# Connectors
## for Cold-Formed Steel Construction

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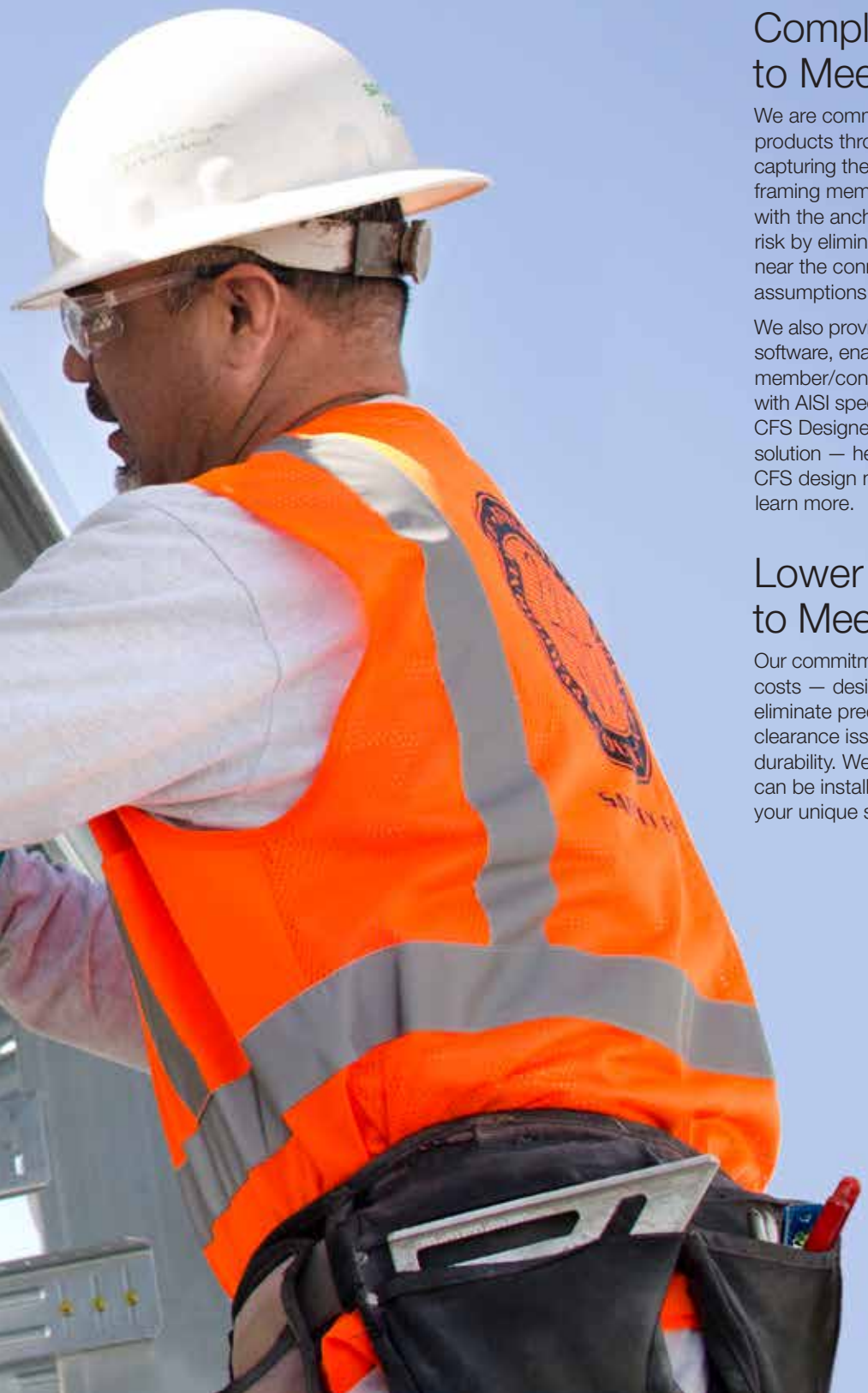
SIMPSON Strong-Tie®



# Innovation to make CFS jobs faster and easier



At Simpson Strong-Tie, we are committed to being your valued partner and total solutions provider for cold-formed steel (CFS) commercial curtain-wall, mid-rise and residential construction. Our products are manufactured with quality that our customers can rely on — with precision engineering, thorough lab testing and design software that automates AISI design calculations. The result is, we deliver innovative and lower installed-cost solutions for CFS applications.



## Complete, Tested Solutions to Meet Specifier Needs

We are committed to developing fully engineered products through extensive assembly testing — capturing the interaction of the connector with the framing member and the interaction of the connector with the anchorage. Assembly 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 expedite most of your day-to-day CFS design needs. Visit **strongtie.com/software** to learn more.

## Lower Installed Costs to Meet Contractor Budgets

Our commitment extends to reducing your installed costs — designing products to minimize screw count, eliminate predrilling the connector and minimize tool clearance issues without compromising strength or durability. We field-test our products to ensure they can be installed accurately and efficiently following your unique 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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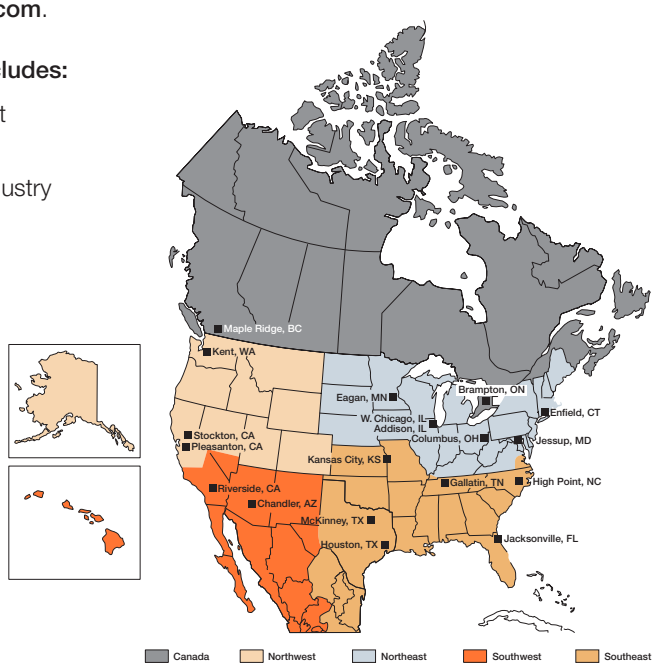
# Introduction

For more than 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 **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
- The most thoroughly tested and evaluated products in the industry
- Strategically located manufacturing and warehouse facilities
- National code agency listings
- The 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, having the following information on hand will help us to serve you promptly and efficiently:

- Which Simpson Strong-Tie® catalog are you using? *(See the front cover for the catalog number.)*
- Which Simpson Strong-Tie product are you using?
- What are your application and load requirement?
- What are the carried and/or supporting members' size, gauge and strength?

## 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 that they can count on the consistent quality of Simpson Strong-Tie® products and services.

**(800) 999-5099 | strongtie.com**

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# New Products for 2017




Version V2.0

## 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.

Version V2.0 is now equipped with a powerful tool to automate the design of load-bearing wall systems up to eight stories in height.

**See p. 23 for more information.**



## RCKW Kneewall Connectors

The Simpson Strong-Tie® RCKW rigid connectors have been developed to resist overturning moment at the base of exterior kneewalls and parapets as well as interior partial-height walls. These connectors offer a unique anchor-hole pattern that permits anchorage to both concrete and structural steel.

**See pp. 100–111 for more information.**



## SCHA Slide-Clip Connectors for Horizontal Anchorage

The SCHA slide-clip connector is an ideal solution for panelized or stick-frame construction where cold-formed steel bypass framing anchors to the top of a floor slab or the bottom flange of a steel beam. The connector features a wide anchorage leg that minimizes connection eccentricity and accommodates several different anchorage methods to concrete and steel. The included SCVS slider provides superior rotational support to the vertical leg of the SCHA connector, helping to improve the buckling performance of the anchored leg.

**See pp. 39–41 for more information.**



DBR SBR

## SBR and DBR Spacer Bracers

Specify the only bridging connectors on the market with load ratings based on assembly testing. The new Simpson Strong-Tie® SBR and DBR spacer bracers come with load data based on assembly testing so you can mitigate risk and maximize design confidence. The tabulated design values and precision-engineered slots make it easier to provide a value-engineered solution to your customers.

**See pp. 125–132 for more information.**

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# New Products for 2017



## FC Bypass Framing Fixed-Clip Connectors

Ideal for high-seismic areas, Simpson Strong-Tie® FC connectors are the optimal solution for fixed-clip bypass framing. FC clips are often welded to the structure in high-seismic zones, but they also feature anchorage holes so that concrete screws or powder-actuated fasteners can be used to attach the clip to the structure. In addition to its anchorage versatility, the FC clip features prepunched screw holes for the framing attachment, eliminating the need for predrilling holes or worrying that fastener placement doesn't match the Designer specifications. FC connectors are manufactured using heavy-duty 10- and 12-gauge steel to provide exceptional resistance to in-plane seismic load.

**See pp. 57–60 for more information.**



## SC Bypass Framing Slide-Clip Connectors

Ideal for high-seismic areas, Simpson Strong-Tie® SC connectors are the optimal solution for slide-clip bypass framing. SC clips are often welded to the structure in high-seismic zones, but they also feature anchorage holes so that concrete screws or powder-actuated fasteners can be used to attach the clip to the structure. SC connectors are manufactured using heavy-duty 10- and 12-gauge steel to provide exceptional resistance to in-plane seismic load.

**See pp. 29–32 for more information.**



## FSB Bypass Framing Fixed-Clip Strut Connector

The FSB connector is the fixed-clip version of our popular SSB slide-clip strut connector. The FSB is commonly used at the bottom flange of a steel beam to accommodate large stand-off distances for bypass curtain-wall studs. The connector features anchor holes throughout the length of the part to enable use with a wide array of stand-offs. The FSB can also be field-trimmed for smaller stand-offs.

**See pp. 61–62 for more information.**



## IDCB Drift-Clip Bypass Framing Connector

The IDCB drift-clip connector is used to secure bypass stud framing to the edge of a slab. The connector will accommodate 1" of lateral drift in each direction and 1" of upward and downward vertical deflection. Horizontal embossments and corner gussets optimize performance for resisting out-of-plane loads.

**See p. 43 for more information.**



## RCA Rigid Connector Angles

The Simpson Strong-Tie® rigid connector angle is a general-purpose clip angle designed for a wide range of cold-formed steel construction applications. With prepunched holes for fastener attachment, these L-shaped clips save time and labor on the job.

**See pp. 92–98 for more information.**

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# New Products for 2017



## S/DHUTF Drywall Hangers

The S/DHUTF top-mount hangers are designed to carry floor joist loads to a CFS stud wall through two layers of ⅝" gypsum board. These hangers install after the drywall is in place. The hangers come in sizes that accommodate 8", 10" and 12" joist depths.

**See p. 255 for more information.**



## DTT1Z Tension Tie

DTT1Z tension tie is suitable for lighter-duty hold-down applications on single or back-to-back studs, and installs easily with #10 self-drilling screws.

**See p. 244 for more information.**



## Titen® 2 Concrete and Masonry Screw

With patented undercutting threads that make installation easier and increase load capacity, the Titen 2 concrete and masonry screw is ideal for attaching all types of components to concrete and masonry. The improved thread design undercuts the base material more efficiently, reducing installation torque and making it easier to drive without binding, snapping or stripping, even during installation into hard base material.

**See pp. 204–207 for more information.**



Drop-In



Lipped Drop-In

## DIAB Drop-In Internally Threaded Anchor

Simpson Strong-Tie introduces a new, redesigned Drop-In Anchor (DIAB) that provides easier installation into base materials. Improved geometry in the preassembled expansion plug allows the anchor to install with 40% fewer hammer strikes than previous versions. These deformation-controlled expansion anchors are easily set by driving the plug toward the bottom of the anchor using either the hand- or power-setting tools.

**See pp. 215–217 for more information.**



## Strong-Drive® XM MEDIUM-HEAD METAL Screw

Strong-Drive XM Medium-Head Metal screws have been engineered as a 1-for-1 replacement option for power-actuated pins in steel decking to structural members involving wide or narrow valley, nestable or interlocking 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 p. 147 for more information.**

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# How To Use This Catalog

## New Products

New products are shown with the NEW symbol. There are also many 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

The teal arrow icon identifies products that are available with additional corrosion protection (ZMAX®, hot-dip galvanized or double-barrier coating). The SS teal arrow icon identifies products also available in stainless steel. Other products may also be available with additional protection; contact Simpson Strong-Tie for options. 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). Stainless products may need to be manufactured upon ordering. See pp. 18–21 for information on corrosion, and visit our website **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.

# Load Table Explanation

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

**Allowable Design Load:** 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 two CFS members of different thicknesses, the Designer shall use the thinner of the two members for selecting allowable loads.

**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 p. 11 for the Code Reference Key Chart, to determine which code reports include this product.

| Model No. | Connector Material Thickness mil. (ga.) | Dimensions (in.) | | Fasteners (Total) | | | Allowable ASD Tension Load | | | 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 | 1,120 | 1,190 | IP1, L2, FL |
| LSTA12 | | 1¼ | 12 | (10) #10 | (10) #10 | (8) #10 | 885 | 1,190 | 1,190 | |
| LSTA15 | | 1¼ | 15 | (12) #10 | (12) #10 | (10) #10 | 1,060 | 1,190 | 1,190 | |
| LSTA18 | | 1¼ | 18 | (14) #10 | (12) #10 | (10) #10 | 1,190 | 1,190 | 1,190 | |

### 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 three 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 the maximum force the system can deliver.

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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)
- Product is 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 **strongtie.com/codes** or visit the product evaluation agencies' web sites for the current evaluation reports.

Simpson Strong-Tie® products are listed by several product evaluation agencies. Agencies that list our products include 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 2006/2009/2012/2015 IBC and IRC. We continue to submit product information to ICC-ES 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 the 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 as new stamped and welded connector evaluation services reports are issued. Please visit **strongtie.com** for the latest information or contact ICC Evaluation Service at **icc-es.org**.

IAPMO Uniform Evaluation Service has been evaluating products for more than 75 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 **strongtie.com** for the latest information or contact IAPMO Uniform Evaluation Service at **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 IRA-5, updated in October 2012, addresses product and evaluation report acceptance.

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 access pertinent code reports related to Simpson Strong-Tie® products, you can access our Code Report Finder Software at **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 | Florida Product Approval<br>Visit **strongtie.com/codes** or **floridabuilding.org** for accurate and up-to-date product approval and code evaluation reports. | FL |
| 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 |
| Calculated per Code | — | 200 |

* Because code reports can be issued throughout the year, we encourage the user to visit **strongtie.com**, **icc-es.org**, **iapmoes.org**, **ladbs.org**, and **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 Company Inc. products and achieve maximal 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 Company Inc. To ensure proper installation and use, Designers and installers must carefully read the following General Notes, General Instructions for the Installer and General Instructions for 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, *Installer's Pocket Guide* or any other Simpson Strong-Tie publications.
3. Install all required fasteners per installation instructions provided by Simpson Strong-Tie Company Inc.: (a) use proper fastener type; (b) use proper fastener quantity; (c) fill all 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.

Failure to follow fully all of the notes and instructions provided by Simpson Strong-Tie Company Inc. 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.

### Important Information

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 Company Inc. website at **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-C-INSTALL), 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 country;
- Product-specific installation videos;
- Specialty catalogs;
- Code reports – Simpson Strong-Tie® Code Report Finder software;
- Technical fliers and bulletins;
- Engineering letters;
- Master format specifications;
- Safety data sheets;
- Corrosion information;
- Connector selection guides for engineered wood products (by manufacturer);
- Simpson Strong-Tie® Connector Selector® software;
- Simpson Strong-Tie® Joist Hanger Selector;
- 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;
- Simpson Strong-Tie® YouTube Channel; and
- Answers to frequently asked questions and technical topics.
- For all our web and mobile apps, visit **strongtie.com/software**.

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# Important Information and General Notes

## 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 mil (18 ga.) and thinner, and a minimum yield strength, $F_y$, of 50 ksi and tensile strength, $F_u$, of 65 ksi for 54 mil (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 (p. 237) is ASTM A36, RFB (p. 239) 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.

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. Reference General Note "e" for additional requirements.

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.

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# General Instructions to the Installer (cont.)

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 three 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. To achieve the loads shown in this catalog, the Designer must verify that the self-drilling screws used for connector installation have $P_{ss}/\Omega$ and $P_{ts}/\Omega$ values greater than or equal to the values given in the table, Minimum ASD Loads for Screws (lb.), per p. 22 of this catalog.

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

Design Uplift/Allowable Uplift + Design Lateral Parallel to Track/Allowable Lateral Parallel to Track + Design Lateral Perpendicular to Track/Allowable Lateral Perpendicular to Track ≤ 1.0.

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.

e. 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.

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

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

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

i. 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."

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

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

l. 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.

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

n. 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.

o. Simpson Strong-Tie recommends that hanger height be at least 60% of joist height for stability against rotation while under construction prior to sheathing install.

p. 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.

q. 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.

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# 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 | Fc⊥ | 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 Douglas-Fir 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 (2015 NDS 12.1.5.3).

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.

# 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 2015 NDS 12.1.3.2 and AISI S100 Table E3a, if applicable).

b. 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 AC261, ASTM D1761 and ASTM D7147 test standards (unless specifically noted otherwise).

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.

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

a. Loads are based on the AISI S100 and the 2015 AF National Design Specifications (NDS), unless otherwise specified. Other code agencies may use different methodologies.

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

Do not alter installation procedures from those set forth in this catalog.
"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.

b. 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.

c. 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 2015 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.

d. 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 / MSCB, SC, SCW, SSB, FCB, FC and FSB Connectors

1. Allowable loads for #12–24 self-drilling screws and PDPAT 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® PDPAT-62KP powder-actuated "tophat" fasteners also apply to alternate fasteners with a minimum shank 0.157", a minimum head diameter of 0.300", a minimum allowable shear of 410 lb. and tension strength of 260 lb. for A36 steel, and a minimum allowable shear of 420 lb. and tension strength of 305 lb. for A572 or A992 steel per ESR-2138. "Tophat" fasteners are recommended to ensure adequate clamping force and consistent installations.
3. Allowable loads for Simpson Strong-Tie Titen® screws are based on installation in concrete with a minimum $f'_c$ = 2,500 psi and a maximum $f'_c$ = 4,000 psi. Reference the current *Anchoring and Fastening Systems for Concrete and Masonry* catalog for more information about Titen screws.
4. 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.
5. 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 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 | 6,895 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° |

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.

### 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° |

### US Standard Steel Gauge Equivalents in Nominal Dimensions

| Min. Thick. | Design Thick. | Ref. Ga.[2] | Thickness of Steel Sheets (in.) | | |
|---|---|---|---|---|---|
| mil | 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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# 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 (**strongtie.com/info**) and also by reviewing information, literature and evaluation reports published by others.

# Galvanic Corrosion

Galvanic corrosion occurs when two electrochemically dissimilar metals contact each other in the presence of an electrolyte (such as water) that acts as a conductive path for metal ions to move from the more anodic to the more cathodic metal. In the galvanic couple, the more anodic metal will corrode preferentially. The Galvanic Series of Metals table provides a qualitative guide to the potential for two metals to interact galvanically. Metals in the same group (see table) have similar electrochemical potentials. The farther the metals are apart on the table, the greater the difference in electrochemical potential, and the more rapidly galvanic corrosion will occur. Corrosion also increases with increasing conductivity of the electrolyte.

Good detailing practice, including the following, can help reduce the possibility of galvanic corrosion of fasteners:

- Use fasteners and metals with similar electrochemical properties
- Separate dissimilar metals with insulating materials
- Ensure that the fastener is the cathode when dissimilar metals are present
- Prevent exposure to and pooling of electrolytes

## Galvanic Series of Metals

| Corroded End (Anode) |
|---|
| Magnesium, Magnesium alloys, Zinc |
| Aluminum 1100, Cadmium, Aluminum 2024-T4, Iron and Steel |
| Lead, Tin, Nickel (active), Inconel Ni-Cr alloy (active), Hastelloy alloy C (active) |
| Brasses, Copper, Cu-Ni alloys, Monel |
| Nickel (passive) |
| 304 stainless steel (passive), 316 stainless steel (passive), Hasteloy alloy C (passive) |
| Silver, Titanium, Graphite, Gold, Platinum |
| Protected End (Cathode) |

# Hydrogen-Assisted Stress-Corrosion Cracking

Some hardened fasteners may experience premature failure if exposed to moisture as a result of hydrogen-assisted stress-corrosion cracking. These fasteners are recommended specifically for use in dry, interior locations.

# 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 |
|---|---|---|
| **Connectors** | | |
| 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 |
| Galvanized | Standard (G90) zinc-galvanized coating containing 0.90 oz. of zinc per square foot of surface area (total both sides). | 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). Products with a powder-coat finish over a ZMAX base have the same level of corrosion resistance. | Medium |
| HOT DIP HDG 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./ft.$^2$ (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 |
| 316 Stainless Steel<br>Type 316L Stainless Steel | Type 316L stainless steel is a nickel-chromium austenitic grade of stainless steel with 2-3% Molybdenum. Type 316L stainless steel is not hardened by heat treatment and is inherently nonmagnetic. It provides a level of corrosion protection suitable for severe environments, especially environments with chlorides. Type 316L stainless-steel fasteners are compliant with the 2012 and 2015 IBC and IRC. | High/Severe |
| **Fasteners** | | |
| 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 |
| 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 |
| HOT DIP HDG GALVANIZED®<br>ASTM A153, Class C | Simpson Strong-Tie Strong-Drive Timber-Hex screws are hot-dip galvanized in accordance with ASTM A153, Class C. Hot-dip galvanized fasteners have a minimum average of 1.25 oz./ft.$^2$ of zinc coating. Hot-dip galvanized fasteners are compliant with the 2012 and 2015 IRC (R317.3) and IBC. | High/Severe |

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

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# Simpson Strong-Tie General Recommendations

Simpson Strong-Tie has evaluated the AWPA (American Wood Protection Association) Use Categories (AWPA U1-16) 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 (p. 17).

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.
- **Fire-Retardant-Treated (FRT) Wood:** Metal connectors in contact with FRT wood in dry service applications may generally be uncoated, painted or galvanized G90 zinc-coated steel. Refer to the FRT wood manufacturer’s recommendations for fastener and connector protection requirements. The 2015 IBC Section 2304.10.5.4 and 2015 IRC Section R317.3.4 refer to the manufacturer’s recommendations for fastener corrosion requirements. In the absence of recommendations from the manufacturer, the code requires fasteners to be hot-dip galvanized, stainless steel, silicon bronze or copper. Fastener shear and withdrawal allowable loads may be reduced in FRT lumber. Refer to the FRT manufacturer’s evaluation report for reduction factors.

### 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. 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 A123) | Type 316L stainless steel | Type 316L stainless steel |

## Corrosion Resistance Classifications

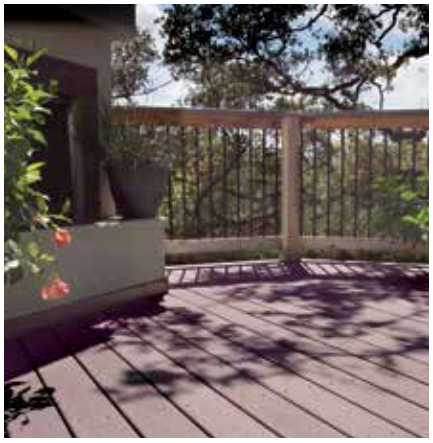
| Environment | Material to Be Fastened | | | | | | |
|---|---|---|---|---|---|---|---|
| | Untreated Wood or Other Material | Preservative-Treated Wood | | | | | FRT Wood[9] |
| | | SBX-DOT Zinc Borate | Chemical Retention ≤ AWPA, UC4A | Chemical Retention > AWPA, UC4A | ACZA | Other or Uncertain | |
| Dry Service | Low | Low | Low | High | Med | 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 | Severe |
| 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 greater than those for AWPA UC4A; CA-C, 0.15 pcf; CA-B, 0.21 pcf; micronized CA-C, 0.14 pcf; micronized CA-B, 0.15 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 wood with 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 alternative for some applications in environments with ocean air and/or elevated wood moisture content.
8. Some woods, such as cedars, redwood and oak, contain water-soluble tannins and are more susceptible to staining when in contact with metal connectors and fasteners. According to the California Redwood Association (**calredwood.org**), applying a quality finish to all surfaces of the wood prior to installation can help reduce the amount of staining, which in redwood, for example, is caused by surface tannins leaching out during rains.
9. Fasteners in contact with FRT lumber shall be hot-dip galvanized, stainless steel, silicon bronze or copper unless recommended otherwise by the FRT manufacturer. Some FRT manufacturers permit low-resistant finishes for interior dry conditions. Fastener shear and withdrawal capacities may be reduced in FRT lumber. Refer to the FRT manufacturer's code report for reduction factors.

