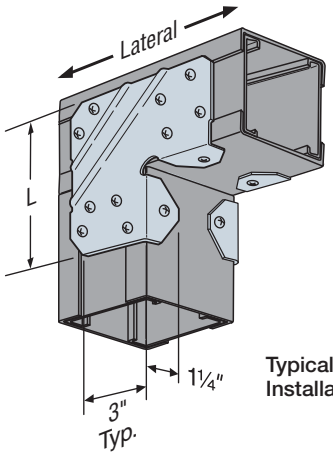
Material: LCE4—33 mil. (20 ga)

Finish: Galvanized, ZMAX® coating or stainless steel: see Corrosion Information, pages 17-20.

Installation:

- Use all specified fasteners. See General Notes.
- Install in pairs.

Codes: See page 11 for Code Report Reference Key Chart.



Typical LCE Installation

Installation for Cold-Formed Steel Built-Up Column

Note: The Designer is responsible for design of column and beam member.

Model No.	Dimensions (in.)		Fasteners[1] (Total)		Allowable Loads (lbs.)				Code Ref.
					Uplift		Lateral		
	W	L	Beam	Post	33 mil (20 ga)	43 mil (18 ga)	33 mil (20 ga)	43 mil (18 ga)	
LCE4	—	5⅜	14- #10	10- #10	1700	2355	1420	2150	170

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. See pages 65 through 81 for more information on Simpson Strong-Tie fasteners.

PSPN Protecting Shield Plate

PSPN58 and PSPN516 protecting shield plate fastener stoppers meet IRC, IBC and the International Plumbing Code. PSPN516 meets the code plumbing protection requirements as well as having additional fasteners if the Designer chooses to use it as a track splice strap.

Material: 54 mil (16 ga)

Finish: Galvanized, available in ZMAX®

Installation:

- Flatten prongs with hammer as needed.
- Use #10 screws.

Codes: See page 11 for Code Report Reference Key Chart.

PSPN516 at top plates

- International Residential Code® – 2006/2009/2012 P2603.2.1
- International Plumbing Code – 2006/2009/2012 305.8

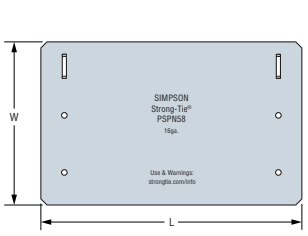
PSPN516 at bottom plate.

- International Plumbing Code – 2006/2009/2012 305.8

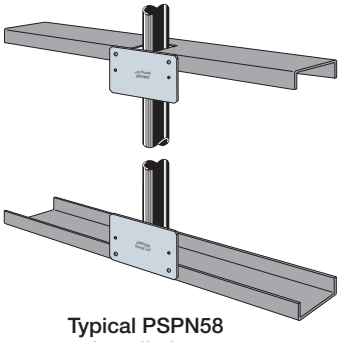
PSPN58 at top plates and bottom plate.

- International Plumbing Code – 2006/2009/2012 305.8

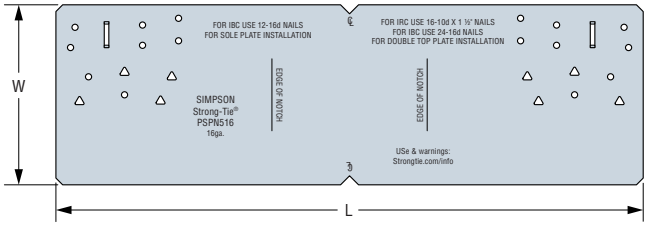
Note that the IBC section 2308.9.8 and the IRC section 602.6.1 require a 54 mil (16 ga) strap with 6-16d nails and 8-16d nails respectively each side at a hole or notch in a wood top, sill or sole plate. The Designer or local building jurisdiction may permit an equivalent fastener strength (e.g., screws in lieu of nails) to be used for the same condition in a CFS top or bottom track.



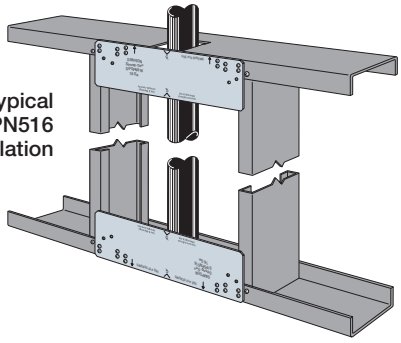
PSPN58



Typical PSPN58 Installation



PSPN516



Typical PSPN516 Installation

Model No.	W (in.)	L (in.)	Code Ref.
PSPN58	5	8	190
PSPN516	5	16⅝	

These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. #10 self-tapping screws may be used to attach PSPN to CFS framing with quantity determined by Designer.
2. PSPN516 with 6 #10 self-tapping screws each side achieves an allowable shear capacity of 1060 lbs and 1580 lbs to 33 mil (20 ga) track and to 43 mil (18 ga) track, respectively.