### 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

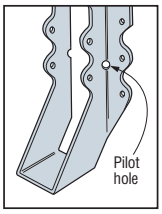
**Purpose:**
To temporarily fasten a connector to make installing it easier.

**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.

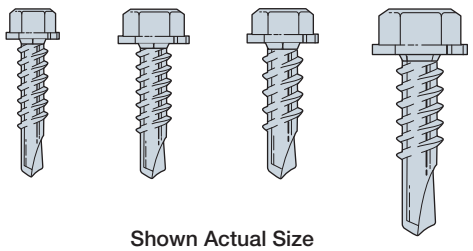
To achieve the loads shown in this catalog, the Designer must verify that the self-drilling screws used for connector installation have $P_{ss}/\Omega$ and $P_{ts}/\Omega$ values greater than or equal to the values tabulated in this table.

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 ties), the Designer is to ensure that the minimum screw head diameter complies with ASME B18.6.4.

## Minimum ASD Loads for Screws (lb.)

| Screw No. Designation | Nominal Diameter d (in.) | Washer Diameter $d_W$ (in.) | Allowable Screw Shear Strength ($P_{ss}/\Omega$) | Allowable Shear Connection Strength ($P_{ns}/\Omega$, $P_{ss}/\Omega$) Steel Thickness mil (ga.) | | | | | Allowable Screw Tension Strength ($P_{ts}/\Omega$) | Allowable Tensile Pull-Out Strength ($P_{not}/\Omega$, $P_{ts}/\Omega$) 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 | 1,045 | 180 | 285 | 555 | 795 | 825 | 1,220 | 85 | 120 | 215 | 295 | 455 |

1. Allowable loads are per AISI S-100 and are for use when utilizing the traditional Allowable Stress Design methodology. The tabulated loads may be multiplied by a Factor of Safety ($\Omega$) of 3 to determine the screw nominal strength. The LRFD load may be determined by multiplying the nominal screw load by a Resistance Factor ($\phi$) 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 S200-12 General Provisions Standard, Sect. D1.3.
7. Screw diameters per AISI S200-12 Commentary Table C-E4-1.
8. Size ¼"-diameter self-tapping screws may be substituted for #14 screws.




**Shown Actual Size**

See pp. 138 through 171 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

| Mil | 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.

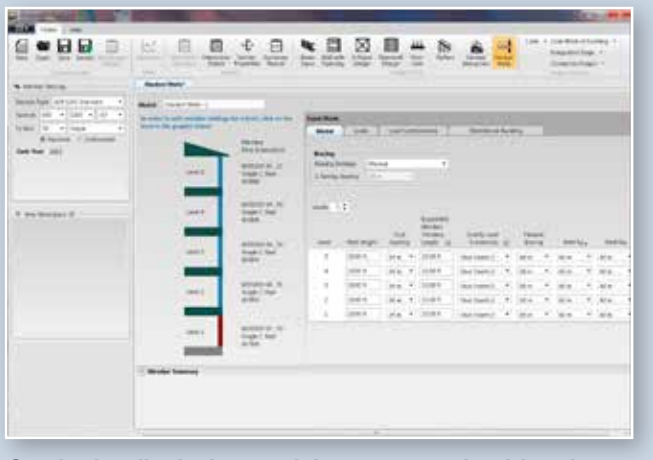
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# GET THERE QUICKER!

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

### New for 2017 – CFS Designer Version V2.0!

CFS Designer V2.0 now includes a module that empowers users to design multi-story load-bearing wall systems. With this new time-saving feature engineers can design up to 8-stories of wall framing in a matter of minutes. The design tool automates the bookkeeping for transferring loads from one level to another, and it also checks up to ten different load combinations for each stud.



**Stacked walls design module automates load-bearing framing for platform and ledger framing**

### Additional Key Features:

- Enables input of a complicated array of axial loads, distributed loads, sloped loads, and point loads.
- Supports 2012, 2010, 2007 and 2004 AISI Specifications
- Member design includes single stud and track sections, z-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 bridging connectors, and SCB, SCW, SSB, and FCB curtain-wall connectors.

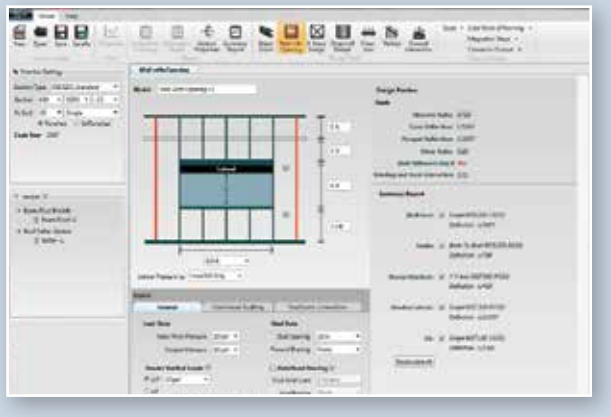
**Please visit strongtie.com/cfsdesigner to:**

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

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**



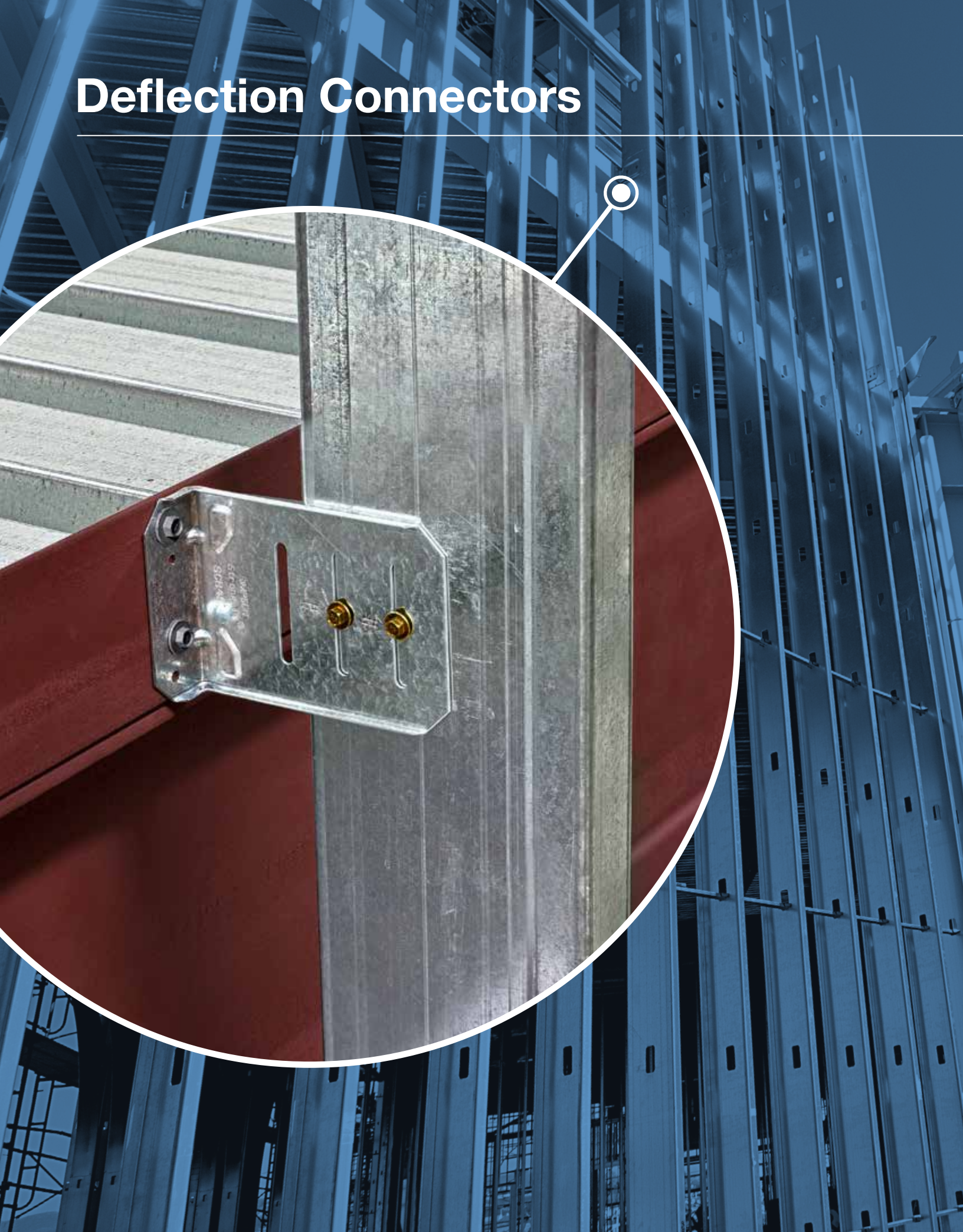
**Design automation tools for framed wall openings, x-braced and sheathed shearwalls, floor joists, rafters and stacked walls**

### 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

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# Deflection Connectors



# 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.

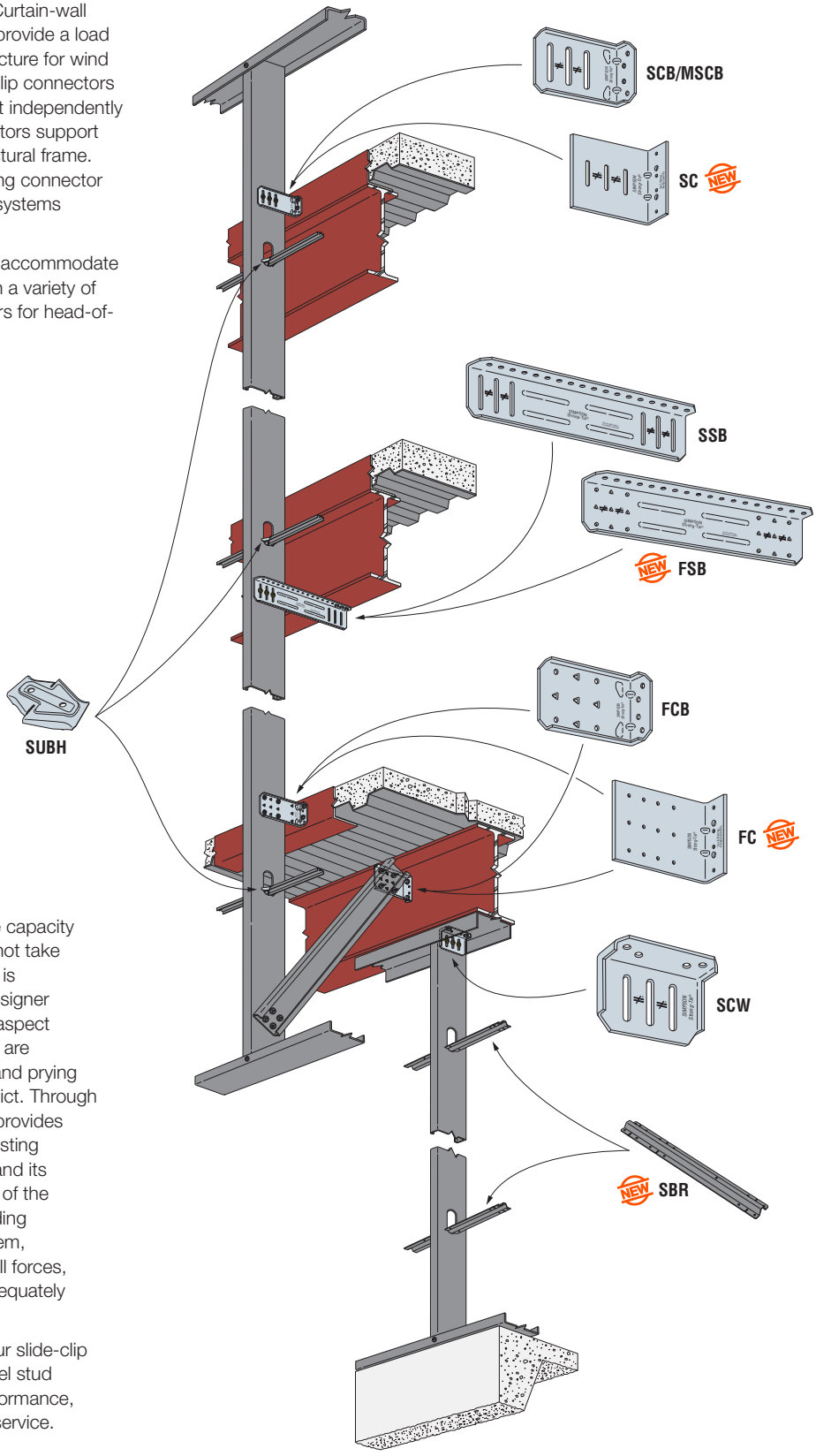
## Tailored to Your Design

Our standard slide clips accommodate either ¾" or 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 p. 56).

## 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 XLSH34B1414 #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the No-Equal stamp.
- Use a maximum of one screw per slot.

**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

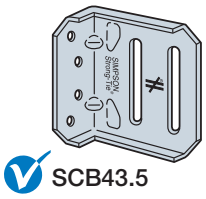
SCB43.5-KT contains:

- 25 connectors
- (55) XLSH34B1414 #14 shouldered screws

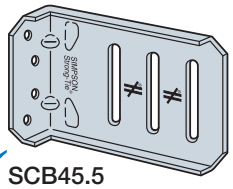
SCB45.5-KT, MSCB45.5-KT, SCB47.5-KT, MSCB47.5-KT, SCB49.5-KT, and SCB411.5-KT contain:

- 25 connectors
- (83) XLSH34B1414 #14 shouldered screws

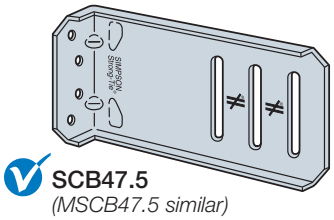
**Note:** Replacement #14 shouldered screws for SCB/MSCB connectors are XLSH34B1414-RP83



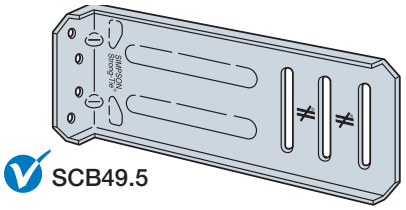
**SCB43.5**



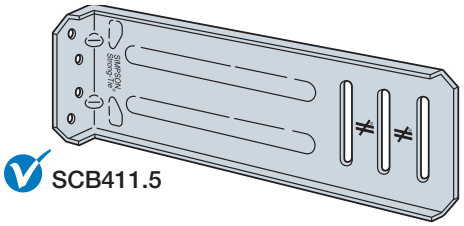
**SCB45.5**
*(MSCB45.5 similar)*



**SCB47.5**
*(MSCB47.5 similar)*

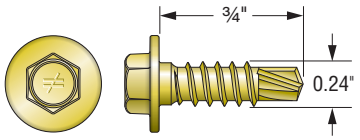


**SCB49.5**

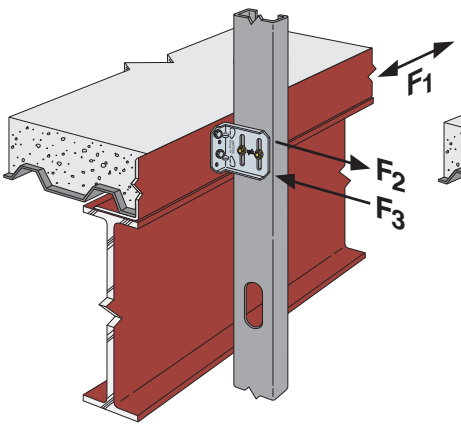


**SCB411.5**

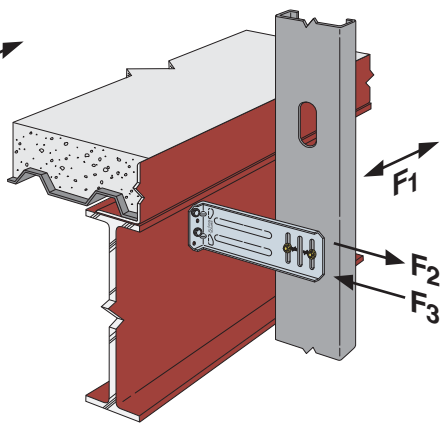
U.S. Patent 8,555,592



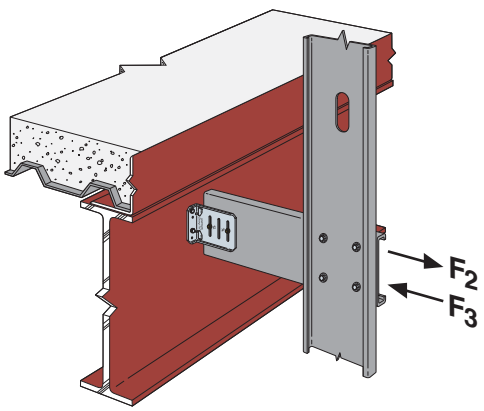

**XLSH34B1414**
**#14 Shouldered Screw**




**Typical SCB/MSCB Installation**




**SCB/MSCB Installation at Fascia Beam**




**Typical SCB/MSCB Installation with Stud Strut**

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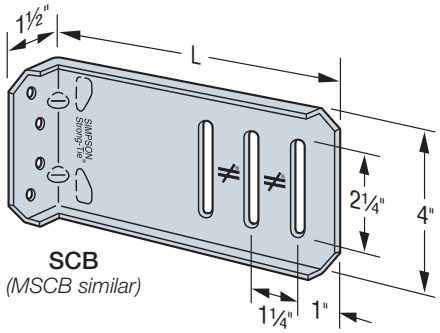
# **SCB/MSCB** Bypass Framing Slide-Clip Connector



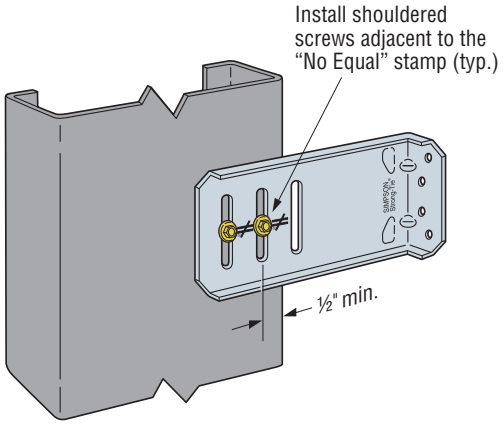
## SCB/MSCB Allowable Connector Loads

| 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.) | | | |
| | | | | $F1^{3,4}$ | $F2^{2}$ | $F3^{2}$ | $F1^{3,4}$ | $F2^{2}$ | $F3^{2}$ | $F1^{3,4}$ | $F2^{2}$ | $F3^{2}$ | $F1^{3,4}$ | $F2^{2}$ | $F3^{2}$ | |
| SCB43.5 | 54 (16) | 3½ | 2 | 100 | 520 | 520 | 155 | 610 | 690 | 185 | 760 | 975 | 185 | 760 | 975 | IP2, L8, FL |
| SCB45.5 | 54 (16) | 5½ | 2[1] | 75 | 490 | 520 | 85 | 610 | 690 | 85 | 760 | 975 | 85 | 760 | 975 | |
| | | | 3 | 120 | 675 | 675 | 140 | 895 | 1,000 | 140 | 990 | 1,260 | 140 | 990 | 1,260 | |
| MSCB45.5 | 68 (14) | 5½ | 2[1] | 75 | 490 | 520 | 120 | 780 | 690 | 135 | 1,055 | 1,200 | 135 | 1,195 | 1,475 | IP2, L8 |
| | | | 3 | 120 | 675 | 675 | 185 | 1,070 | 1,000 | 225 | 1,220 | 1,930 | 225 | 1,365 | 1,930 | |
| SCB47.5 | 54 (16) | 7½ | 2[1] | 55 | 490 | 520 | 55 | 610 | 690 | 55 | 760 | 945 | 55 | 760 | 945 | IP2, L8, FL |
| | | | 3 | 70 | 675 | 675 | 70 | 895 | 1,000 | 70 | 990 | 1,260 | 70 | 990 | 1,260 | |
| MSCB47.5 | 68 (14) | 7½ | 2[1] | 70 | 490 | 520 | 75 | 780 | 690 | 85 | 1,055 | 1,200 | 85 | 1,195 | 1,475 | IP2, L8 |
| | | | 3 | 90 | 675 | 675 | 90 | 1,070 | 1,000 | 110 | 1,220 | 1,930 | 110 | 1,365 | 1,930 | |
| SCB49.5 | 54 (16) | 9½ | 2[1] | 40 | 490 | 520 | 40 | 690 | 690 | 40 | 760 | 945 | 40 | 760 | 945 | IP2, L8, FL |
| | | | 3 | 45 | 675 | 675 | 45 | 895 | 1,000 | 45 | 990 | 1,260 | 45 | 990 | 1,260 | |
| SCB411.5 | 54 (16) | 11½ | 2[1] | 30 | 490 | 520 | 30 | 690 | 690 | 30 | 990 | 920 | 30 | 990 | 920 | |
| | | | 3 | 35 | 675 | 675 | 35 | 860 | 1,000 | 35 | 990 | 1,260 | 35 | 990 | 1,260 | |

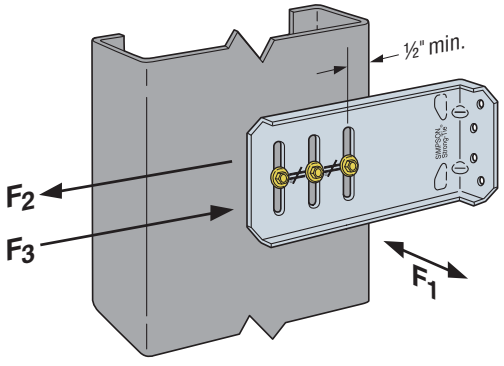
1. When the SCB or MSCB connector is used with two shouldered screws, the screws may be installed in any two slots.
2. Allowable loads are based on clips installed with (4) #12–14 screws in the anchor leg. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCB/MSCB Allowable Anchorage Loads table on p. 28.
3. Anchorage to the supporting structure using welds or a minimum of (2) #12–24 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-CWCF1DIR17 at **strongtie.com**.
5. Reference pp. 63–67 for LRFD design strengths.




**SCB**
*(MSCB similar)*




**SCB/MSCB Installation with Two Shouldered Screws**




**SCB/MSCB Installation with Three Shouldered Screws**

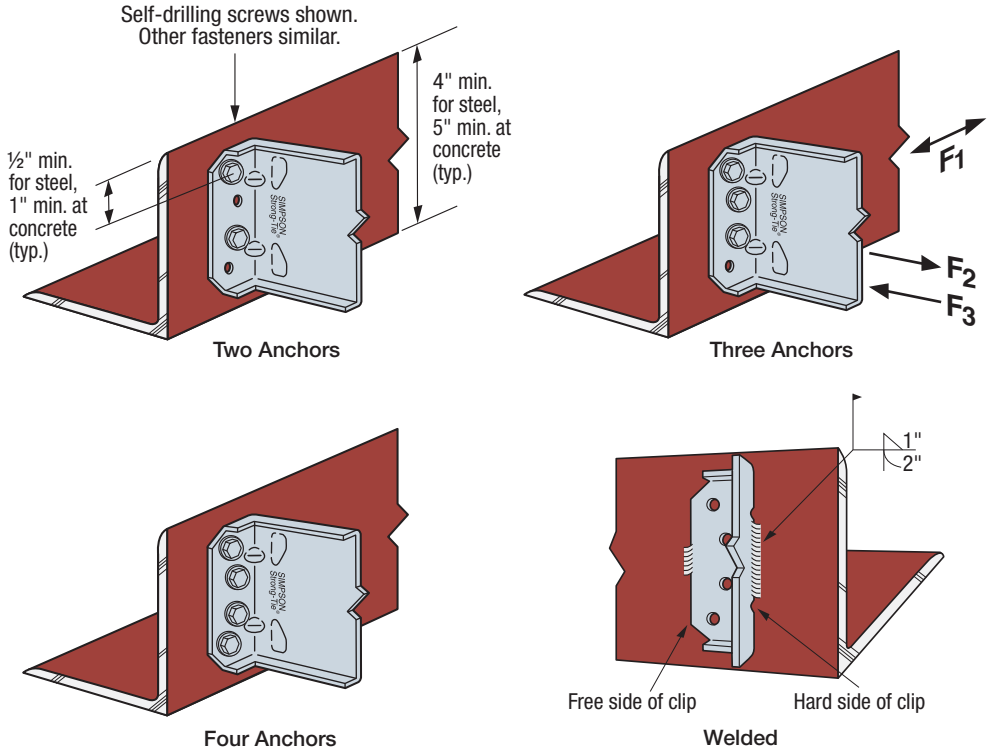
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# **SCB/MSCB** Bypass Framing Slide-Clip Connector

## SCB/MSCB Allowable Anchorage Loads

| Anchorage Type | Minimum Base Material | No. of Anchors | $F_2$ and $F_3$ | |
|---|---|---|---|---|
| | | | SCB | MSCB |
| #12 self-drilling screws<br>Simpson Strong-Tie® X Metal screws<br>XQ1S1214, X1S1214 | A36 steel<br>3⁄16" thick | 2 | 795 | 1,020 |
| | | 3 | 1,120 | 1,525 |
| | | 4 | 1,590 | 2,040 |
| Simpson Strong-Tie<br>#12–24 x 1¼" Strong-Drive®<br>XL Large-Head Metal screws<br>XLQ114T1224, XLQ114B1224-2K | A36 steel<br>3⁄16" thick | 2 | 1,115 | 1,150 |
| | | 3 | 1,645 | 1,725 |
| | | 4 | 2,230 | 2,300 |
| Simpson Strong-Tie<br>0.157" x 5⁄8" power-actuated fasteners<br>PDPAT-62KP | A36 steel<br>3⁄16" thick | 2 | 440 | 520 |
| | | 3 | 585 | 780 |
| | | 4 | 895 | 1,040 |
| Simpson Strong-Tie<br>0.157" x 5⁄8" power-actuated fasteners<br>PDPAT-62KP | A572 or<br>A992 steel<br>3⁄16" thick | 2 | 585 | 610 |
| | | 3 | 800 | 915 |
| | | 4 | 1,170 | 1,220 |
| Simpson Strong-Tie<br>¼" x 1¾" Titen® hex-head<br>masonry screws TTN25134H | Concrete<br>$f'_c$ = 2,500 psi | 2 | 380 | 380 |
| | | 3 | 445 | 445 |
| | | 4 | 510 | 510 |
| Welded<br>E70XX electrodes | A36 steel<br>3⁄16" thick | Hard side: 2"<br>Free side: 1" | 1,735 | 2,040 |

1. For additional important information, see General Information on p. 16.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated allowable anchorage loads the allowable load from the SCB/MSCB Allowable Connector Load table on p. 27.
3. Allowable loads for #12–24 self-drilling screws and PDPAT powder-actuated fasteners are based on installation in minimum 3⁄16" thick structural steel with $F_y$ = 36 ksi. PDPAT values are also provided for A572 steel. Values listed above maybe used where other thicknesses of steel are encountered provided that the fastener has equal or better tested values into thicker steel (see p. 16). It is the responsibility of the Designer to select the proper length fasteners based on the steel thickness installation.
4. For screw fastener installation into steel backed by concrete, predrilling of both the steel and the concrete is suggested. For predrilling use a maximum 3⁄16"-diameter drill bit.




SCB/MSCB Anchor Layout

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# **SC** Bypass Framing Slide-Clip Connector



Ideal for high-seismic areas, Simpson Strong-Tie® SC connectors are the optimal solution for slide-clip bypass framing. SC clips are often welded to the structure in high-seismic zones, but they also feature anchorage holes so that concrete screws or powder-actuated fasteners can be used to attach the clip to the structure. In addition to anchorage versatility, the SC clips include "No-Equal" stamps at the center of the slots to ensure proper shouldered screw placement. SC connectors are manufactured using heavy-duty 10- and 12-gauge steel to provide exceptional resistance to in-plane seismic load.

**Features:**

- The clips come in lengths of 3½", 6" and 8" for use with 3⅝", 6" and 8" studs, respectively
- The maximum stand-off distance is 1" for 3⅝" studs and 1½" for 6" and 8" studs
- Provides a full ¾" of both upward and downward deflection
- Embossments in the bend line provide increased strength and stiffness in the $F_1$ and $F_2$ load directions, but are positioned towards the center of the clip so that 1½" long welds can be applied at the top and bottom of the clip
- Prepunched large-diameter anchor holes accommodate ¼"-diameter concrete screws like the Simpson Strong-Tie Titen HD®
- Prepunched small-diameter anchor holes accommodate powder-actuated fasteners like the 0.157"-diameter Simpson Strong-Tie PDPAT or the #12 self-drilling Simpson Strong-Tie Strong-Drive® XL large-head metal screw
- Precision-manufactured shouldered screws, provided with SC connectors, are designed to prevent overdriving and to ensure the clip functions properly

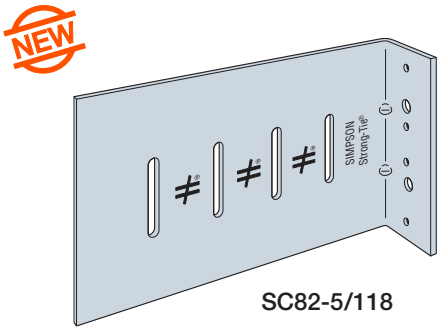
**Material:** 50 ksi

**Finish:** Galvanized (G90)

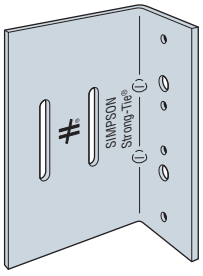
**Installation:**

- Use the specified type and number of anchors.
- Use the specified number of XLSH78B1414 #14 shouldered screws (included). Install the screws in the slots adjacent to the "No-Equal" stamps.
- Use one shouldered screw per slot (maximum).

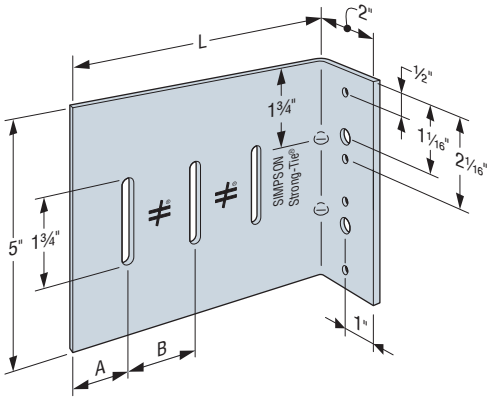
**Codes:** See p. 11 for Code Reference Key Chart



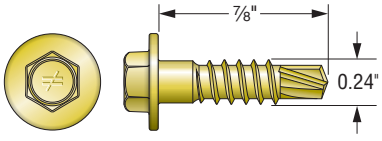

SC82-5/118




SC32-5/97




SC62-5/97, SC62-5/118




XLSH78B1414
#14 Shouldered Screw for Attachment to Stud Framing (included)

## Ordering Information and Dimensions

| Model No. | Ordering SKU | Thickness mil (ga.) | L (in.) | A (in.) | B (in.) |
|---|---|---|---|---|---|
| SC32-5/97 | SC32-5/97-KT25 | 97 (12) | 3½ | ⅞ | 1¼ |
| SC62-5/97 | SC62-5/97-KT25 | 97 (12) | 6 | 1⅛ | 1½ |
| SC62-5/118 | SC62-5/118-KT25 | 118 (10) | 6 | 1⅛ | 1½ |
| SC82-5/118 | SC82-5/118-KT25 | 118 (10) | 8 | 1⅝ | 1½ |

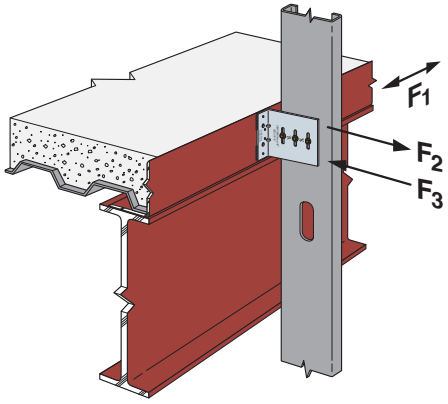
1. Each box contains (25) connectors and enough shouldered screws for installation.
2. Replacement #14 shouldered screws for SC connectors are XLSH78B1414-RP83.

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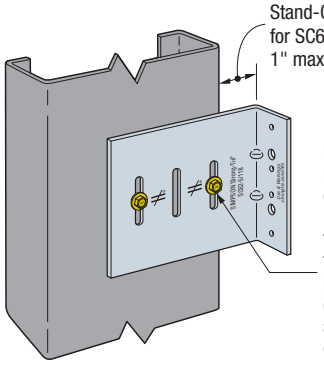
# **SC** Bypass Framing Slide-Clip Connector

## SC Allowable Connector Loads

| Model No. | Stud Thickness mil (ga.) | Fasteners to Stud | | Allowable Load | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | Allowable Pullout per Single #14 Shouldered Screw | No. of #14 Shouldered Screws | $F_1$ 1" Stand-Off | $F_1$ 1½" Stand-Off | $F_2$ | $F_3$ | |
| SC32-5/97 | 33 (20) | 100 | 2 | 170 | — | 585 | 715 | 170 |
| SC62-5/97 | | | 2 | 100 | 115 | 585 | 715 | |
| | | | 3 | 115 | 130 | 880 | 1,070 | |
| SC62-5/118 | | | 2 | 100 | 115 | 585 | 710 | |
| | | | 3 | 115 | 130 | 880 | 1,070 | |
| SC82-5/118 | | | 2 | 115 | 130 | 585 | 710 | |
| | | | 4 | 115 | 130 | 1,170 | 1,425 | |
| SC32-5/97 | 43 (18) | 145 | 2 | 220 | — | 765 | 930 | |
| SC62-5/97 | | | 2 | 135 | 155 | 765 | 930 | |
| | | | 3 | 150 | 175 | 1,145 | 1,395 | |
| SC62-5/118 | | | 2 | 135 | 155 | 765 | 930 | |
| | | | 3 | 150 | 175 | 1,145 | 1,395 | |
| SC82-5/118 | | | 2 | 150 | 175 | 765 | 930 | |
| | | | 4 | 150 | 175 | 1,525 | 2,125 | |
| SC32-5/97 | 54 (16) | 270 | 2 | 300 | — | 1,145 | 1,645 | |
| SC62-5/97 | | | 2 | 255 | 295 | 1,145 | 1,645 | |
| | | | 3 | 265 | 305 | 2,120 | 2,345 | |
| SC62-5/118 | | | 2 | 255 | 295 | 1,405 | 1,685 | |
| | | | 3 | 265 | 305 | 2,110 | 2,530 | |
| SC82-5/118 | | | 2 | 260 | 300 | 1,405 | 1,685 | |
| | | | 4 | 260 | 300 | 2,810 | 3,370 | |
| SC32-5/97 | 68 (14) | 410 | 2 | 375 | — | 1,695 | 1,645 | |
| SC62-5/97 | | | 2 | 320 | 370 | 1,695 | 1,645 | |
| | | | 3 | 335 | 385 | 2,540 | 2,345 | |
| SC62-5/118 | | | 2 | 330 | 380 | 2,165 | 2,040 | |
| | | | 3 | 345 | 395 | 3,250 | 3,060 | |
| SC82-5/118 | | | 2 | 325 | 375 | 2,165 | 2,085 | |
| | | | 4 | 325 | 375 | 4,330 | 4,165 | |
| SC32-5/97 | 97 (12) | 725 | 2 | 540 | — | 1,695 | 1,645 | |
| SC62-5/97 | | | 2 | 555 | 555 | 1,695 | 1,645 | |
| | | | 3 | 555 | 555 | 2,540 | 2,345 | |
| SC62-5/118 | | | 2 | 555 | 555 | 2,165 | 2,040 | |
| | | | 3 | 635 | 635 | 3,250 | 3,060 | |
| SC82-5/118 | | | 2 | 465 | 465 | 2,165 | 2,085 | |
| | | | 4 | 465 | 465 | 4,330 | 4,165 | |




**Typical SC Installation**




**SC62 with Two Screws**
*(SC82 similar)*

1. For additional important information, see General Information on p. 16.
2. SC Allowable Connector Loads are also limited by the SC Anchorage Load tables on pp. 31 and 32. Use the minimum tabulated values from the connector and anchorage load tables as applicable.
3. See illustration for fastener placement when using only two shouldered screws to the stud.
4. Tabulated $F_1$ loads are based on assembly tests with the load through the centerline of the stud. Tested failure modes were due to screw pullout; therefore compare $F_1$ against $F_p$ calculated per ASCE 7-10 Chapter 13 with $a_p = 1.25$ and $R_p = 1.0$.
5. $F_1$ loads are based on maximum stand-off distances of 1" or 1½" as shown. Other loads are applicable to a 1" stand-off for SC32 and 1" or 1½" stand-off for SC62 and SC82.
6. At the bend line, the gross allowable plastic moment in the $F_1$ load direction for 97 mil (12 ga.) and 118 mil (10 ga.) SC connectors are 395 in.-lb. and 675 in.-lb., respectively.
7. At a vertical slot, the net allowable plastic moment in the $F_1$ load direction for 97 mil (12 ga.) and 118 mil (10 ga.) SC connectors are 260 in.-lb. and 440 in.-lb., respectively.

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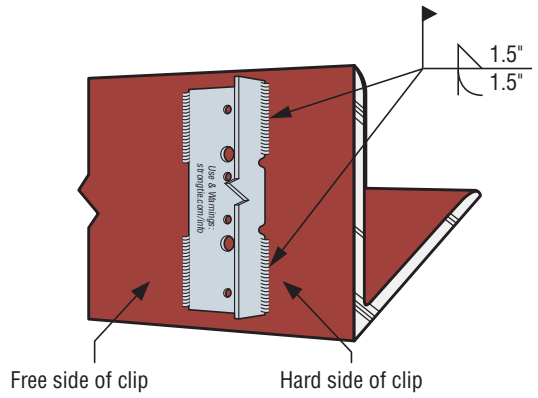
# SC Bypass Framing Slide-Clip Connector



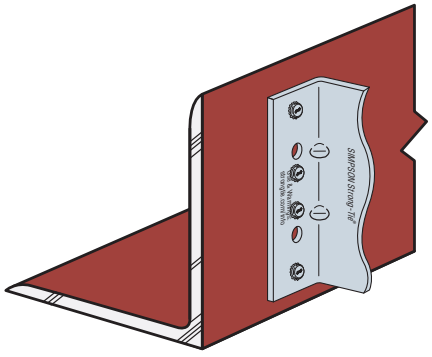
## SC Allowable Anchorage Loads to Steel

| Anchorage Type | Minimum Base Material | No. of Anchors | Allowable Load | |
|---|---|---|---|---|
| | | | $F_1$ | $F_2$ and $F_3$ |
| #12 self-drilling screws<br>Simpson Strong-Tie® X Metal screws<br>XQ1B1214, X1B1214 | A36 steel<br>3/16" thick | 4 | — | 2,070 |
| #12–24 x 1¼"<br>Strong-Drive® XL Large-Head Metal screws<br>XLQ114T1224, XLQ114B1224 | A36 steel<br>3/16" thick | 4 | — | 2,545 |
| #14 self-drilling screws<br>Simpson Strong-Tie E Metal screw<br>E1B1414 | A36 steel<br>3/16" thick | 4 | — | 2,620 |
| Simpson Strong-Tie<br>0.157" x 5/8" powder-actuated fasteners<br>PDPAT-62KP | A36 steel<br>3/16" thick | 4 | — | 1,040 |
| Simpson Strong-Tie<br>0.157" x 5/8" powder-actuated fasteners<br>PDPAT-62KP | A572 grade 50<br>or A992 steel<br>3/16" thick | 4 | — | 1,710 |
| Welded<br>E70XX electrodes | A36 steel<br>3/16" thick | Hard side: 3"<br>Free side: 3" | 2,110 | 3,710 |

1. For additional important information, see General Information on p. 16.
2. Allowable anchorage loads are also limited by the SC Connector Load Table on p. 30. Use the minimum tabulated values from the connector and anchorage load tables as applicable.
3. Allowable loads for #12–24 self-drilling screws and PDPAT powder-actuated fasteners are based on installation in minimum 3/16" thick structural steel with $F_y$ = 36 ksi. PDPAT values are also provided for A572 steel. Values listed above may be used where other thicknesses of steel are encountered provided that the fastener has equal or better tested values into thicker steel (see p. 16). It is the responsibility of the Designer to select the proper length fasteners based on the steel thickness installation.
4. For screw fastener installation into steel backed by concrete, predrilling of both the steel and the concrete is suggested. For predrilling use a maximum 3/16"-diameter drill bit.




Weld Anchorage



PAF Anchorage

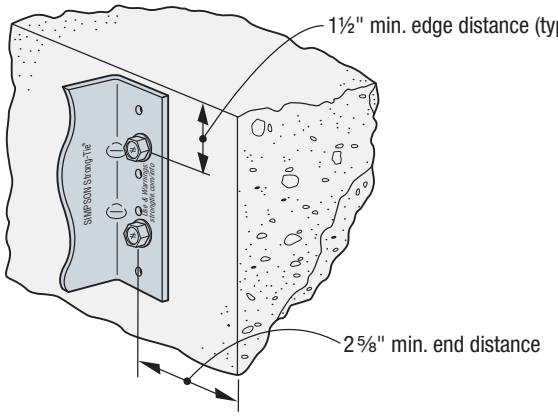
C-CF-2017 ©2017 SIMPSON STRONG-TIE COMPANY INC.

# **SC** Bypass Framing Slide-Clip Connector

## Allowable Titen HD® Anchorage Loads into Concrete with SC Clip

| Simpson Strong-Tie ¼" Titen HD Screw Anchor | Nominal Embedment (in.) | Anchor Quantity and Size | f'c (psi) | Load Direction | Wind and Seismic in SDC A&B | | Seismic in SDC C through F |
|---|---|---|---|---|---|---|---|
| | | | | | Uncracked Concrete | Cracked Concrete | Cracked Concrete[6] |
| THDB25178H | 1⅝ | (2) ¼" x 1⅞" | 3,000 | $F_1$ | 335 | 240 | 280 |
| | | | | $F_2$ and $F_3$ | 660 | 630 | 550 |
| | | | 4,000 | $F_1$ | 390 | 280 | 325 |
| | | | | $F_2$ and $F_3$ | 760 | 725 | 635 |
| THDB25234H | 2½ | (2) ¼" x 2¾" | 3,000 | $F_1$ | 370 | 265 | 310 |
| | | | | $F_2$ and $F_3$ | 475 | 695 | 610 |
| | | | 4,000 | $F_1$ | 430 | 305 | 360 |
| | | | | $F_2$ and $F_3$ | 550 | 805 | 705 |

1. Allowable anchor capacities have been determined using ACI 318-14 Chapter 17 calculations with a minimum concrete compressive strength ($f'_c$) of 3,000 and 4,000 psi in normal-weight concrete. Tabulated values shall be multiplied by a factor ($\lambda_a$) of 0.6 for sand light-weight concrete.
2. Edge distance is assumed to be 1½", and end distance is 2⅝".
3. Load values are for group anchors based on ACI 318, condition B, load factors from ACI 318-14 Section 5.3, no supplement edge reinforcement, $\Psi_c$, v = 1.0 for cracked concrete and periodic special inspection.
4. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha ($\alpha$), of 0.70 for seismic load and 0.6 for wind loads. ASD values for other combinations may be determined using alternate conversion factors.
5. 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.
6. Design loads shall include the over-strength factor per ASCE7 Section 12.4.3. For fasteners in exterior wall connection systems, $\Omega_o$ = 1.5 per Table 13.5-1.
7. Allowable loads for $F_1$ are based on the governing loading direction which is toward the end of slab.
8. For anchor subjected to both tension and shear loads, it shall be designed to satisfy following:
   - For $N_a$ / $N_{all}$ ≤ 0.2, the full allowable load in shear is permitted.
   - For $V_a$ / $V_{all}$ ≤ 0.2, the full allowable load in tension is permitted.
   - For all other cases: $N_a$ / $N_{all}$ + $V_a$ / $V_{all}$ ≤ 1.2 where:
     $N_a$ = Applied ASD tension load
     $N_{all}$ = Allowable $F_2$ and $F_3$ load from the SC Allowable Anchorage Loads for Concrete table
     $V_a$ = Applied ASD shear load
     $V_{all}$ = Allowable $F_1$ load from the SC Allowable Anchorage Loads for Concrete table
9. Tabulated allowable loads are based on anchorage only. The capacity of the connection system shall be the minimum of the allowable anchorage load and the SC Allowable Connector Loads.




Titen HD® Anchorage

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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)

**Installation:**

- Use the specified type and number of anchors.
- Use the specified number of XLSH34B1414 #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the No-Equal stamp.
- Use a maximum of one 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.

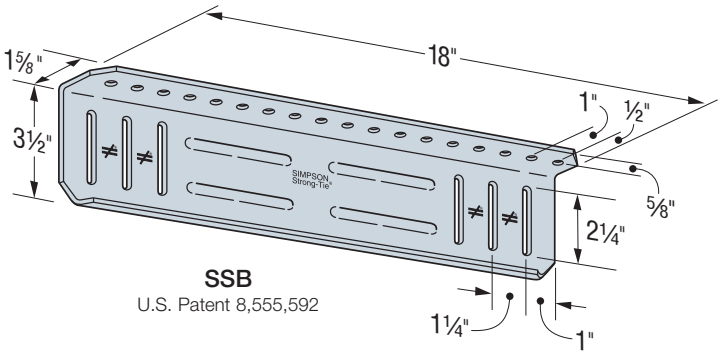
**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

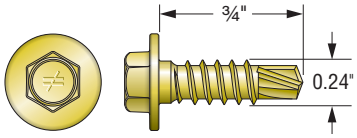
SSB3.518-KT contains:

- Box of 25 connectors
- (83) XLSH34B1414 #14 shouldered screws

**Note:** Replacement #14 shouldered screws for SSB connectors are XLSH34B1414-RP83.




**SSB**
U.S. Patent 8,555,592

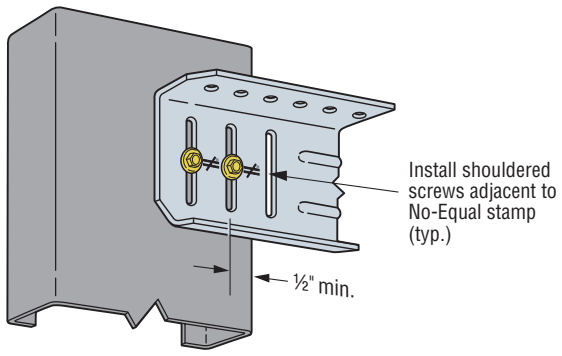



**XLSH34B1414**
**#14 Shouldered Screw**

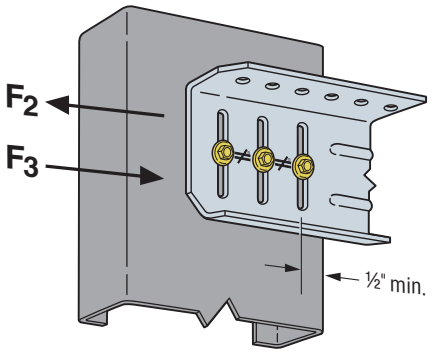
## SSB Allowable Connector Loads

| 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.) | | |
| | | | $F_2$ | $F_3$ | $F_2$ | $F_3$ | $F_2$ | $F_3$ | |
| SSB3.518 | 54 (16) | 2[1] | 520 | 520 | 690 | 690 | 1,075 | 960 | IP2, L8, FL |
| | | 3 | 815 | 815 | 1,030 | 1,080 | 1,335 | 1,225 | |

1. When the SSB connector is used with two shouldered screws, the screws may be installed in any two slots.
2. Allowable loads are based on clips installed with (3) #12–24 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 on p. 34.
3. Reference pp. 63–67 for LRFD design strengths.