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TP/TPA Tie Plates

TPs are screw-on tie plates.
TPAs are flanged for added support.

Material: 33 mil (20 ga)

Finish: Galvanized

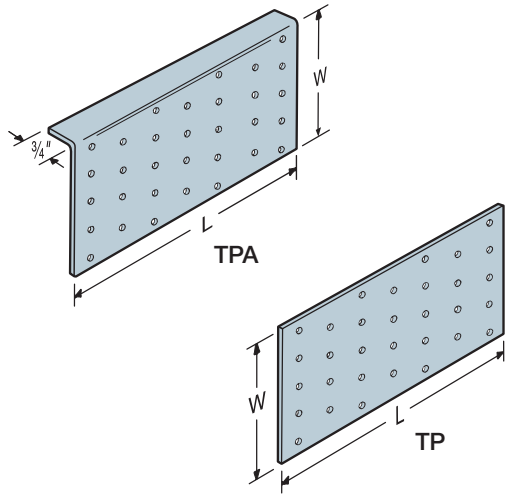
Installation:

- Holes are sized for #8 or #10 screw.

Codes: See page 11 for Code Report Reference Key Chart.

Model No.	Dimensions (in.)		Number of Nail Holes	Code Ref.
	W	L		
TP15	1 13/16	5	13	180
TPA37	3½	7	32	
TPA39	3½	9	41	
TP35	3⅛	5	23	
TP37	3⅛	7	32	
TP39	3⅛	9	41	
TP311	3⅛	11	50	
TP45	4⅛	5	30	
TP47	4⅛	7	42	
TP49	4⅛	9	54	
TP411	4⅛	11	66	
TP57	5⅜	7	60	
TPA57	5	7	49	

1. Connectors are not load rated.



PSCL/PSCA Panel Sheathing Clips

Simpson Strong-Tie® Panel Sheathing Clips are used to brace unsupported sheathing edges. The PSCA is a new version of the PSCL with less material for a more cost effective solution. Model sizes include: PSCL⅜, PSCA7/16, PSCL7/16, PSCA15/32, PSCL15/32, PSCL½, PSCL⅝, PSCL19/32, PSCL¾.

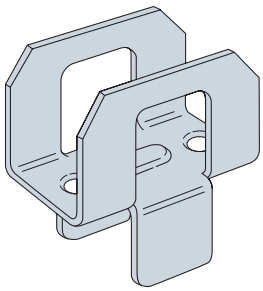
Material: 33 mil (20 ga)

Finish: Galvanized

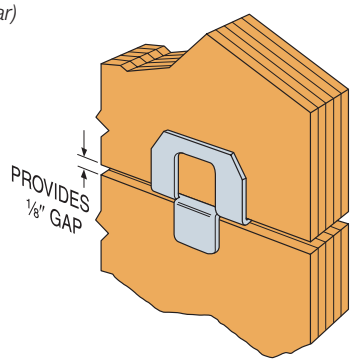
Installation:

- Use the same size sheathing clip as the wood panel thickness.
- Spans may be reduced for low slopes (per the APA Residential Design/Construction Guide).

Codes: See page 11 for Code Report Reference Key Chart.



PSCL
(PSCA similar)



Typical PSCL Installation

Span Rating	Wood Panel Thickness	Maximum Roof Sheathing Span		PSCLs Per Span	Code Ref.
		With PSCL	Without PSCL		
24/0	⅜	24	20	1	180
24/16	7/16	24	24	1[2]	
32/16	15/32, ½	32	28	1[2]	
40/20	⅝, 19/32	40	32	1	
48/24	¾	48	36	2	

1. Span rating and Maximum Roof Sheathing Spans are for reference only; refer to IBC Table 2304.7 (3) for additional important information.
2. Max. roof sheathing span with single PSCA is 24". For spans greater than 24", use two PSCAs.

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Notes

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Easier to bridge –

inside and out

DBC

SUBH

DBC and SUBH

Reduce installed cost and increase productivity with the Simpson Strong-Tie® DBC and SUBH bridging connectors. A single screw holds the connector to the channel, reducing the installed cost over conventional connections that require four screws. The SUBH wall-stud connector fits snug over 1½" U-channel and is the only code-listed bridging connector. The DBC is the first and only connector load rated for drywall studs and smaller ¾" U-channel.

The SUBH and DBC have been extensively lab tested as a system, ensuring that tabulated design values reflect stud web depth and thickness. To learn more, call (800) 999-5099 or visit **www.strongtie.com/cfs**.

SIMPSON Strong-Tie®

FSC MIX FSC® C004755

Printed on recycled paper with 10% post-consumer waste.

C-CFS-15 Effective 3/1/2015 Expires 12/31/2017

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