**SSB Installation with Two Shouldered Screws**




**SSB Installation with Three Shouldered Screws**

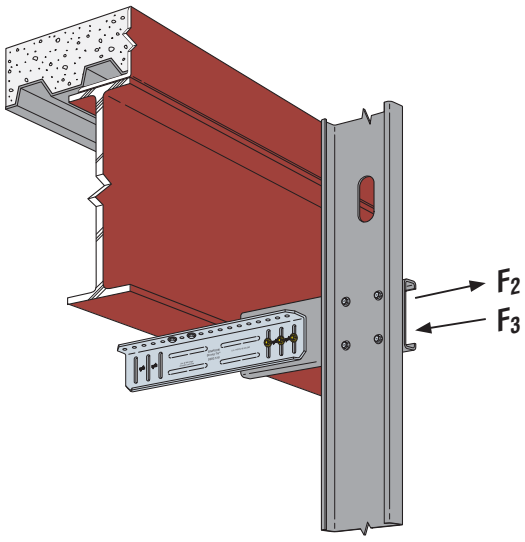
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# **SSB** Bypass Framing Slide-Clip Strut Connector

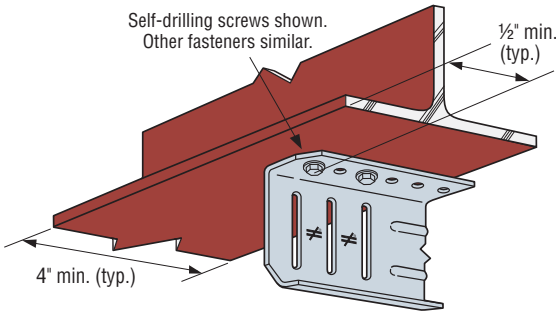
## SSB Allowable Anchorage Loads

| Anchorage Type | No. of Anchors | Allowable Load $F_2$ and $F_3$ |
|---|---|---|
| #12–24 self-drilling screws[3] | 2 | 1,250 |
| | 3 | 1,335 |
| Simpson Strong-Tie® 0.157" PDPAT powder-actuated fasteners | 2 | 1,320 |
| | 3 | 1,335 |
| Welded | Hard side: 2"<br>Free side: 1" | 1,335 |

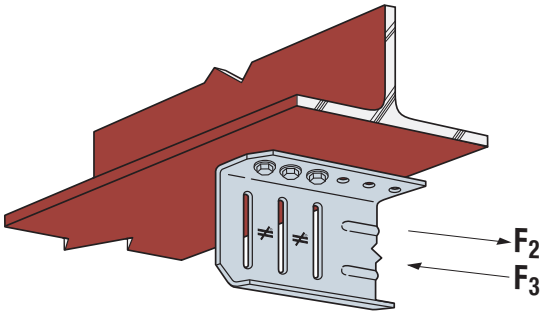
1. For additional important information, see General Information on p. 16.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SSB Allowable Connector Loads table on p. 33.
3. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



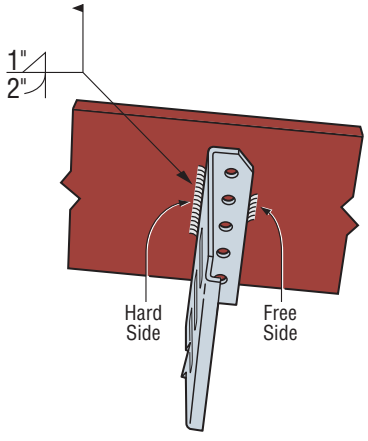

Typical SSB Installation with Stud Strut




Two Anchors

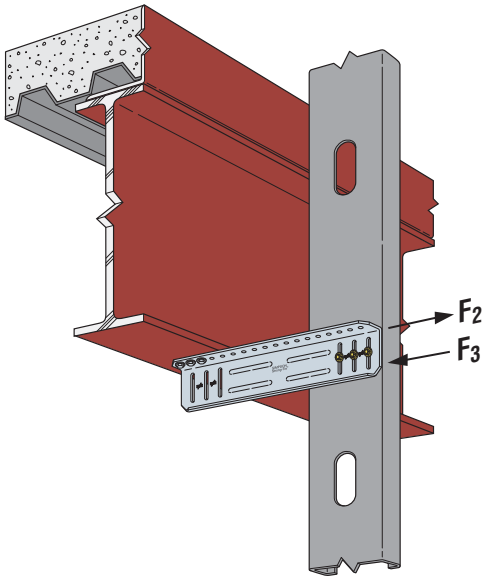



Three Anchors




Welded

SSB Anchor Layout




Typical SSB3.518 Installation

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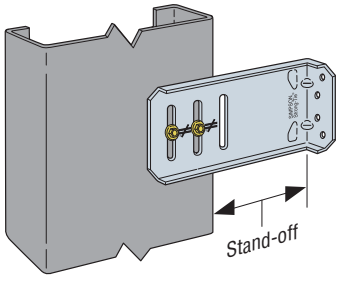
# Design Aid – SCB, SSB and FCB



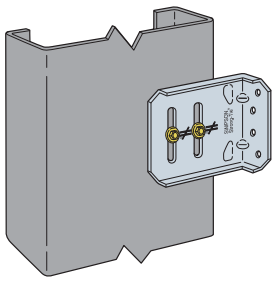
## Curtain-Wall Connector Stand-Off Distances

| Model No. | Fastener Pattern | 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 and 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 and 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 and 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 and E | — | 5½" to 7½" | 3½" to 7½" | 1½" to 7½" | 0" to 7½" |
| SSB3.518/FSB3.518 | B[2] | 0" to 12¼" | 0" to 12¼" | 0" to 12¼" | 0" to 12¼" | 0" to 12¼" |
| | C, D and 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" |

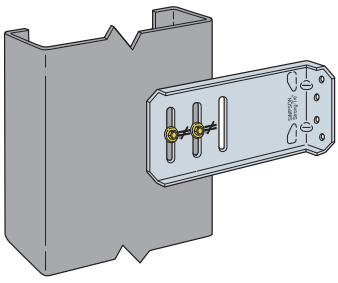
1. The stand-off is the distance from the interior flange of the stud to the face of the supporting structure (see illustration below). All dimensions assume fasteners are installed a minimum of ½" from the edge of stud, and the connector does not extend beyond the exterior flange of the stud; "—" designates conditions where fastener pattern will not fit on stud.
2. A tabulated maximum stand-off of 12¼" is based on three anchors. For two anchors, maximum stand-off is 13¼".
3. A tabulated maximum stand-off of 11" is based on three anchors. For two anchors, maximum stand-off is 12".
4. For FCB fixed connectors (pp. 47–49), minimum indicates fill all round holes, and maximum indicates fill all round and triangle holes.
5. Fastener patterns are as follows:



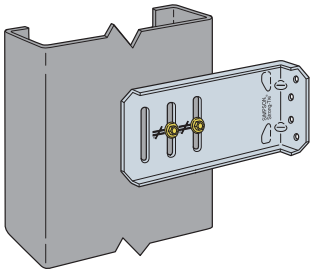

**Stand-Off Distance**



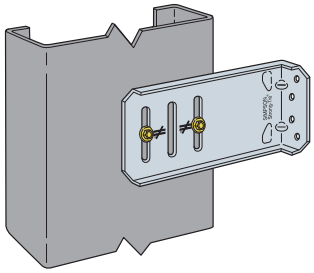
**Pattern A**
*Two screws installed with one in each slot*



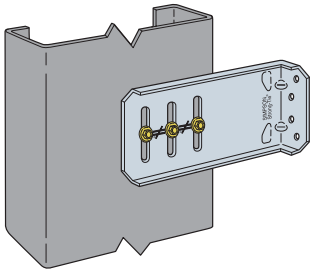
**Pattern B**
*Two screws installed in slots farthest from the anchor leg*



**Pattern C**
*Two screws installed in slots closest to the anchor leg*



**Pattern D**
*Two screws installed in outer slots with center slot empty*



**Pattern E**
*Three 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 one screw per slot.

**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

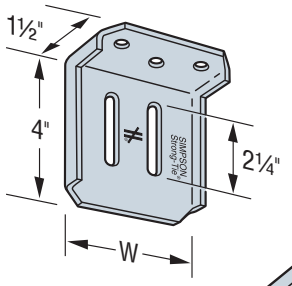
SCW3.25-KT contains:

- Box of 25 connectors
- 55 XLSH34B1414 #14 shouldered screws

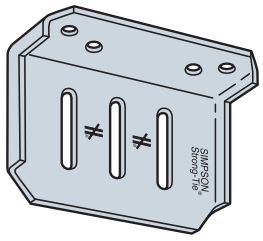
SCW5.5-KT contains:

- Box of 25 connectors
- 83 XLSH34B1414 #14 shouldered screws

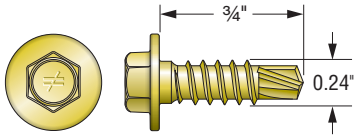
**Note:** Replacement #14 shouldered screws for SCW connectors are XLSH34B1414-RP83.




**SCW3.25**



**SCW5.5**

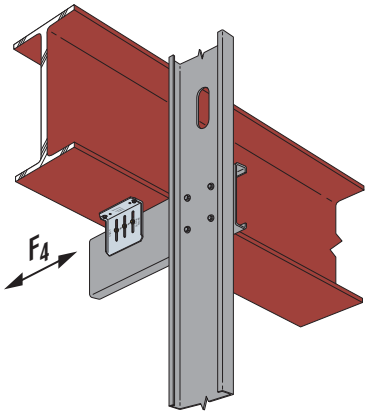



**XLSH34B1414 #14 Shouldered Screw**

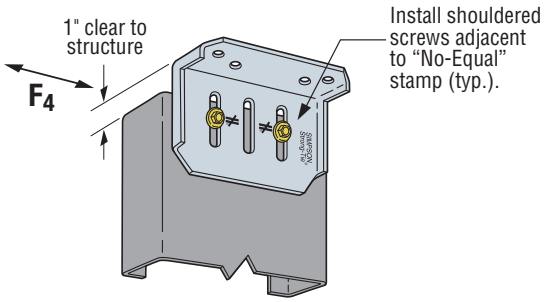
## SCW Allowable Connector Loads

| 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) | 3¼ | 2 | 455 | 630 | 755 | IP2, L8, FL |
| SCW5.5 | 54 (16) | 5½ | 2[1] | 455 | 630 | 995 | |
| | | | 3 | 455 | 630 | 1,220 | |

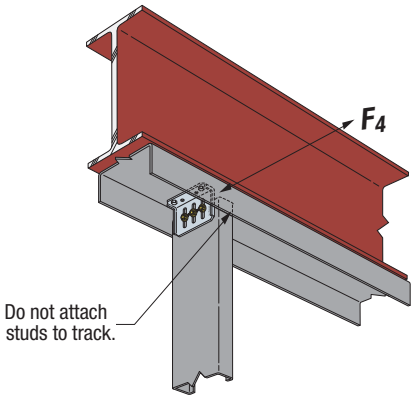
1. When the SCW5.5 connector is used with two shouldered screws, install screws in the outermost slots.
2. Allowable loads are based on clips installed with all holes in the anchor leg filled with #12–14 screws. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCW Allowable Anchorage Loads table on p. 37.
3. Reference pp. 63–67 for LRFD design strengths.




**Typical SCW Installation with Stud Strut**




**SCW5.5 Installation with Two Shouldered Screws**
*(Three shouldered screws and SCW3.25 similar)*




**Typical SCW Installation at Stud**

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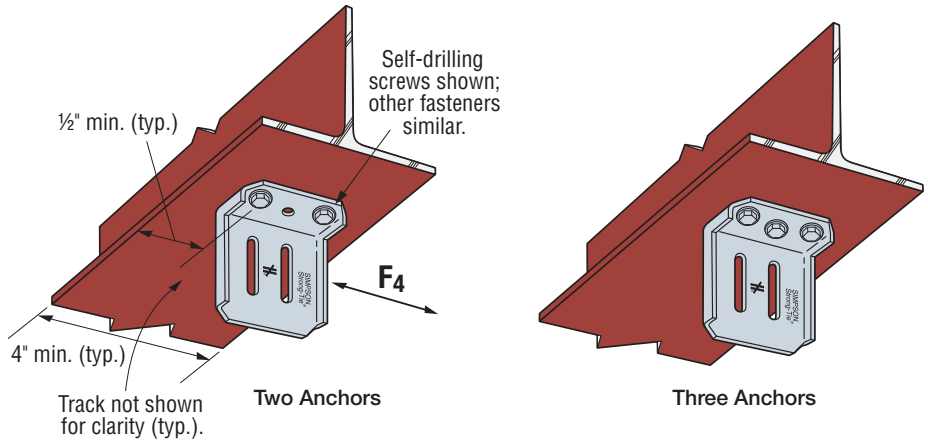
# **SCW** Head-of-Wall Slide-Clip Connector



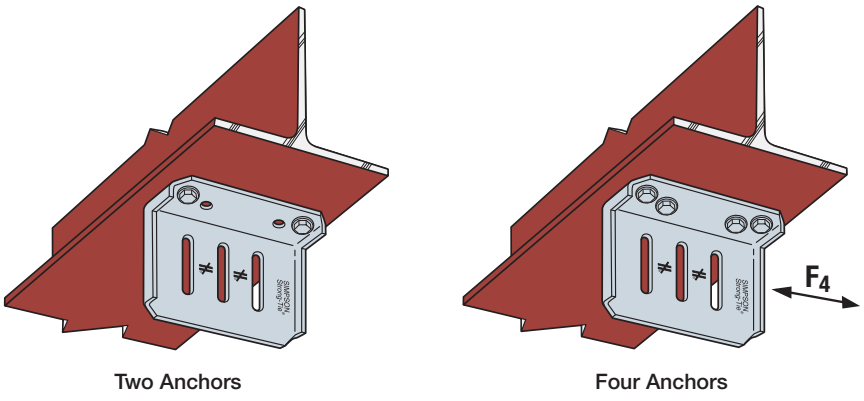
## SCW Allowable Anchorage Loads

| Model No. | Anchorage Type | No. of Anchors | Allowable Load $F_4$ |
|---|---|---|---|
| SCW3.25 | #12–24 self-drilling screws[3] | 2 | 640 |
| | | 3 | 755 |
| | Simpson Strong-Tie® 0.157" PDPAT powder-actuated fasteners | 2 | 520 |
| | | 3 | 560 |
| SCW5.5 | #12–24 self-drilling screws[3] | 2 | 1,200 |
| | | 4 | 1,220 |
| | Simpson Strong-Tie® 0.157" PDPAT powder-actuated fasteners | 2 | 920 |
| | | 4 | 1,220 |

1. For additional important information, see General Information on p. 16.
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 on p. 36.
3. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




**SCW3.25 Anchor Layout**




**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.

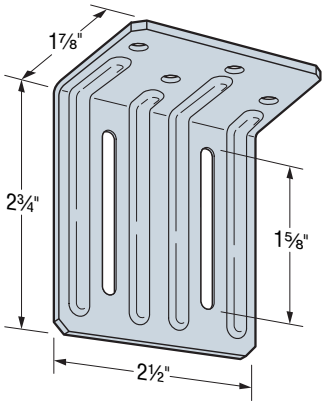
**Material:** 43 mil (18 ga.)

**Finish:** Galvanized (G90)

**Installation:**

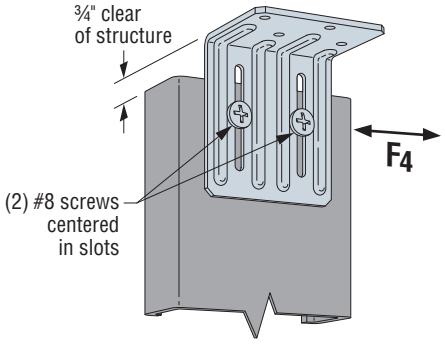
- Use specified type and number of anchors per the installation drawing below
- Install (2) #8 screws centered in the vertical slots
- Once tightened, back-out screws ½ turn to ensure slip

**Codes:** See p. 11 for Code Reference Key Chart



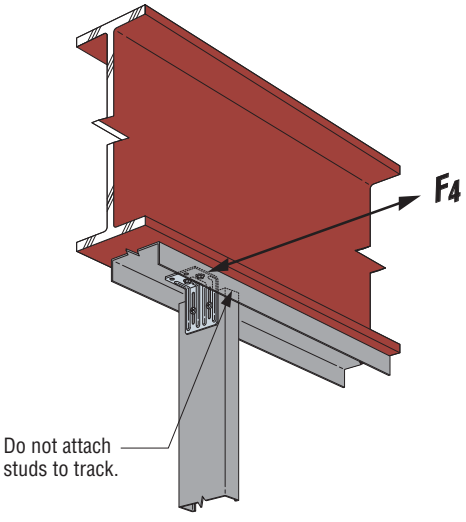

DTC

| 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) 0.157" PDPAT 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 | |

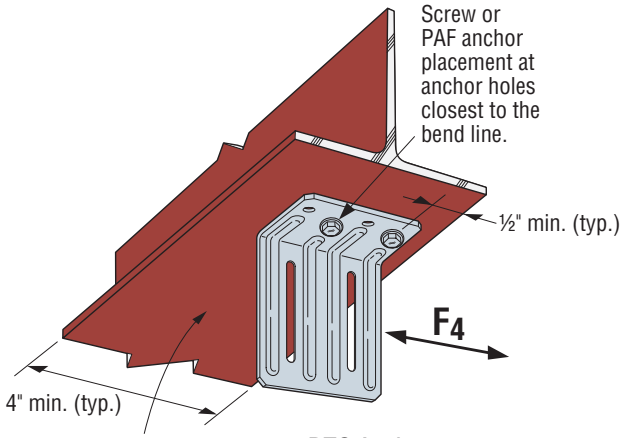



Typical DTC Screw Installation

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical DTC Installation at Stud




DTC Anchor Layout

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# **SCHA** Slide-Clip Connectors for Horizontal Anchorage



***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.***

SCHA connectors are an ideal solution for panelized or stick-frame construction where the CFS framing anchors to the top of a concrete floor slab or the bottom of a steel beam. The connector features a wide support leg to decrease eccentricity on anchors and provide a variety of anchorage options. The included SCVC vertical slider helps to strengthen the connector for the highest tension ($F_2$) and compression ($F_3$) loads in the industry.

**Features:**

- Provides a full 1" of both upward and downward movement
- Tabulated design values for anchorage help mitigate risk and provide ease of specification
- Either face of anchorage leg can be used against the support
- Accommodates stand-off distances up to 4¾"
- Can be used with 3⅝", 4", 6" and 8" studs
- Prepunched anchor holes accommodate ¼"-diameter Titen HD® or other ¼"-diameter concrete screw anchors, and 0.157"-diameter powder-actuated fasteners such as the Simpson Strong-Tie® PDPAT-62KP
- Prepunched anchor holes also eliminate the need for pre-drilling and help ensure accurate anchor placement

**Material:** SCHA —118 mil (10 ga., 33 ksi); SCVS — 97 mil (12 ga., 33 ksi)

**Coating:** Galvanized (G90)

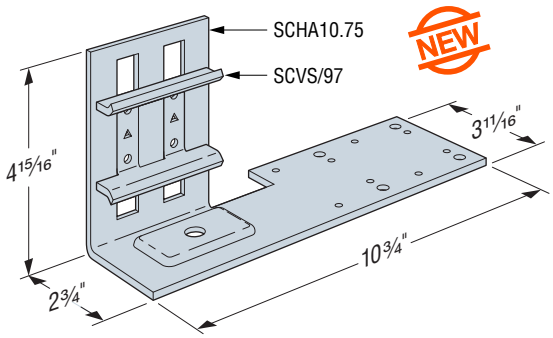
**Installation:**

- Use all specified fasteners and anchors. Note that the smaller diameter anchor holes are provided for PAF installation, and the larger diameter anchor holes are for ¼"-diameter concrete screw anchors.
- Ensure that the SCVS vertical slider is centered in the SCHA vertical slots by aligning the tic-marks adjacent to the triangle holes on the slider with the ≠ stamp on the SCHA clip.

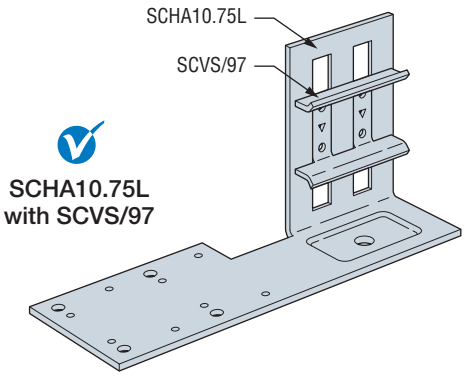
**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

- SCHA10.75-KT15 contains (15) SCHA10.75 connectors and (15) SCVS/97 sliders
- SCHA10.75L-KT15 contains (15) SCHA10.75L connectors and (15) SCVS/97 sliders

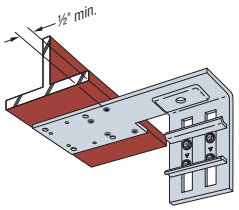
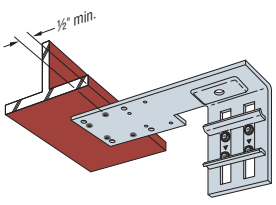
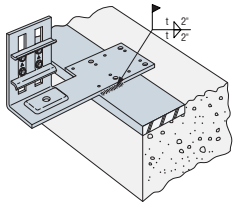
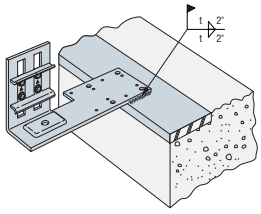
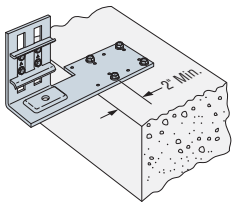
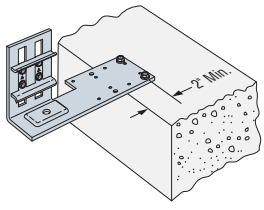



**SCHA10.75 with SCVS/97**
U.S. Patent Pending




**SCHA10.75L with SCVS/97**

## SCHA Anchorage Types and Conditions

| Four PDPAT Anchors to Steel | |
|---|---|
| Front Condition | End Condition |
|  |  |
| **4" Weld** | |
| Front Condition | End Condition |
|  |  |
| **¼"-Diameter Concrete Screws** | |
| Four Anchors | Two Anchors |
|  |  |

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# **SCHA** Slide-Clip Connectors for Horizontal Anchorage

## SCHA Allowable Loads

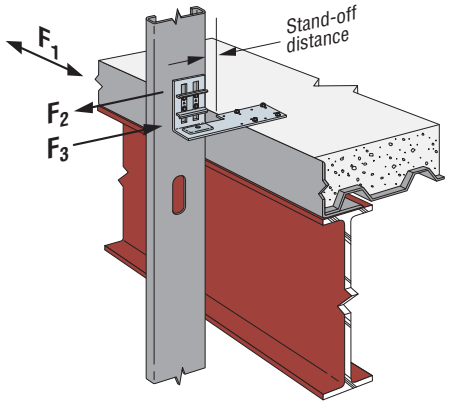
| Primary Structure Base Material | Anchorage | | Fasteners to Stud Self-Drilling Screws | | Stud Thickness mil (ga.) | Maximum Stand-Off Distance (in.) | Allowable Load (lb.) | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty./Type/Size | Condition | Min./ Max. | No. #12–14 | | | $F_1$[7] | $F_2$ | $F_3$ | |
| Structural steel A36 3⁄16" thick minimum | (4) PAF – 0.157" dia. x 5⁄8" PDPAT-62KP or (2) welds – 2" length | Front condition | Min. | 4 | 33 (20) | 2 | 150 | 645 | 490 | 170 |
| | | | | | 43 (18) | | 195 | 860 | 610 | |
| | | | | | 54 (16) | | 235 | 990 | 880 | |
| | | | | | 68 (14) | | 235 | 990 | 880 | |
| | | | Max. | 6 | 54 (16) | 2 | 350 | 1,300 | 1,045 | |
| | | | | | 68 (14) | | 350 | 1,495 | 1,045 | |
| | | End condition | Min. | 4 | 33 (20) | 4¾ | 105 | 625 | 470 | |
| | | | | | 43 (18) | | 110 | 830 | 570 | |
| | | | | | 54 (16) | | 165 | 830 | 720 | |
| | | | | | 68 (14) | | 165 | 830 | 720 | |
| | | | Max. | 6 | 54 (16) | 4¾ | 350 | 1,060 | 775 | |
| | | | | | 68 (14) | | 350 | 1,060 | 775 | |
| Normal or lightweight concrete $f'_c$ = 2,500 psi minimum | (4) concrete screw anchors – 1⁄4" diameter[3] | 4 anchors | Min. | 4 | 33 (20) | 2 | 105 | 625 | 470 | |
| | | | | | 43 (18) | | 110 | 830 | 570 | |
| | | | | | 54 (16) | | 165 | 830 | 720 | |
| | | | | | 68 (14) | | 165 | 830 | 720 | |
| | | | Max. | 6 | 54 (16) | 2 | 350 | 1,060 | 775 | |
| | | | | | 68 (14) | | 350 | 1,060 | 775 | |
| | (2) concrete screw anchors – 1⁄4" diameter[3] | 2 anchors | Min. | 4 | 33 (20) | 4¾ | 105 | 625 | 470 | |
| | | | | | 43 (18) | | 105 | 830 | 570 | |
| | | | | | 54 (16) | | 165 | 830 | 720 | |
| | | | | | 68 (14) | | 165 | 830 | 720 | |
| | | | Max. | 6 | 54 (16) | 4¾ | 350 | 860 | 745 | |
| | | | | | 68 (14) | | 350 | 860 | 745 | |

1. For additional important information, see the General Information on p. 16.
2. Allowable loads are based on connectors installed with tabulated anchorage type, quantity and size into structural steel. For anchorage installations into concrete, the capacity of the connection system will be the minimum of the tabulated value and the allowable load using concrete screws indicated on the table on p. 41. Note that if the Designer chooses to calculate concrete anchorage with alternate 1⁄4"-diameter anchors, then the maximum load shall not exceed the tabulated values in this table. Refer to the figures on p. 39 for anchorage conditions.
3. Please refer to the table on p. 41 for Simpson Strong-Tie® Titen HD anchorage loads.
4. Min. fasteners quantity and tabulated values — fill round holes; max. fasteners quantity and tabulated values — fill round and triangular holes.
5. The stand-off is the distance from the interior flange of the stud to the face of the supporting structure. Note that the interior flange of the stud is assumed to align with the inside vertical edge of the connector as indicated in the illustrations on p. 41.
6. Tabulated values are based on 3 5⁄8" studs. Web crippling checks for deeper members are the responsibility of the Designer.
7. 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.

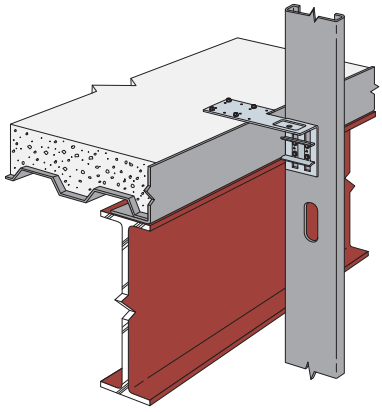
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# **SCHA** Slide-Clip Connectors for Horizontal Anchorage

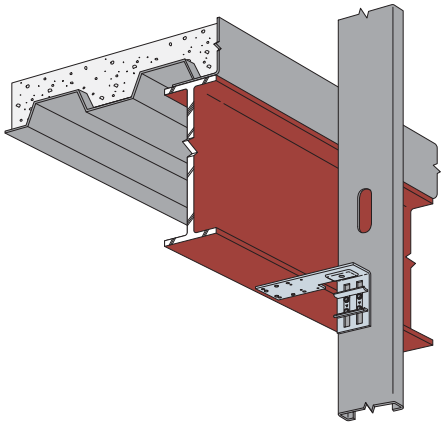




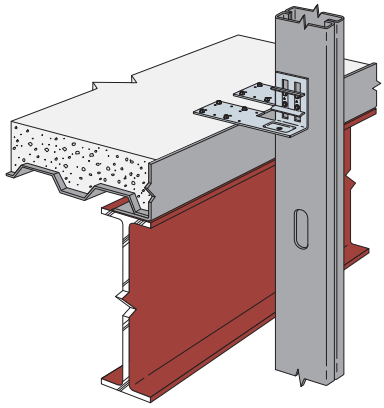

**Typical SCHA Installation at Floor Slab**



**Typical SCHA Installation at Floor Slab** *(inverted)*



**Typical SCHA Installation at Beam Flange**



**Typical SCHA Installation for Built-Up Studs at Floor Slab** *(SCHA10.75L near side and SCHA10.75 far side)*

## Allowable ¼" Titen HD® Concrete Screw Anchorage Loads

| Anchorage Type | Anchors Quantity and Size | Allowable Anchor Load (lb.) $F_2$ and $F_3$ | | | |
|---|---|---|---|---|---|
| | | Wind and Seismic in SDC A&B | | Seismic in SDC C through F | |
| | | Uncracked Concrete | Cracked Concrete | Cracked Concrete ($\Omega$ = 1.0) | Cracked Concrete[7] ($\Omega$ = 2.5) |
| Simpson Strong-Tie® Titen HD screw anchor model THDB25178H | (4) ¼" x 1⅞" | 1,025 | 730 | 855 | 350 |
| | (2) ¼" x 1⅞" | 510 | 365 | 425 | 175 |

1. Allowable anchor capacities have been determined using ACI 318-14 Chapter 17 calculations with a minimum concrete compressive strength ($f'_c$) of 2,500 psi and 5" slab thickness in normal-weight concrete. Tabulated values can be multiplied by a factor ($\lambda_a$) of 0.6 for sand-lightweight concrete.
2. Nominal Embedment Depth/Effective Embedment Depth relationship is 1.75" ($h_{nom}$) / 1.30" ($h_{ef}$).
3. Edge distance is assumed to be 2", and end distance is 7⅛".
4. Load values are for group anchors based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, no supplement edge reinforcement, $\psi_c$, v = 1.0 for cracked concrete and periodic special inspection.
5. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha ($\alpha$), of 0.70 for seismic load and 0.6 for wind loads. ASD values for other combinations may be determined using alternate conversion factors.
6. 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.
7. Allowable loads have been divided by an Omega ($\Omega$) seismic factor of 2.5 for brittle failure as required by ACI 318-14 Chapter 17.
8. Allowable $F_2$ and $F_3$ loads are based on the governing loading direction, which is toward the edge of slab.
9. 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 SCHA Allowable Connector Loads.

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# Drift Clips



# **IDCB** Drift-Clip Bypass Framing Connector



The IDCB drift-clip connector is used to secure bypass stud framing to the edge of a slab. The connector will accommodate 1" of lateral drift in each direction and 1" of upward and downward vertical deflection. Tested load values are provided for anchorage to a steel-edge angle using #12 x 1¼" Strong-Drive® XL Large-Head Metal screws.

**Features:**

- Horizontal embossments and corner gussets optimize performance in the $F_2$ load direction
- Precision-manufactured shouldered screws provided with the IDCB connector are designed to prevent overdriving and to ensure that the clip functions properly
- Simpson Strong-Tie® No-Equal stamps mark the center of the slots to help ensure correct shouldered screw and anchor placement

**Material:** 97 mil (12 ga.)

**Coating:** Galvanized (G90)

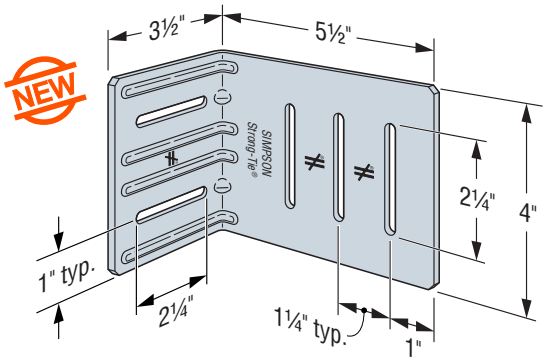
**Installation:**

- Use the specified type and number of fasteners and anchors.
- In the vertical slots, use the specified number of #14 shouldered screws (included) for attachment to the stud. Install screws to align with the No-Equal stamp.
- For attachment to a minimum 3⁄16"- and maximum ½"-thick steel edge angle, use Simpson Strong-Tie® Strong-Drive XL Large-Head Metal screws (XLQ114B1224). Use one screw centered in each horizontal slot. Install screws to align with the No-Equal stamp and back out ½ turn.
- For fastener installation into steel backed by concrete, predrilling of both the steel and the concrete may be required. For predrilling, use a maximum 3⁄16"-diameter drill bit.

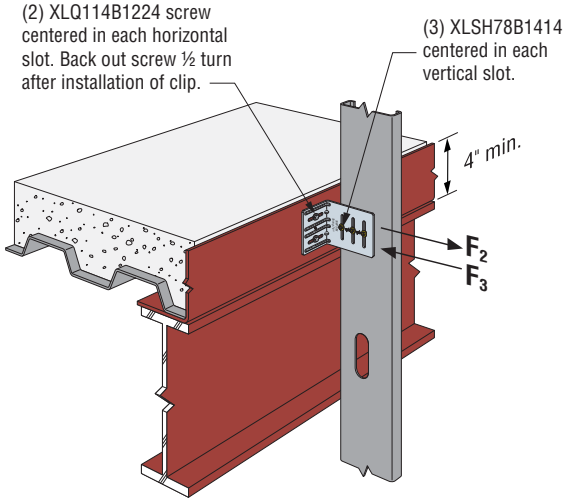
**Codes:** See p. 11 for Code Reference Key Chart

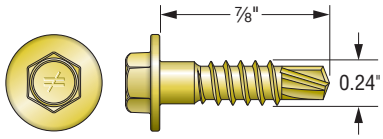
**Ordering Information:**

IDCB45.5-KT25 contains (25) IDCB45.5 connectors and (83) XLSH78B1414 #14 shouldered screws

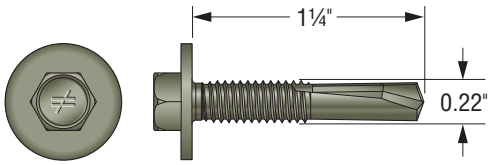



IDCB45.5

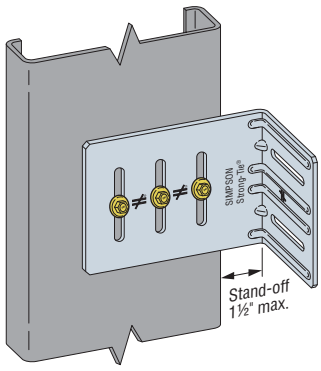



**XLSH78B1414**
**#14 Shouldered Screw for Attachment to Stud Framing**
*(included)*




**XLQ114B1224 Screw for Anchorage to Steel Edge Angle**
*(sold separately)*




**Stand-Off Distance**

## IDCB45.5 Connector Loads

| Model No. | No. of #14 Shouldered Screws[1] | No. of #12 XLQ Screw Anchors[2] | Load Direction | Stud Thickness mil (ga.) | Strength[3] | | Service Limit[3] | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | ASD | LRFD | ⅛" Deformation | 3⁄16" Deformation | |
| IDCB45.5 | 3 | 2 | $F_2$ and $F_3$ | 33 mil (20 ga.) | 600 | 900 | 410 | 650 | 170 |
| | | | | 43 mil (18 ga.) | 680 | 1,060 | 455 | 695 | |
| | | | | 54 mil (16 ga.) | 760 | 1,220 | 500 | 745 | |

1. #14 x ⅞" shouldered screw (model no. "XLSH78B1414") provided with the clips are ASTM C1513 compliant.
2. For additional information on the #12 XL screw (model no. "XLQ114B1224") refer to p. 149.
3. The capacity of the connection will be the minimum of Strength Load and applicable Service Limit Load as determined by the Designer.
4. See additional important general information on p. 16.

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# **DSSCB** Drift Strut Sliding Clip Bypass



***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.***

Simpson Strong-Tie introduces the DSSCB for cold-formed steel construction. The DSSCB is used to anchor cold-formed steel bypass framing to the edge of a floor slab for situations that accomodate horizontal building drift. The DSSCB is also used by contractors that perform panelized construction. For this application the DSSCB makes it a snap to anchor finished panels to the slab edge by enabling the installer to work off of the top of the slab without having to waste time drilling and installing anchors. It also eliminates the coordination difficulties associated with pre-anchorage of standard bypass clips.

**Features:**

- The clips come in lengths of 3½", 6", and 8".
- Prepunched slots provide a full ¾" of both upward and downward deflection.
- Precision manufactured shouldered screws, provided with DSSCB connectors, are designed to prevent overdriving and to ensure the clip functions properly.
- Works with 1³⁄₁₆" and 1⅝" strut channels as given in the figures below. Common manufacturers are Unistrut®, PHD and B-Line. Struts are not supplied by Simpson Strong-Tie.
- The maximum stand-off distance for 1³⁄₁₆" struts is 3⅛", and for 1⅝" struts is 4¼".
- Depending on the application and the Designer's specifications, struts can be mechanically anchored or welded.
- Pre-engineered design solutions are provided for channel strut anchorage.

**Material:** 97 mil (12 ga.), 50 ksi

**Coating:** Galvanized (G90)

**Installation:**

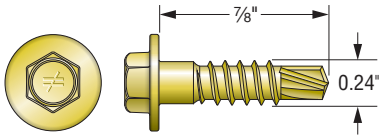
- Use the specified type and number of fasteners

**Ordering Information:**

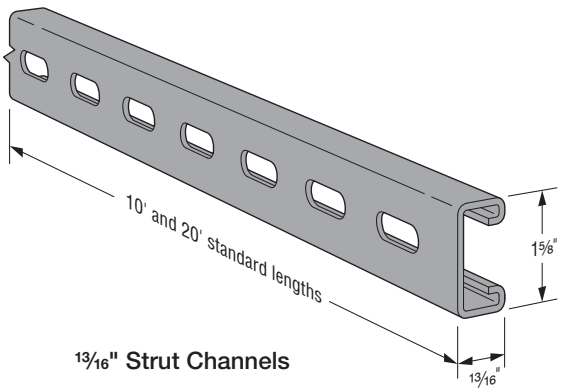
- DSSCB43.5-KT25, DSSCB46-KT25, DSSCB48-KT25 contains: 25 connectors and enough shouldered screws for installation

**Available in the summer of 2017**

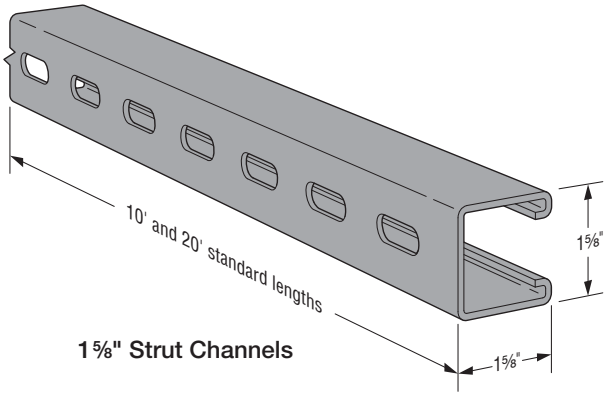





**XLSH78B1414**
**#14 Shouldered Screw for Attachment to Stud Framing**
*(included)*




**1³⁄₁₆" Strut Channels**

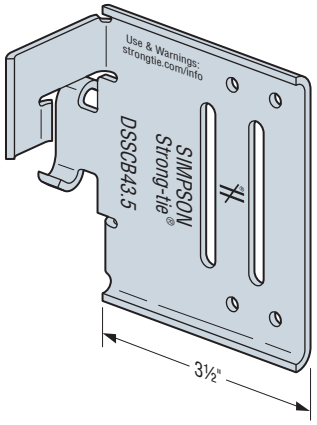



**1⅝" Strut Channels**

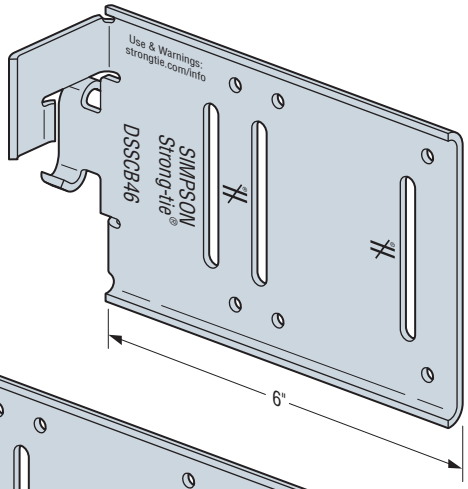
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# **DSSCB** Drift Strut Sliding Clip Bypass

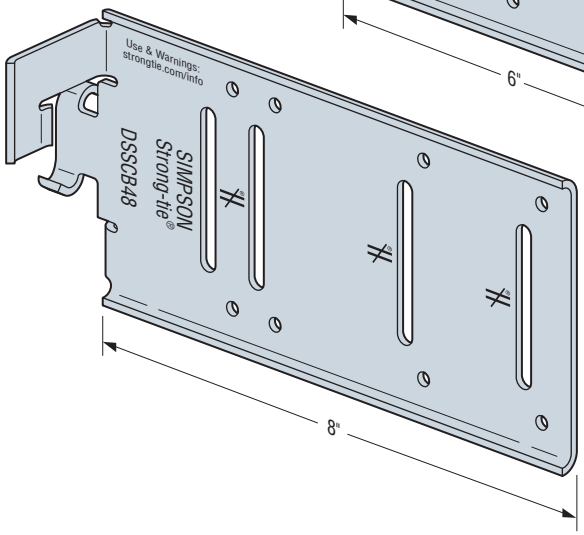





DSSCB43.5



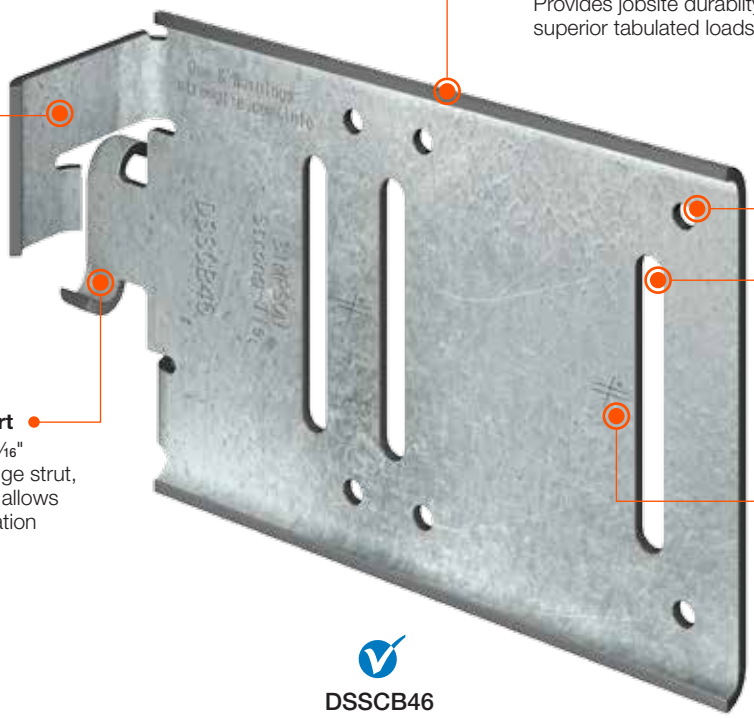

DSSCB46




DSSCB48

**Squaring Flanges**
Helps the clip stay square with the strut

**Stiffened Edges and Heavy 12-Gauge Construction**
Provides jobsite durabilty and superior tabulated loads



**Dual Function**
Clips can be used for either deflection or fixed conditions

**Unique Formed Insert**
Works with standard 13⁄16" and 1 5⁄8" deep, 12-gauge strut, minimizes friction, and allows an easy twist-in installation

**No-Equal Stamps**
Marks the center of the slots to help ensure correct shouldered-screw placement

DSSCB46
U.S. Patent Pending

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# Rigid Connectors



# **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. Note that #10 self-drilling screws can be used per the load tables given on pp. 54, 55.

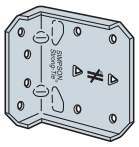
**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

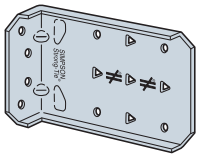
FCB43.5-R25, FCB45.5-R25, FCB47.5-R25, FCB49.5-R25, and FCB411.5-R25 contain:

- Box of 25 connectors (screws not included)

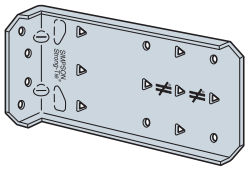
FCB43.5



FCB45.5

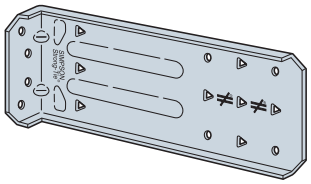


FCB47.5

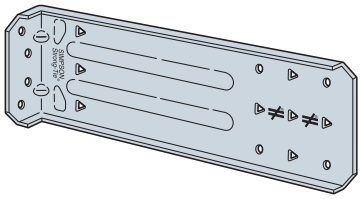


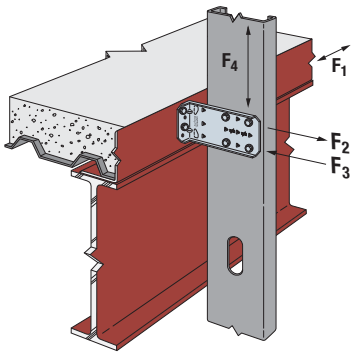
U.S. Patent 8,555,592

FCB49.5

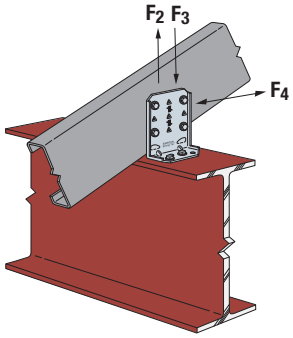


FCB411.5

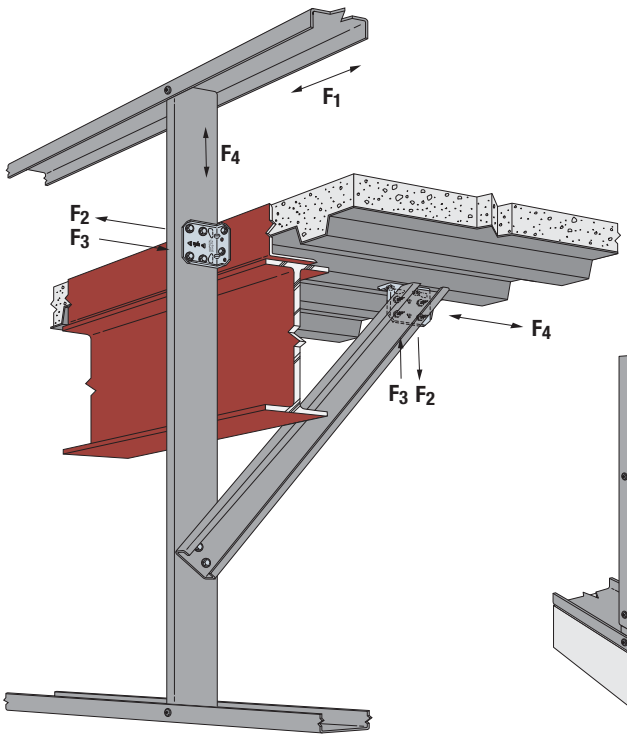




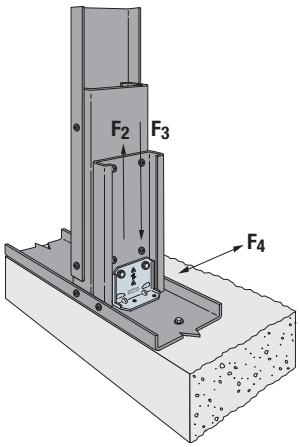

Typical FCB Installation at Bypass Framing




Typical FCB Installation for Roof Rafters




Typical FCB Installation at Sprandrel Studs and Kickers




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



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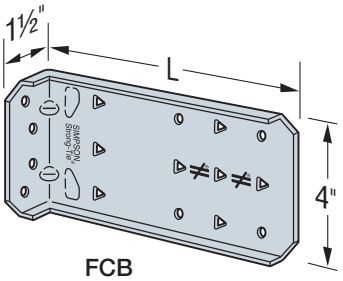
# **FCB** Bypass Framing Fixed-Clip Connector



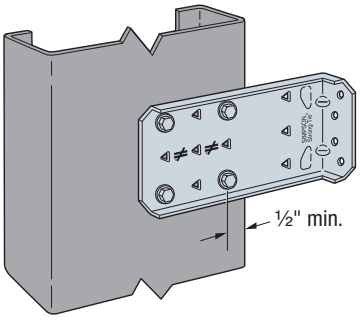
## FCB Allowable Connector Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Min./ Max. | No. of #12–14 Self-Drilling Screws[5] | 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 | 1,105 | 975 | 1,120 | 235 | 1,250 | 975 | 1,490 | IP2, L8, FL |
| | | | Max. | 6 | 205 | 1,100 | 1,130 | 1,130 | 205 | 1,105 | 1,260 | 1,455 | 235 | 1,250 | 1,735 | 1,910 | |
| FCB45.5 | 54 (16) | 5½ | Min. | 4 | 120 | 755 | 755 | 755 | 175 | 1,105 | 975 | 945 | 175 | 1,105 | 975 | 1,325 | |
| | | | Max. | 9 | 155 | 1,100 | 1,260 | 1,180 | 175 | 1,105 | 1,260 | 1,485 | 175 | 1,105 | 1,735 | 1,925 | |
| FCB47.5 | 54 (16) | 7½ | Min. | 4 | 90 | 755 | 755 | 220 | 90 | 1,105 | 945 | 330 | 90 | 1,105 | 945 | 365 | |
| | | | Max. | 12 | 205 | 1,100 | 1,260 | 705 | 235 | 1,105 | 1,260 | 1,050 | 235 | 1,105 | 1,735 | 1,445 | |
| FCB49.5 | 54 (16) | 9½ | Min. | 4 | 60 | 755 | 755 | 170 | 60 | 1,105 | 945 | 255 | 60 | 1,105 | 945 | 365 | |
| | | | Max. | 12 | 205 | 1,100 | 1,260 | 750 | 235 | 1,105 | 1,260 | 1,115 | 235 | 1,105 | 1,735 | 1,200 | |
| FCB411.5 | 54 (16) | 11½ | Min. | 4 | 45 | 755 | 755 | 140 | 45 | 1,105 | 920 | 205 | 45 | 1,105 | 920 | 365 | |
| | | | Max. | 12 | 205 | 1,100 | 1,260 | 795 | 235 | 1,105 | 1,260 | 860 | 235 | 1,105 | 1,735 | 860 | |

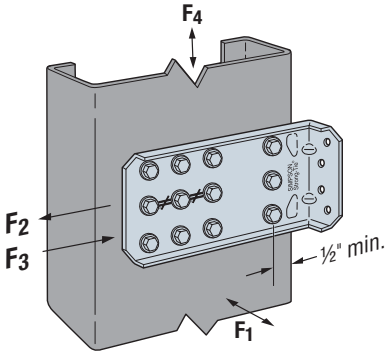
1. Min. fastener quantity and load values — fill all round holes; max. fastener quantity and load values — fill all round and triangular holes.
2. Allowable loads are based on clip capacity only and do not consider anchorage. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the FCB Allowable Anchorage Loads table on p. 49.
3. Anchorage to the supporting structure using welds or a minimum of (2) #12–24 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-CWCF1DIR17 at **strongtie.com**.
5. Reference pp. 54, 55 for loads for #10–16 screws.
6. Reference pp. 63–67 for LRFD design strengths.




FCB




FCB Installation with Min. Fasteners




FCB Installation with Max. Fasteners

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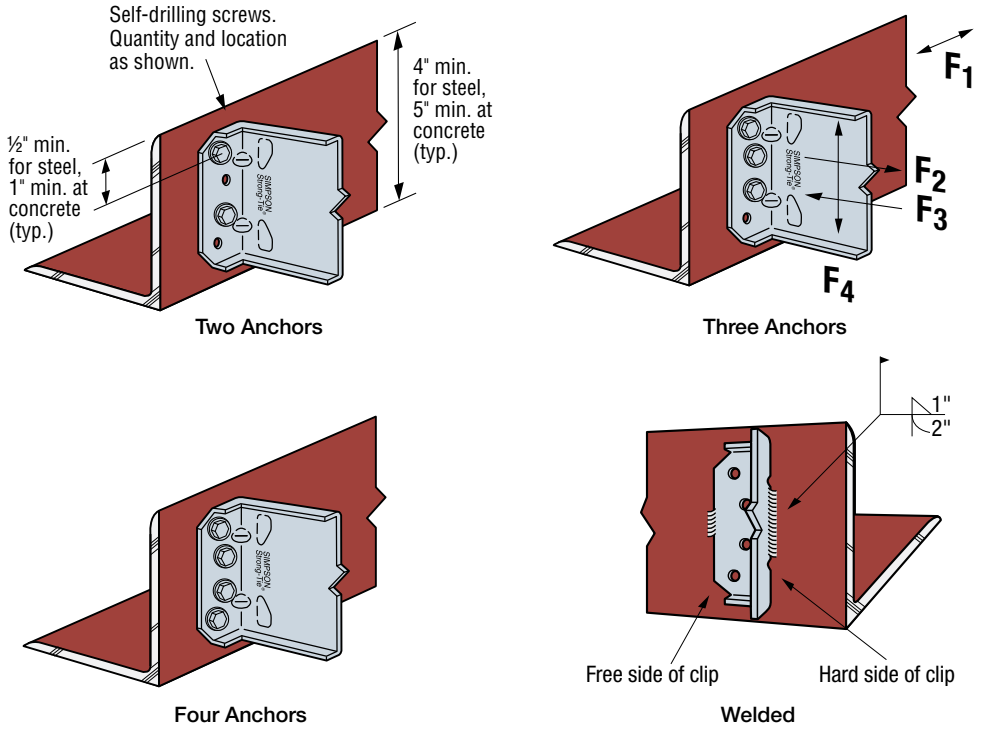
# **FCB** Bypass Framing Fixed-Clip Connector



## FCB Allowable Anchorage Loads

| Anchorage Type | Minimum Base Material | No. of Anchors | Allowable Load (lb.) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $F_2$ 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 self-drilling screws<br>Simpson Strong-Tie® X Metal screws<br>XQ1S1214, X1S1214 | A36 steel<br>3⁄16" thick | 2 | 795 | 625 | 410 | 255 | 445 | 185 | 265 | 120 | 190 |
| | | 3 | 1,120 | 690 | 450 | 280 | 490 | 200 | 295 | 135 | 210 |
| | | 4 | 1,590 | 1,255 | 820 | 365 | 890 | 355 | 535 | 275 | 380 |
| Simpson Strong-Tie #12–24 x 1 1⁄4"<br>Strong-Drive® XL Large-Head Metal screws<br>XLQ114T1224, XLQ114B1224-2K | A36 steel<br>3⁄16" thick | 2 | 1,115 | 625 | 410 | 255 | 445 | 185 | 265 | 120 | 190 |
| | | 3 | 1,645 | 690 | 450 | 280 | 490 | 200 | 295 | 135 | 210 |
| | | 4 | 2,230 | 1,255 | 820 | 365 | 890 | 355 | 535 | 275 | 380 |
| Simpson Strong-Tie<br>0.157" x 5⁄8" power-actuated fasteners<br>PDPAT-62KP | A36 steel<br>3⁄16" thick | 2 | 390 | 410 | 265 | 165 | 290 | 120 | 175 | 75 | 125 |
| | | 3 | 715 | 465 | 305 | 190 | 330 | 135 | 195 | 85 | 140 |
| | | 4 | 970 | 840 | 550 | 340 | 595 | 245 | 355 | 145 | 255 |
| Simpson Strong-Tie<br>0.157" x 5⁄8" power-actuated fasteners<br>PDPAT-62KP | A572 or<br>A992 steel<br>3⁄16" thick | 2 | 585 | 410 | 265 | 165 | 290 | 120 | 175 | 75 | 125 |
| | | 3 | 800 | 465 | 305 | 190 | 330 | 135 | 195 | 85 | 140 |
| | | 4 | 1,170 | 840 | 550 | 340 | 595 | 245 | 355 | 145 | 255 |
| Simpson Strong-Tie<br>1⁄4" x 1 3⁄4" Titen® hex-head masonry screws<br>TTN25134H | Concrete<br>$f'_c$ = 2,500 psi | 2 | 380 | 415 | 270 | 165 | 295 | 120 | 175 | 105 | 125 |
| | | 3 | 445 | 470 | 310 | 190 | 335 | 140 | 200 | 120 | 145 |
| | | 4 | 510 | 645 | 420 | 260 | 455 | 190 | 275 | 165 | 195 |
| Welded<br>E70XX electrodes | A36 steel<br>3⁄16" thick | Hard side: 2" | 1,735 | 1,910 | 1,925 | 365 | 1,445 | 365 | 1,200 | 365 | 860 |
| | | Free side: 1" | | | | | | | | | |

1. For additional important information, see General Information on p. 16.
2. Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated allowable anchorage loads the allowable load from the FCB Allowable Connector Load table on p. 48.
3. Allowable loads for #12–24 self-drilling screws and PDPAT powder-actuated fasteners are based on installation in minimum 3⁄16"-thick structural steel with $F_y$ = 36 ksi. PDPAT values are also provided for A572 steel. Values listed above maybe used where other thicknesses of steel are encountered provided that the fastener has equal or better tested values into thicker steel (see p. 16). It is the responsibility of the Designer to select the proper length fasteners based on the steel thickness installation.
4. For screw fastener installation into steel backed by concrete, predrilling of both the steel and the concrete is suggested. For predrilling use a maximum 3⁄16"-diameter drill bit.




FCB Anchor Layout

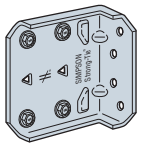
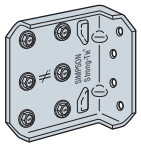
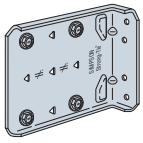
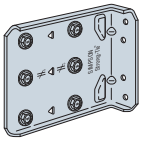
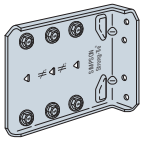
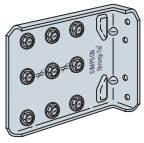
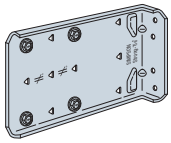
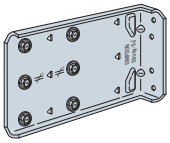
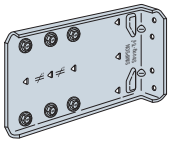
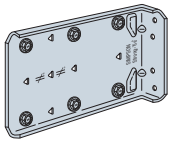
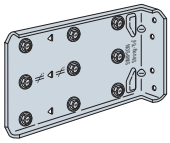
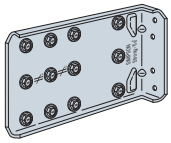
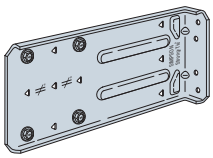
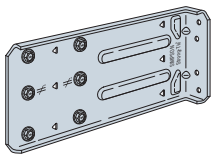
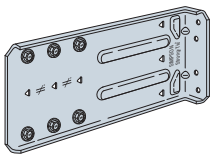
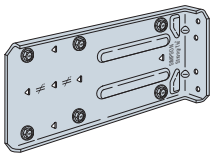
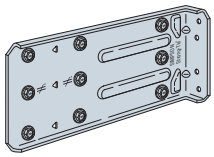
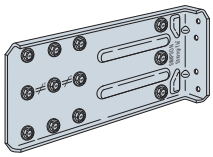
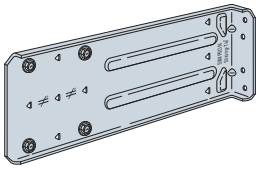
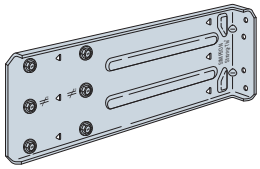
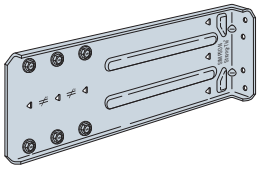
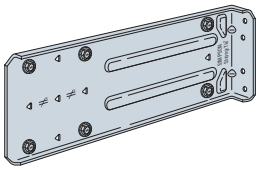
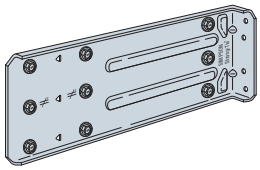
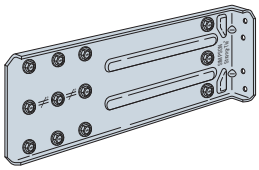
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# **FCB** Supplemental Information



The following FCB supplemental information is given to help Designers with value-engineered solutions for our FCB connectors. Loads are given for fastener patterns other than our standard "min." (fill all round holes) and "max." (fill all round and triangle holes). In addition, the tables give LRFD loads and loads for #10 screws as well as #12 screws.

## Table 1: FCB Screw Patterns

| | | | | | | |
|---|---|---|---|---|---|---|
| FCB43.5 | Pattern "Min." | Pattern "Max." | | | | |
| |  |  | | | | |
| FCB45.5 | Pattern "Min." | Pattern 1 | Pattern 2 | Pattern "Max." | | |
| |  |  |  |  | | |
| FCB47.5 | Pattern "Min." | Pattern 3 | Pattern 4 | Pattern 5 | Pattern 6 | Pattern "Max." |
| |  |  |  |  |  |  |
| FCB49.5 | Pattern "Min." | | Pattern 7 | | Pattern 8 | |
| |  | |  | |  | |
| | Pattern 9 | | Pattern 10 | | Pattern "Max." | |
| |  | |  | |  | |
| FCB411.5 | Pattern "Min." | | Pattern 11 | | Pattern 12 | |
| |  | |  | |  | |
| | Pattern 13 | | Pattern 14 | | Pattern "Max." | |
| |  | |  | |  | |

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# Footnotes for Tables 2, 3, 4 and 5

1. Calculated values are per AISI RP15-2, AISI S-100, or generally accepted industry standards. Shaded values for #12–14 screws are tabulated in this catalog and are based on testing per ICC-ES AC261. For #12–14 screws unshaded tabulated values are conservatively based on the maximum value from calculations and from the minimum (4-screw) tested values.
2. The tabulated values do not account for anchorage to the support. Anchor strength must be calculated separately and may reduce the capacity of the connection when compared to the tabulated values.
3. Tabulated values do not include shear, web crippling, buckling or other local effects in the member. The Designer must check member limit states separately.
4. For load combinations that include $F_1$ and/or $F_2$ and/or $F_3$, use an appropriate interaction equation.
5. #10–16 screws shall have $P_{ss} \geq 1{,}620$ lb. #12–14 screws shall have $P_{ss} \geq 2{,}520$. Calculated values are per AISI S-100. Screws must be installed with three (min.) exposed threads.
6. The number of screws listed is for one clip leg that is attached to the supported stud.
7. For the minimum screw pattern, fill all round holes. For the maximum screw pattern fill all round and triangle holes. Reference Table 1 on p. 50.
8. Reference p. 48 for load direction definitions.
9. In addition to calculations of net and gross section tension, and screw shear of the clip leg attached to the stud, $F_2$ values are also calculated for weak-axis bending of the anchored clip leg with the line of bending at the holes farthest from the bend radius of the angle. The Designer is responsible for calculating pull-over, pullout and tension strength of the anchors and this may reduce $F_2$ strength compared to the tabulated values.
10. $F_3$ values are computed using the plate buckling provisions of AISI RP15-2.
11. For the $F_4$ values it is assumed that all of the connection eccentricity is taken by screws in the supported stud. $F_4$ values are also limited by plate shear buckling per AISI RP15-2. The Designer is responsible for calculating the shear capacity of the anchorage which may reduce $F_4$ strength compared to the tabulated values.
12. In addition to the limit states given in notes 9, 10 and 11, $F_2$, $F_3$ and $F_4$ are also limited by screw shear according to the thinnest connected part of the connector and stud.
13. Where test data is not available, service load limits for $F_2$ and $F_3$ are not given since there are no generally accepted industry methods available to compute these values. Calculated $F_4$ service load limits are based on AISI Research Report RP15-2 for ⅛" deflection.
14. For 50 ksi studs, 68 mil (14 ga.) and thicker, use tabulated values for 54 mil (16 ga.) — 50 ksi studs.



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# **FCB** Supplemental Information



## Table 2: FCB Bypass Framing Fixed-Clip Connectors (FCB43.5, FCB45.5, FCB47.5 with #12–14 Screws) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #12 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| FCB43.5 | 4 | Min. | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,250 | 3,040 | 4,655 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 975 | 1,565 | 2,180 | 975 | 1,565 | 2,180 |
| | | | $F_4$ | 2,170 | 755 | 1,130 | 1,980 | 1,120 | 1,680 | 2,590 | 1,490 | 2,380 | 3,380 |
| | 6 | Max. | $F_2$ | 1,100 | 1,100 | 1,690 | 3,245 | 1,105 | 2,425 | 3,720 | 1,250 | 3,040 | 4,655 |
| | | | $F_3$ | 1,260 | 1,130 | 1,690 | 3,245 | 1,260 | 2,425 | 3,720 | 1,735 | 3,040 | 4,010 |
| | | | $F_4$ | 2,415 | 1,130 | 1,690 | 2,635 | 1,455 | 2,330 | 3,315 | 1,910 | 3,055 | 4,345 |
| FCB45.5 | 4 | Min. | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 975 | 1,565 | 2,180 | 975 | 1,565 | 2,180 |
| | | | $F_4$ | 1,225 | 755 | 1,130 | 1,720 | 945 | 1,515 | 2,150 | 1,325 | 2,120 | 3,015 |
| | 6 | 1 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 975 | 1,565 | 2,180 | 975 | 1,565 | 2,180 |
| | | | $F_4$ | 1,225 | 755 | 1,130 | 1,720 | 945 | 1,515 | 2,150 | 1,325 | 2,120 | 3,015 |
| | 6 | 2 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 975 | 1,565 | 2,180 | 975 | 1,565 | 2,180 |
| | | | $F_4$ | 1,225 | 755 | 1,130 | 1,720 | 945 | 1,515 | 2,150 | 1,325 | 2,120 | 3,015 |
| | 9 | Max. | $F_2$ | 1,100 | 1,100 | 2,025 | 2,880 | 1,105 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,260 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 1,735 | 2,870 | 4,010 |
| | | | $F_4$ | 2,570 | 1,180 | 1,890 | 2,685 | 1,485 | 2,375 | 3,380 | 1,925 | 3,080 | 4,380 |
| FCB47.5 | 4 | Min. | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,115 | 945 | 1,515 | 2,115 | 945 | 1,515 | 2,115 |
| | | | $F_4$ | 380 | 200 | 330 | 660 | 330 | 495 | 830 | 365 | 580 | 830 |
| | 6 | 3 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,115 | 945 | 1,515 | 2,115 | 945 | 1,515 | 2,115 |
| | | | $F_4$ | 380 | 260 | 390 | 775 | 380 | 575 | 1,060 | 380 | 585 | 1,060 |
| | 6 | 4 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,115 | 945 | 1,515 | 2,115 | 945 | 1,515 | 2,115 |
| | | | $F_4$ | 380 | 275 | 410 | 820 | 380 | 585 | 1,060 | 380 | 585 | 1,060 |
| | 6 | 5 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 785 | 1,275 | 2,550 | 945 | 1,515 | 2,550 | 945 | 1,515 | 2,550 |
| | | | $F_4$ | 465 | 385 | 580 | 1,155 | 575 | 860 | 1,720 | 900 | 1,385 | 2,520 |
| | 9 | 6 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,195 | 2,390 | 945 | 1,515 | 2,390 | 945 | 1,515 | 2,390 |
| | | | $F_4$ | 465 | 530 | 800 | 1,595 | 790 | 1,185 | 2,370 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | 1,100 | 1,100 | 2,025 | 2,880 | 1,105 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,260 | 1,360 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 1,735 | 2,870 | 3,780 |
| | | | $F_4$ | 1,875 | 705 | 1,060 | 2,120 | 1,060 | 1,575 | 3,155 | 1,445 | 2,310 | 3,440 |

See footnotes on p. 51.

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# FCB Supplemental Information



## Table 3: FCB Bypass Framing Fixed-Clip Connectors (FCB49.5, FCB411.5 with #12–14 Screws) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #12 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| FCB49.5 | 4 | Min. | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 945 | 1,565 | 2,180 | 945 | 1,565 | 2,180 |
| | | | $F_4$ | 380 | 170 | 255 | 510 | 255 | 380 | 760 | 365 | 580 | 830 |
| | 6 | 7 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 945 | 1,565 | 2,180 | 945 | 1,565 | 2,180 |
| | | | $F_4$ | 380 | 195 | 295 | 590 | 265 | 410 | 760 | 365 | 580 | 830 |
| | 6 | 8 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 2,180 | 945 | 1,565 | 2,180 | 945 | 1,565 | 2,180 |
| | | | $F_4$ | 380 | 210 | 315 | 630 | 265 | 410 | 760 | 365 | 580 | 830 |
| | 6 | 9 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 785 | 1,275 | 2,550 | 945 | 1,565 | 2,550 | 945 | 1,565 | 2,550 |
| | | | $F_4$ | 465 | 390 | 585 | 1,170 | 580 | 870 | 1,735 | 900 | 1,385 | 2,520 |
| | 9 | 10 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,195 | 2,390 | 945 | 1,565 | 2,390 | 945 | 1,565 | 2,390 |
| | | | $F_4$ | 465 | 555 | 835 | 1,670 | 830 | 1,240 | 2,485 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | 1,100 | 1,100 | 2,025 | 2,880 | 1,105 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,260 | 1,360 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 1,735 | 2,870 | 4,010 |
| | | | $F_4$ | 2,290 | 750 | 1,120 | 2,245 | 1,115 | 1,670 | 3,020 | 1,200 | 2,125 | 3,020 |
| FCB411.5 | 4 | Min. | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 1,720 | 920 | 1,470 | 1,720 | 920 | 1,470 | 1,720 |
| | | | $F_4$ | 380 | 140 | 210 | 415 | 205 | 310 | 620 | 365 | 580 | 830 |
| | 6 | 11 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 1,720 | 920 | 1,470 | 1,720 | 920 | 1,470 | 1,720 |
| | | | $F_4$ | 380 | 160 | 240 | 480 | 205 | 315 | 620 | 365 | 580 | 830 |
| | 6 | 12 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,130 | 1,720 | 920 | 1,470 | 1,720 | 920 | 1,470 | 1,720 |
| | | | $F_4$ | 380 | 170 | 255 | 510 | 205 | 315 | 620 | 365 | 580 | 830 |
| | 6 | 13 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 785 | 1,275 | 2,550 | 920 | 1,470 | 2,550 | 920 | 1,470 | 2,550 |
| | | | $F_4$ | 465 | 405 | 605 | 1,210 | 600 | 900 | 1,795 | 900 | 1,385 | 2,520 |
| | 9 | 14 | $F_2$ | 1,100 | 755 | 1,130 | 2,255 | 1,105 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,185 | 755 | 1,195 | 2,390 | 920 | 1,470 | 2,390 | 920 | 1,470 | 2,390 |
| | | | $F_4$ | 465 | 585 | 880 | 1,760 | 870 | 1,310 | 2,520 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | 1,100 | 1,100 | 2,025 | 2,880 | 1,105 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | $F_3$ | 1,260 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,645 | 1,735 | 2,870 | 3,645 |
| | | | $F_4$ | 2,290 | 795 | 1,195 | 2,390 | 860 | 1,780 | 3,020 | 860 | 2,125 | 3,020 |

See footnotes on p. 51.

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# **FCB** Supplemental Information



## Table 4: FCB Bypass Framing Fixed-Clip Connectors (FCB43.5, FCB45.5, FCB47.5 with #10–16 Screws) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| FCB43.5 | 4 | Min. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 440 | 715 | 1,430 | 440 | 715 | 1,430 | 440 | 715 | 1,430 |
| | | | $F_4$ | 465 | 340 | 515 | 1,025 | 530 | 795 | 1,585 | 900 | 1,385 | 2,520 |
| | 6 | Max. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 660 | 1,075 | 2,145 | 660 | 1,075 | 2,145 | 660 | 1,075 | 2,145 |
| | | | $F_4$ | 465 | 415 | 620 | 1,240 | 640 | 960 | 1,915 | 900 | 1,385 | 2,520 |
| FCB45.5 | 4 | Min. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 670 | 1,085 | 2,170 | 670 | 1,085 | 2,170 |
| | | | $F_4$ | 350 | 270 | 410 | 815 | 420 | 630 | 1,260 | 700 | 1,075 | 1,955 |
| | 6 | 1 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 625 | 1,015 | 2,035 | 625 | 1,015 | 2,035 | 625 | 1,015 | 2,035 |
| | | | $F_4$ | 350 | 350 | 525 | 1,055 | 545 | 815 | 1,630 | 700 | 1,075 | 1,955 |
| | 6 | 2 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 670 | 1,085 | 2,170 | 670 | 1,085 | 2,170 | 670 | 1,085 | 2,170 |
| | | | $F_4$ | — | 370 | 555 | 1,110 | 570 | 855 | 1,710 | 700 | 1,075 | 1,955 |
| | 9 | Max. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 625 | 1,015 | 2,035 | 625 | 1,015 | 2,035 | 625 | 1,015 | 2,035 |
| | | | $F_4$ | 350 | 460 | 690 | 1,380 | 700 | 1,065 | 1,955 | 700 | 1,075 | 1,955 |
| FCB47.5 | 4 | Min. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 455 | 735 | 1,470 | 455 | 735 | 1,470 | 455 | 735 | 1,470 |
| | | | $F_4$ | 175 | 195 | 290 | 580 | 300 | 450 | 895 | 380 | 585 | 1,060 |
| | 6 | 3 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 425 | 690 | 1,380 | 425 | 690 | 1,380 | 425 | 690 | 1,380 |
| | | | $F_4$ | 175 | 245 | 365 | 730 | 375 | 565 | 1,060 | 380 | 585 | 1,060 |
| | 6 | 4 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 455 | 735 | 1,470 | 455 | 735 | 1,470 | 455 | 735 | 1,470 |
| | | | $F_4$ | 175 | 260 | 390 | 775 | 380 | 585 | 1,060 | 380 | 585 | 1,060 |
| | 6 | 5 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 |
| | | | $F_4$ | 465 | 365 | 545 | 1,090 | 560 | 845 | 1,685 | 900 | 1,385 | 2,520 |
| | 9 | 6 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 500 | 750 | 1,505 | 775 | 1,165 | 2,325 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 620 | 930 | 1,855 | 900 | 1,385 | 2,520 | 900 | 1,385 | 2,520 |

See footnotes on p. 51.

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# FCB Supplemental Information



## Table 5: FCB Bypass Framing Fixed-Clip Connectors (FCB49.5, FCB411.5 w/ #10–16 Screws) — Service Load Limits and Strengths (lb.)

| Model | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| FCB49.5 | 4 | Min. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 360 | 585 | 1,175 | 360 | 585 | 1,175 | 360 | 585 | 1,175 |
| | | | $F_4$ | 115 | 150 | 225 | 450 | 230 | 345 | 690 | 265 | 410 | 745 |
| | 6 | 7 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 340 | 550 | 1,100 | 340 | 550 | 1,100 | 340 | 550 | 1,100 |
| | | | $F_4$ | 115 | 185 | 280 | 560 | 265 | 410 | 745 | 265 | 410 | 745 |
| | 6 | 8 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 360 | 585 | 1,175 | 360 | 585 | 1,175 | 360 | 585 | 1,175 |
| | | | $F_4$ | 115 | 200 | 295 | 595 | 265 | 410 | 745 | 265 | 410 | 745 |
| | 6 | 9 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 |
| | | | $F_4$ | 465 | 365 | 550 | 1,100 | 570 | 850 | 1,705 | 900 | 1,385 | 2,520 |
| | 9 | 10 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 525 | 790 | 1,575 | 810 | 1,220 | 2,435 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 655 | 985 | 1,965 | 900 | 1,385 | 2,520 | 900 | 1,385 | 2,520 |
| FCB411.5 | 4 | Min. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 210 | 320 | 375 | 210 | 320 | 375 | 210 | 320 | 375 |
| | | | $F_4$ | 90 | 120 | 180 | 365 | 190 | 280 | 565 | 205 | 315 | 575 |
| | 6 | 11 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 210 | 320 | 375 | 210 | 320 | 375 | 210 | 320 | 375 |
| | | | $F_4$ | 90 | 150 | 225 | 450 | 205 | 315 | 575 | 205 | 315 | 575 |
| | 6 | 12 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 210 | 320 | 375 | 210 | 320 | 375 | 210 | 320 | 375 |
| | | | $F_4$ | 90 | 160 | 240 | 480 | 205 | 315 | 575 | 205 | 315 | 575 |
| | 6 | 13 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 |
| | | | $F_4$ | 465 | 380 | 570 | 1,140 | 585 | 880 | 1,760 | 900 | 1,385 | 2,520 |
| | 9 | 14 | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 555 | 830 | 1,660 | 855 | 1,285 | 2,520 | 900 | 1,385 | 2,520 |
| | 12 | Max. | $F_2$ | — | 490 | 735 | 815 | 490 | 735 | 815 | 490 | 735 | 815 |
| | | | $F_3$ | — | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 | 735 | 1,195 | 2,390 |
| | | | $F_4$ | 465 | 695 | 1,045 | 2,090 | 900 | 1,385 | 2,520 | 900 | 1,385 | 2,520 |

See footnotes on p. 51.

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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 (mil 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 pp. 12–16

## Specification Example:

**Quantity:** XX pieces

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

Drawing must be fully dimensioned, including:

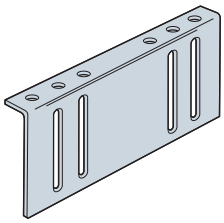
- Overall dimensions
- Leg dimensions
- Bend angles (if required)
- Hole/slot sizes and centerlines (if required)

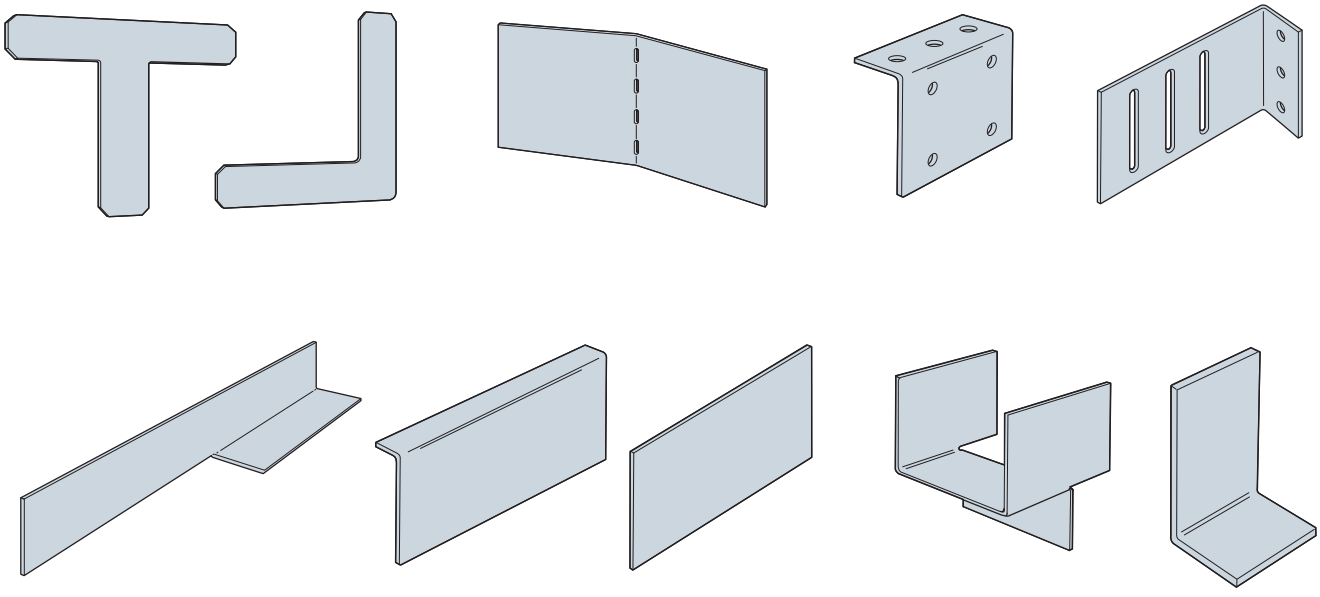
**Material Specification:** Contact Simpson Strong-Tie for availability

**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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# **FC** Bypass Framing Fixed-Clip Connector



Ideal for high-seismic areas, Simpson Strong-Tie® FC connectors are the optimal solution for fixed-clip bypass framing. FC clips are often welded to the structure in high-seismic zones, but they also feature anchorage holes so that concrete screws or powder-actuated fasteners can be used to attach the clip to the structure. In addition to its anchorage versatility, the FC clip features prepunched screw holes for the framing attachment, eliminating the need for predrilling holes or worrying that fastener placement doesn't match the Designer specifications. FC connectors are manufactured using heavy-duty 10- and 12-gauge steel to provide exceptional resistance to in-plane seismic load.

**Features:**

- The clips come in lengths of 3½", 6" and 8" and are intended to be used with 3⅝", 6" and 8" studs, respectively
- The maximum stand-off distance is 1" for 3⅝" studs and 1½" for 6" and 8" studs
- Embossments in the bend line provide increased strength and stiffness in the $F_1$ and $F_2$ load directions, but are positioned towards the center of the clip so that 1½"-long welds can be applied at the top and bottom of the clip
- Prepunched large-diameter anchor holes accommodate ¼"-diameter concrete screws like the Simpson Strong-Tie Titen HD® screw anchor
- Prepunched small-diameter anchor holes accommodate powder-actuated fasteners like the 0.157"-diameter Simpson Strong-Tie PDPAT or #12 self-drilling Simpson Strong-Tie Strong-Drive® XL Large-Head Metal screw

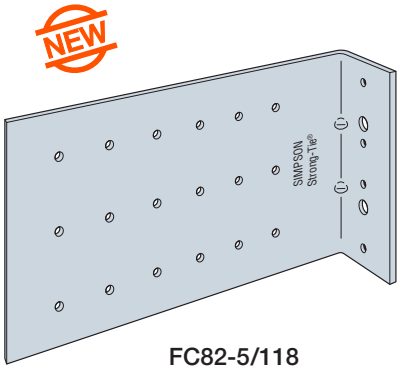
**Material:** 50 ksi

**Finish:** Galvanized (G90)

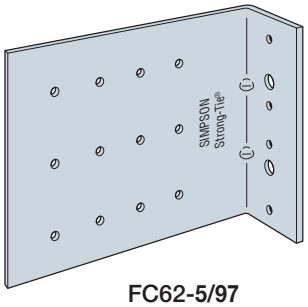
**Installation:**

- Use the specified type and number of fasteners and anchors

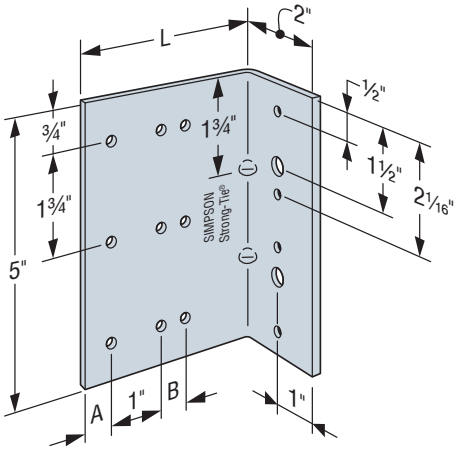
**Codes:** See p. 11 for Code Reference Key Chart




**FC82-5/118**




**FC62-5/97**
*(FC62-5/118 similar)*




**FC32-5/97**

## Ordering Information and Dimensions

| Model No. | Ordering SKU | Thickness mil (ga.) | L (in.) | A (in.) | B (in.) |
|---|---|---|---|---|---|
| FC32-5/97 | FC32-5/97-KT25 | 97 (12) | 3½ | ½ | ½ |
| FC62-5/97 | FC62-5/97-KT25 | 97 (12) | 6 | 1 | 1 |
| FC62-5/118 | FC62-5/118-KT25 | 118 (10) | 6 | 1 | 1 |
| FC82-5/118 | FC82-5/118-KT25 | 118 (10) | 8 | 1 | 1 |

**Note:** Each box contains (25) connectors.

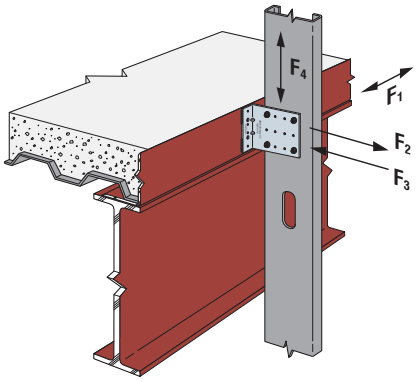
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# **FC** Bypass Framing Fixed-Clip Connector

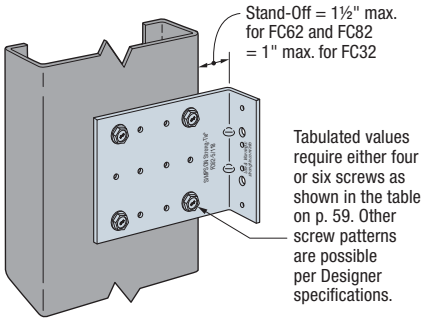


## FC Allowable Connector Loads (lb.)

| Model No. | Stud Thickness mil (ga.) | Fasteners to Stud | | Allowable Load | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | | Allowable Pullout Per Single #10 Screw | No. of #10 Self-Drilling Screws | $F_1$ | | $F_2$ | $F_3$ | $F_4$ | |
| | | | | 1" Stand-Off | 1½" Stand-Off | | | | |
| FC32-5/97 | 33 (20) | 85 | 4 | 165 | — | 705 | 1,130 | 705 | 170 |
| | | | 6 | 225 | — | 1,060 | 1,355 | 1,060 | |
| FC62-5/97 | | | 4 | 115 | 130 | 705 | 1,130 | 705 | |
| | | | 6 | 140 | 160 | 1,060 | 1,355 | 1,060 | |
| FC62-5/118 | | | 4 | 115 | 130 | 705 | 1,130 | 705 | |
| | | | 6 | 140 | 160 | 1,060 | 1,355 | 1,060 | |
| FC82-5/118 | | | 4 | 105 | 120 | 705 | 1,130 | 705 | |
| | | | 6 | 135 | 155 | 1,060 | 1,355 | 1,060 | |
| FC32-5/97 | 43 (18) | 110 | 4 | 215 | — | 1,050 | 1,470 | 1,050 | |
| | | | 6 | 290 | — | 1,580 | 1,765 | 1,580 | |
| FC62-5/97 | | | 4 | 150 | 175 | 1,050 | 1,470 | 1,050 | |
| | | | 6 | 185 | 215 | 1,580 | 1,765 | 1,580 | |
| FC62-5/118 | | | 4 | 150 | 175 | 1,050 | 1,470 | 1,050 | |
| | | | 6 | 185 | 215 | 1,580 | 1,765 | 1,580 | |
| FC82-5/118 | | | 4 | 140 | 160 | 1,050 | 1,470 | 1,050 | |
| | | | 6 | 175 | 200 | 1,580 | 1,765 | 1,580 | |
| FC32-5/97 | 54 (16) | 200 | 4 | 395 | — | 2,135 | 2,885 | 2,045 | |
| | | | 6 | 530 | — | 2,690 | 2,885 | 2,195 | |
| FC62-5/97 | | | 4 | 325 | 375 | 2,135 | 2,885 | 2,045 | |
| | | | 6 | 405 | 465 | 2,690 | 2,885 | 2,195 | |
| FC62-5/118 | | | 4 | 345 | 395 | 2,135 | 2,885 | 2,045 | |
| | | | 6 | 370 | 425 | 3,205 | 2,885 | 2,195 | |
| FC82-5/118 | | | 4 | 325 | 375 | 2,135 | 2,885 | 2,045 | |
| | | | 6 | 440 | 505 | 3,205 | 2,885 | 2,195 | |
| FC32-5/97 | 68 (14) | 250 | 4 | 495 | — | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 670 | — | 2,690 | 2,885 | 2,195 | |
| FC62-5/97 | | | 4 | 435 | 500 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 465 | 535 | 2,690 | 2,885 | 2,195 | |
| FC62-5/118 | | | 4 | 435 | 500 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 465 | 535 | 3,240 | 3,780 | 2,195 | |
| FC82-5/118 | | | 4 | 410 | 470 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 555 | 640 | 3,240 | 3,780 | 2,195 | |
| FC32-5/97 | 97 (12) | 355 | 4 | 710 | — | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 955 | — | 2,690 | 2,885 | 2,195 | |
| FC62-5/97 | | | 4 | 775 | 775 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 1295 | 1295 | 2,690 | 2,885 | 2,195 | |
| FC62-5/118 | | | 4 | 775 | 775 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 1150 | 1150 | 3,240 | 3,780 | 2,195 | |
| FC82-5/118 | | | 4 | 585 | 585 | 2,160 | 2,885 | 2,045 | |
| | | | 6 | 790 | 790 | 3,240 | 3,780 | 2,195 | |




**Typical FC Installation at Bypass Framing**




**FC62 with Four Screws**

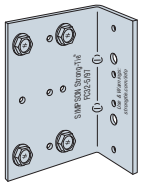
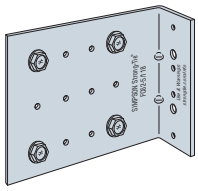
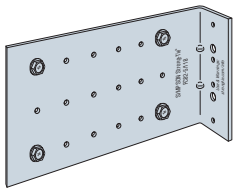
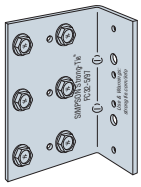
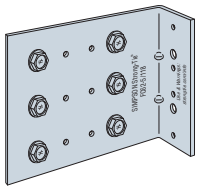
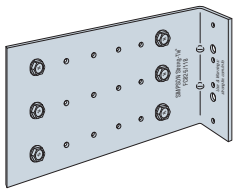
1. For additional important information, see General Information on pp. 14–16.
2. FC Allowable Connector Loads are also limited by the FC Anchorage Load tables on pp. 59 and 60. Use the minimum tabulated values from the connector and anchorage load tables as applicable.
3. See illustrations on p. 59 for screw fastener placement to stud framing.
4. Tabulated $F_1$ loads are based on assembly tests with the load through the centerline of stud. Tested failure modes were due to screw pullout; therefore compare $F_1$ against $F_p$ calculated per ASCE 7-10 Chapter 13 with $a_p = 1.25$ and $R_p = 1.0$.
5. $F_1$ loads are based on maximum stand-off distances of 1" or 1½" as shown. Other loads are applicable to a 1" stand-off for FC32 and 1" or 1½" stand-off for FC62 and FC82.
6. The allowable plastic moment at the bend line in the $F_1$ load direction for 97 mil (12 ga.) and 118 mil (10 ga.) FC connectors are 395 in.-lb. and 675 in.-lb., respectively.

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# FC Bypass Framing Fixed-Clip Connector



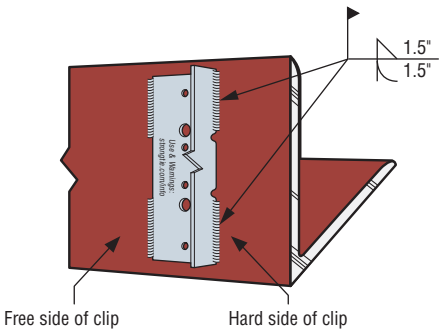
## FC Screw Patterns

| Screw Pattern | Models | | |
|---|---|---|---|
| | FC32-5/97 | FC62-5/97 and FC62-5/118 | FC82-5/118 |
| 4 screws |  |  |  |
| 6 screws |  |  |  |

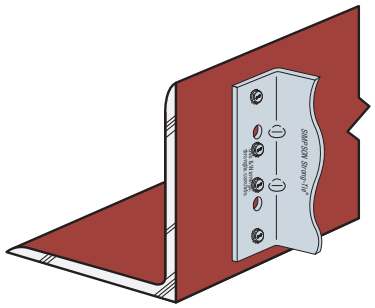
## FC Allowable Anchorage Loads to Steel (lb.)

| Anchorage Type | Minimum Base Material | No. of Anchors | Allowable Load | | |
|---|---|---|---|---|---|
| | | | $F_1$ | $F_2$ and $F_3$ | $F_4$ |
| #12 self-drilling screws Simpson Strong-Tie® X Metal screws XQ1B1214, X1B1214 | A36 steel 3⁄16" thick | 4 | — | 2,070 | 2,200 |
| #12–24 x 1¼" Strong-Drive® XL Large-Head Metal screws XLQ114T1224, XLQ114B1224 | A36 steel 3⁄16" thick | 4 | — | 2,545 | 2,545 |
| #14 self-drilling screws Simpson Strong-Tie E Metal screws E1B1414 | A36 steel 3⁄16" thick | 4 | — | 2,620 | 2,610 |
| Simpson Strong-Tie 0.157" x 5⁄8" powder-actuated fasteners PDPAT-62KP | A36 steel 3⁄16" thick | 4 | — | 1,040 | 1,040 |
| Simpson Strong-Tie 0.157" x 5⁄8" powder-actuated fasteners PDPAT-62KP | A572 Gr. 50 or A992 steel 3⁄16" thick | 4 | — | 1,710 | 1,710 |
| Welded E70XX electrodes | A36 steel 3⁄16" thick | Hard side: 3"<br>Free side: 3" | 2,040 | 3,710 | 4,330 |

1. For additional important information, see General Information on p. 16.
2. Allowable anchorage loads are also limited by the FC Connector Load table on p. 58. Use the minimum tabulated values from the connector and anchorage load tables as applicable.
3. Allowable loads for #12–24 self-drilling screws and PDPAT powder-actuated fasteners are based on installation in minimum 3⁄16" thick structural steel with $F_y$ = 36 ksi. PDPAT values are also provided for A572 steel. Values listed above maybe used where other thicknesses of steel are encountered provided that the fastener has equal or better tested values into thicker steel (see p. 16). It is the responsibility of the Designer to select the proper length fasteners based on the steel thickness installation.
4. For screw fastener installation into steel backed by concrete, predrilling of both the steel and the concrete is suggested. For predrilling, use a maximum 3⁄16"-diameter drill bit.




Weld Anchorage



PAF Anchorage

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# FC Bypass Framing Fixed-Clip Connector

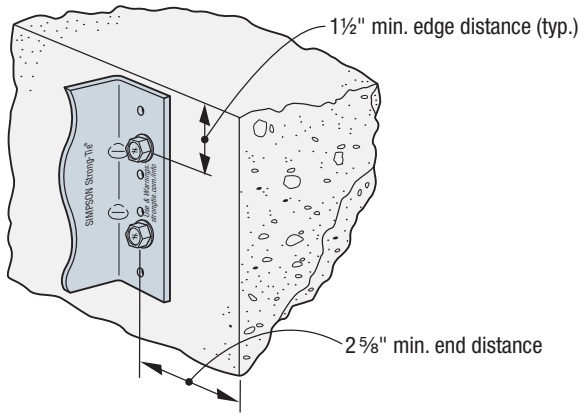


## Allowable Titen HD® Anchorage Loads into Concrete with FC Clip (lb.)

| Simpson Strong-Tie® ¼" Titen HD® Screw Anchor | Nominal Embedment (in.) | Anchor Quantity and Size | $f'_c$ (psi) | Load Direction | Wind and Seismic in SDC A&B | | Seismic in SDC C through F |
|---|---|---|---|---|---|---|---|
| | | | | | Uncracked Concrete | Cracked Concrete | Cracked Concrete[6] |
| THDB25178H | 1⅝ | (2) ¼" x 1⅞" | 3,000 | $F_1$ | 335 | 240 | 280 |
| | | | | $F_2$ and $F_3$ | 660 | 630 | 550 |
| | | | | $F_4$ | 565 | 405 | 470 |
| | | | 4,000 | $F_1$ | 390 | 280 | 325 |
| | | | | $F_2$ and $F_3$ | 760 | 725 | 635 |
| | | | | $F_4$ | 655 | 465 | 545 |
| THDB25234H | 2½ | (2) ¼" x 2¾" | 3,000 | $F_1$ | 370 | 265 | 310 |
| | | | | $F_2$ and $F_3$ | 475 | 695 | 610 |
| | | | | $F_4$ | 515 | 445 | 520 |
| | | | 4,000 | $F_1$ | 430 | 305 | 360 |
| | | | | $F_2$ and $F_3$ | 550 | 805 | 705 |
| | | | | $F_4$ | 590 | 515 | 600 |

1. Allowable anchor capacities have been determined using ACI 318-14 Appendix D calculations with a minimum concrete compressive strength ($f'_c$) of 3,000 and 4,000 psi in normal-weight concrete. Tabulated values shall be multiplied by a factor ($\lambda_a$) of 0.6 for sand light-weight concrete.
2. Edge distance is assumed to be 1½", and end distance is 2⅝".
3. Load values are for group anchors based on ACI 318, condition B, load factors from ACI 318-14 Section 5.3, no supplement edge reinforcement, $\psi_c$, v = 1.0 for cracked concrete and periodic special inspection.
4. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha ($\alpha$), of 0.70 for seismic load and 0.6 for wind loads. ASD values for other combinations may be determined using alternate conversion factors.
5. 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 and B only.
6. Design loads shall include the over-strength factor per ASCE7 Section 12.4.3. For fasteners in exterior wall connection systems, $\Omega_o$ = 1.5 per Table 13.5-1.
7. Allowable loads for $F_4$ are based on the governing loading direction which is toward the edge of slab.
8. Allowable loads for $F_1$ are based on the governing loading direction which is toward the end of slab.
9. For anchor subjected to both tension and shear loads, it shall be designed to satisfy the following:
   - For $N_a / N_{all} \le 0.2$, the full allowable load in shear is permitted.
   - For $V_a / V_{all} \le 0.2$, the full allowable load in tension is permitted.
   - For all other cases: $N_a / N_{all} + V_a / V_{all} \le 1.2$ where:

   $N_a$ = Applied ASD tension load
   $N_{all}$ = Allowable $F_2$ or $F_3$ load from the FC Allowable Anchorage Loads for Concrete table
   $V_a$ = Applied ASD shear load
   $V_{all}$ = Allowable $F_4$ or $F_1$ load from the FC Allowable Anchorage Loads for Concrete table
10. Tabulated allowable loads are based on anchorage only. The capacity of the connection system shall be the minimum of the allowable anchorage load and the FC Allowable Connector Loads.




Titen HD® Anchorage

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# **FSB** Bypass Framing Fixed-Clip Strut Connector



The FSB connector is the fixed-clip version of our popular SSB slide-clip strut connector. The FSB is commonly used at the bottom flange of a steel beam to accommodate large stand-off distances for bypass curtain-wall studs.

**Material:** 54 mil (16 ga.)

**Finish:** Galvanized (G90)

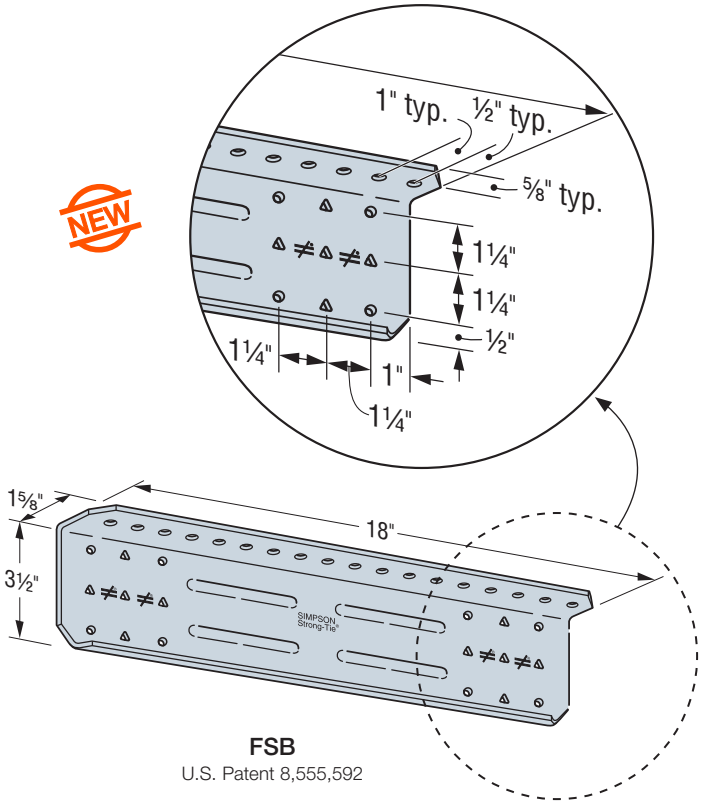
**Installation:**

- Use the specified type and number of anchors.
- Use the specified type and number of screw fasteners to the stud.
- If the FSB intrudes on interior space, it can be trimmed. The trimmed part shall allow an edge distance of ½" or greater from the center of the nearest anchor to the end of the trimmed part.

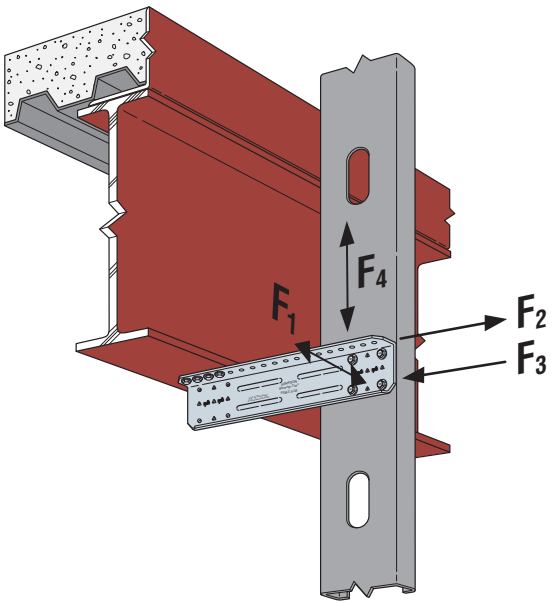
**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

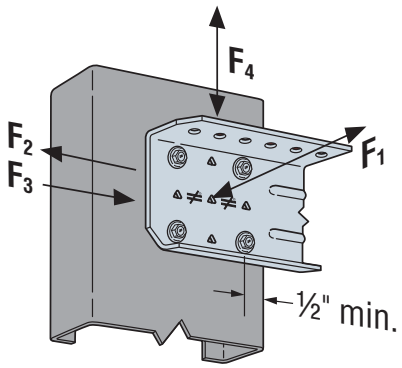
FSB3.518-R25 is a box of 25 connectors.




**FSB**
U.S. Patent 8,555,592




Typical FSB3.518 Installation




FSB Installation with the Min. Number of Fasteners

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# **FSB** Bypass Framing Fixed-Clip Strut Connector



## FSB Allowable Connector Loads (lb.)

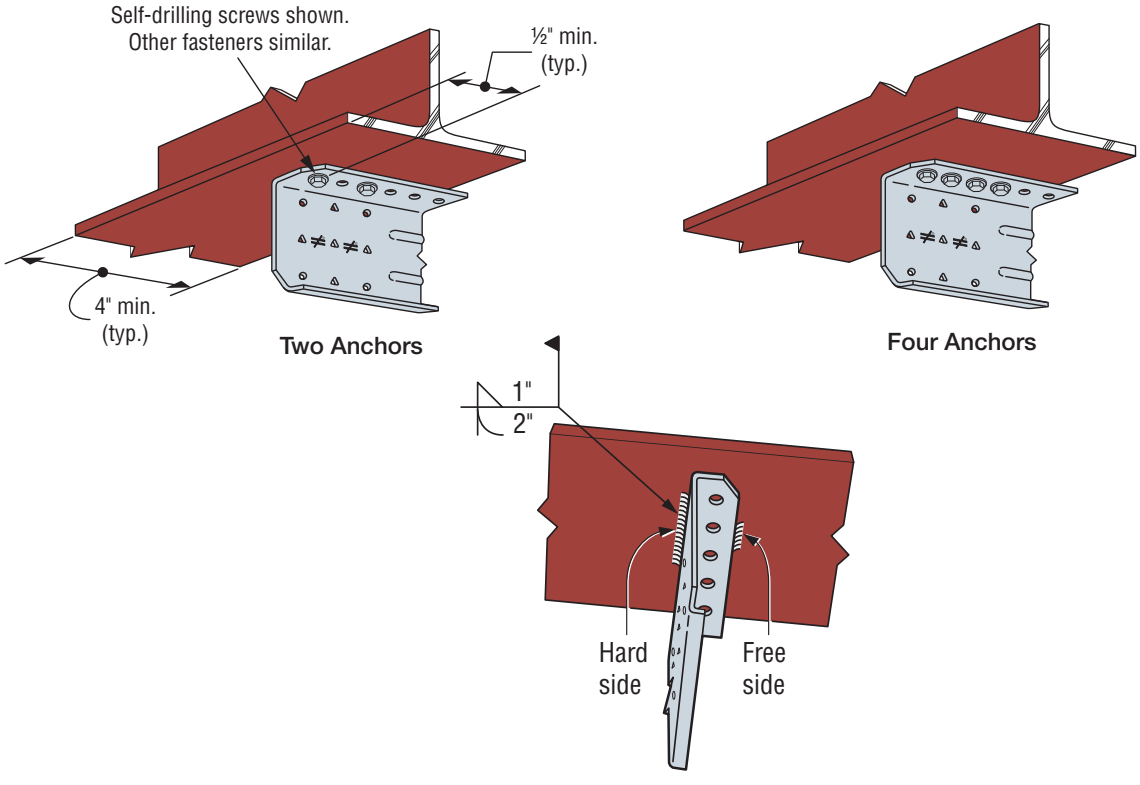
| Model No. | Connector Material Thickness mil (ga.) | Min./ Max. | No. of #10–16 Screws | Stud Thickness | | | | | | | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 33 mil (20 ga.) | | | | 43 mil (18 ga.) | | | | 54 mil (16 ga.) | | | | |
| | | | | $F_1$[4] | $F_2$ | $F_3$ | $F_4$[5] | $F_1$[4] | $F_2$ | $F_3$ | $F_4$[5] | $F_1$[4] | $F_2$ | $F_3$ | $F_4$[5] | |
| FSB3.518 | 54 (16) | Min. | 4 | 120 | 705 | 705 | 160 | 150 | 1,050 | 1,050 | 210 | 200 | 1,670 | 1,615 | 210 | 170 |
| | | Max. | 9 | 155 | 1,590 | 1,340 | 160 | 200 | 2,365 | 2,180 | 210 | 270 | 2,670 | 2,180 | 260 | |

1. For additional important information, see General Information pp. 14–16.
2. FSB Allowable Connector Loads are also limited by the FSB Allowable Anchorage Loads table. Use the minimum value from the connector and anchorage load tables as applicable.
3. Min. fasteners quantity and tabulated values — fill round holes; max. fasteners quantity and tabulated values — fill round and triangle holes.
4. Allowable $F_1$ 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 more extensive treatment of in-plane loads please refer to Simpson Strong-Tie® engineering letter L-CF-CWCF1DIR at **strongtie.com**.
5. Tabulated $F_4$ values are controlled by ⅛" deformation limit. The connector strength load in the $F_4$ direction is 550 lb.

## FSB Allowable Anchorage Loads (lb.)

| Anchorage Type | No. of Anchors | $F_1$ | $F_2$ and $F_3$ | $F_4$ |
|---|---|---|---|---|
| #12–24 self-drilling screws | 2 | 270 | 1,250 | 550 |
| | 4 | 270 | 2,500 | 550 |
| Simpson Strong-Tie® 0.145" PDPT or 0.157" PDPAT powder-actuated fasteners | 2 | — | 820 | — |
| | 4 | 270 | 1,640 | 550 |
| Welded | Hard side: 2" | 270 | 2,455 | 550 |
| | Free side: 1" | | | |

1. Allowable loads for #12–24 self-drilling screws and PDPT powder-actuated fasteners are based on installation in minimum ⅜" thick structural steel with $F_y$ = 36 ksi. It is the responsibility of the Designer to select the proper length fasteners.
2. Allowable loads for welded connections require E70XX electrodes with a minimum throat size equal to the clip thickness. Welding shall comply with AWS D1.3. Welding galvanized steel may produce harmful fumes; follow proper welding procedures and precautions.
3. Allowable loads are for anchorage only. It is the responsibility of the Designer to verify the strength and stability of the structure for loads imposed by the cold-formed steel framing connections.




FSB Anchor Layout

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# Supplemental Information for Slide-Clip and Rigid Connector



## Does your project require DoD-compliant blast design?

Although Allowable Strength Design (ASD) is widely used by Designers of Cold-Formed Steel (CFS) construction, some projects require additional connector limit states beyond the typical ASD values that are normally tabulated in our load tables. For example, many Department of Defense (DoD) projects require blast design of exterior wall framing and connections. Such projects may require the LRFD strength or nominal strength for the blast calculations. For a more comprehensive background on blast design please reference the Simpson Strong-Tie® Structural Engineering Blog at **seblog.strongtie.com** and enter the search term "DoD".

Not finding what you need? Please contact Simpson Strong-Tie.



## Table 1: SCB/MSCB Bypass Framing Slide-Clip Connector — Service Load Limits, LRFD Design Strengths and Nominal Strengths

| Model No. | Dimensions (in.) | | No. of #14 Shldr. Screws | Load Dir. | Stud Thickness | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) | | | 43 mil (18 ga.) | | | 54 mil (16 ga.) | | | 68 mil (14 ga.) | | |
| | L | S | | | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) |
| SCB43.5 | 3½ | 1½ | 2 | $F_2$ | 860 | 830 | 1,180 | 975 | 975 | 1,475 | 990 | 1,215 | 1,795 | 990 | 1,215 | 1,795 |
| | | | | $F_3$ | 1,260 | 830 | 1,180 | 1,260 | 1,105 | 1,570 | 1,260 | 1,565 | 2,180 | 1,260 | 1,565 | 2,180 |
| SCB45.5 | 5½ | 2 | 2 | $F_2$ | 860 | 785 | 1,115 | 975 | 975 | 1,475 | 990 | 1,215 | 1,795 | 990 | 1,215 | 1,795 |
| | | | | $F_3$ | 1,260 | 830 | 1,180 | 1,260 | 1,105 | 1,570 | 2,360 | 1,565 | 2,180 | 2,360 | 1,565 | 2,180 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 975 | 1,605 | 2,280 | 990 | 2,205 | 3,135 | 990 | 2,205 | 3,135 |
| | | | | $F_3$ | 1,260 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 1,260 | 2,025 | 2,825 | 1,260 | 2,025 | 2,825 |
| MSCB45.5 | 5½ | 2 | 2 | $F_2$ | 860 | 785 | 1,115 | 990 | 1,245 | 1,770 | 1,055 | 1,855 | 2,640 | 1,195 | 1,920 | 2,730 |
| | | | | $F_3$ | 1,260 | 830 | 1,180 | 1,260 | 1,105 | 1,570 | 2,210 | 1,925 | 2,685 | 2,195 | 2,360 | 2,760 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 1,105 | 1,715 | 2,435 | 1,220 | 2,570 | 3,655 | 1,365 | 2,575 | 3,660 |
| | | | | $F_3$ | 1,260 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 2,910 | 3,090 | 3,610 | 2,910 | 3,090 | 3,610 |
| SCB47.5 | 7½ | 4 | 2 | $F_2$ | 860 | 785 | 1,115 | 975 | 975 | 1,475 | 990 | 1,215 | 1,795 | 990 | 1,215 | 1,795 |
| | | | | $F_3$ | 1,260 | 830 | 1,180 | 1,260 | 1,105 | 1,570 | 2,260 | 1,515 | 2,115 | 2,260 | 1,515 | 2,115 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 975 | 1,605 | 2,280 | 990 | 2,205 | 3,135 | 990 | 2,205 | 3,135 |
| | | | | $F_3$ | 1,260 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 2,750 | 2,025 | 2,825 | 2,750 | 2,025 | 2,825 |
| MSCB47.5 | 7½ | 4 | 2 | $F_2$ | 860 | 785 | 1,115 | 990 | 1,245 | 1,770 | 1,055 | 1,855 | 2,640 | 1,195 | 1,920 | 2,730 |
| | | | | $F_3$ | 1,260 | 830 | 1,180 | 1,260 | 1,105 | 1,570 | 2,210 | 1,925 | 2,685 | 2,195 | 2,360 | 2,760 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 1,105 | 1,715 | 2,435 | 1,220 | 2,570 | 3,655 | 1,365 | 2,575 | 3,660 |
| | | | | $F_3$ | 1,260 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 2,910 | 3,090 | 3,610 | 2,910 | 3,090 | 3,610 |
| SCB49.5 | 9½ | 6 | 2 | $F_2$ | 860 | 785 | 1,115 | 975 | 1,105 | 1,570 | 990 | 1,215 | 1,795 | 990 | 1,215 | 1,795 |
| | | | | $F_3$ | 860 | 830 | 1,180 | 860 | 1,105 | 1,570 | 2,295 | 1,565 | 2,180 | 2,295 | 1,565 | 2,180 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 975 | 1,605 | 2,280 | 990 | 2,205 | 3,135 | 990 | 2,205 | 3,135 |
| | | | | $F_3$ | 860 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 2,620 | 2,025 | 2,710 | 2,620 | 2,025 | 2,710 |
| SCB411.5 | 11½ | 8 | 2 | $F_2$ | 860 | 785 | 1,115 | 860 | 1,105 | 1,570 | 990 | 1,690 | 2,405 | 990 | 1,690 | 2,405 |
| | | | | $F_3$ | 860 | 830 | 1,180 | 860 | 1,105 | 1,570 | 1,890 | 1,470 | 1,720 | 1,890 | 1,470 | 1,720 |
| | | | 3 | $F_2$ | 860 | 1,080 | 1,535 | 860 | 1,605 | 2,280 | 990 | 2,205 | 3,135 | 990 | 2,205 | 3,135 |
| | | | | $F_3$ | 860 | 1,080 | 1,535 | 1,260 | 1,605 | 2,280 | 2,335 | 2,025 | 2,375 | 2,335 | 2,025 | 2,375 |

1. Tabulated values are for the connector and attachment to the stud-wall framing. The assembly strengths are the minimum of those listed and the anchorage values listed in Table 5 on p. 66.
2. Service Load Limit is the load at ⅛" deflection for use in evaluating the performance under service-level loads.
3. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, $\phi$.
4. Nominal Strength is defined in AISI S100-07.

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## Table 2: SCW Head-of-Wall Slide-Clip Connector — Service Load Limits, LRFD Design Strengths and Nominal Strengths

| Model No. | W (in.) | No. of #14 Shldr. Screws | Load Direction | Stud Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 33 mil (20 ga.) | | | 43 mil (18 ga.) | | | 54 mil (16 ga.) | | |
| | | | | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) |
| SCW3.25 | 3¼ | 2 | $F_4$ | 935 | 730 | 865 | 1,030 | 1,010 | 1,175 | 1,095 | 1,200 | 1,680 |
| SCW5.5 | 5½ | 2 | $F_4$ | 1,125 | 730 | 1,020 | 1,655 | 1,010 | 1,580 | 1,950 | 1,590 | 2,220 |
| | | 3 | $F_4$ | 1,125 | 730 | 1,020 | 1,655 | 1,010 | 1,580 | 2,630 | 1,950 | 2,725 |

1. Tabulated values are for the connector and attachment to the stud-wall framing. The assembly strengths are the minimum of those listed and the anchorage values listed in Table 6 on p. 67.
2. Service Load Limit is the load at ⅛" deflection for use in evaluating the performance under service-level loads.
3. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, ϕ.
4. Nominal Strength is defined in AISI S100-07.

## Table 3A: SSB Bypass Framing Slide-Clip Strut Connector — Service Load Limits, LRFD Design Strengths and Nominal Strengths

| Model No. | No. of #14 Shldr. Screws | Load Direction | Stud Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 33 mil (20 ga.) | | | 43 mil (18 ga.) | | | 54 mil (16 ga.) | | |
| | | | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) |
| SSB3.518 | 2 | $F_2$ | 1,085 | 830 | 1,185 | 1,220 | 1,105 | 1,570 | 1,830 | 1,715 | 2,440 |
| | | $F_3$ | 1,085 | 830 | 1,185 | 1,220 | 1,105 | 1,570 | 2,240 | 1,540 | 2,150 |
| | 3 | $F_2$ | 1,815 | 1,305 | 1,855 | 1,500 | 1,650 | 2,345 | 1,365 | 2,140 | 3,280 |
| | | $F_3$ | 1,815 | 1,305 | 1,855 | 2,650 | 1,730 | 2,415 | 2,915 | 1,960 | 3,050 |

See footnotes below.

## Table 3B: FSB Bypass Framing Fixed-Clip Connector — Service Load Limits, LRFD Design Strengths and Nominal Strengths

| Model No. | No. of #10–16 Screws | Load Direction | Stud Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 33 mil (20 ga.) | | | 43 mil (18 ga.) | | | 54 mil (16 ga.) | | |
| | | | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) |
| FSB3.518 | 4 | $F_2$ | 1,850 | 1,060 | 2,115 | 2,540 | 1,575 | 3,150 | 3,165 | 2,670 | 4,090 |
| | | $F_3$ | 2,045 | 1,060 | 2,115 | 2,855 | 1,575 | 3,150 | 3,405 | 2,585 | 3,965 |
| | | $F_4$ | 160 | 875 | 1,285 | 210 | 875 | 1,285 | 210 | 875 | 1,285 |
| | 9 | $F_2$ | 2,815 | 2,385 | 4,770 | 3,900 | 3,550 | 7,095 | 4,170 | 4,090 | 6,075 |
| | | $F_3$ | 2,515 | 2,140 | 2,420 | 3,820 | 3,485 | 4,130 | 3,955 | 3,485 | 4,130 |
| | | $F_4$ | 160 | 875 | 1,285 | 210 | 875 | 1,285 | 260 | 875 | 1,285 |

1. Tabulated values are for the connector and attachment to the stud-wall framing. The assembly strengths are the minimum of those listed and the anchorage values listed in Table 5A and 5B on p. 66.
2. Service Load Limit is the load at ⅛" deflection for use in evaluating the performance under service-level loads.
3. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, ϕ.
4. Nominal Strength is defined in AISI S100-07.

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# Supplemental Information for Slide-Clip and Rigid Connector



## Table 4: FCB Bypass Framing Fixed-Clip Connector — Service Load Limits, LRFD Design Strengths and Nominal Strengths

| Model No. | Dimensions (in.) | | | Min. or Max. | No. of #12–14 Self-Drilling Screws | Load Direction | Stud Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 33 mil (20 ga.) | | | 43 mil (18 ga.) | | | 54 mil (16 ga.) | | |
| | L | $S_{min}$ | $S_{max}$ | | | | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) | Service Load Limit (lb.) | LRFD Design Strength (lb.) | Nominal Strength (lb.) |
| FCB43.5 | 3½ | 1½ | 1½ | Min. | 4 | F2 | 1,100 | 1,130 | 2,255 | 1,120 | 1,680 | 3,360 | 1,250 | 3,040 | 4,655 |
| | | | | | | F3 | 1,185 | 1,130 | 2,180 | 1,185 | 1,565 | 2,180 | 1,185 | 1,565 | 2,180 |
| | | | | | | F4 | 2,170 | 1,130 | 1,980 | 2,515 | 1,680 | 2,590 | 3,360 | 2,380 | 3,380 |
| | | | | Max. | 6 | F2 | 1,100 | 1,690 | 3,245 | 1,120 | 2,425 | 3,720 | 1,250 | 3,040 | 4,655 |
| | | | | | | F3 | 1,260 | 1,690 | 3,245 | 1,260 | 2,425 | 3,720 | 3,365 | 3,040 | 4,010 |
| | | | | | | F4 | 2,415 | 1,690 | 2,635 | 2,860 | 2,330 | 3,315 | 2,865 | 3,055 | 4,345 |
| FCB45.5 | 5½ | 2 | 2 | Min. | 4 | F2 | 1,100 | 1,130 | 2,255 | 1,120 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,185 | 1,130 | 2,180 | 1,185 | 1,565 | 2,180 | 1,185 | 1,565 | 2,180 |
| | | | | | | F4 | 1,225 | 1,130 | 1,720 | 1,500 | 1,515 | 2,150 | 2,100 | 2,120 | 3,015 |
| | | | | Max. | 9 | F2 | 1,100 | 2,025 | 2,880 | 1,120 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 3,365 | 2,870 | 4,010 |
| | | | | | | F4 | 2,570 | 1,890 | 2,685 | 2,965 | 2,375 | 3,380 | 3,505 | 3,080 | 4,380 |
| FCB47.5 | 7½ | 4 | 1½ | Min. | 4 | F2 | 1,100 | 1,130 | 2,255 | 1,120 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,185 | 1,130 | 2,115 | 1,185 | 1,515 | 2,115 | 1,185 | 1,515 | 2,115 |
| | | | | | | F4 | 380 | 330 | 660 | 380 | 495 | 830 | 380 | 580 | 830 |
| | | | | Max. | 12 | F2 | 1,100 | 2,025 | 2,880 | 1,120 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 4,170 | 2,870 | 3,780 |
| | | | | | | F4 | 1,875 | 1,060 | 2,120 | 1,875 | 1,575 | 3,155 | 1,875 | 2,3w10 | 3,440 |
| FCB49.5 | 9½ | 6 | 1½ | Min. | 4 | F2 | 1,100 | 1,130 | 2,255 | 1,120 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,185 | 1,130 | 2,180 | 1,185 | 1,565 | 2,180 | 1,185 | 1,565 | 2,180 |
| | | | | | | F4 | 380 | 255 | 510 | 380 | 380 | 760 | 380 | 580 | 830 |
| | | | | Max. | 12 | F2 | 1,100 | 2,025 | 2,880 | 1,120 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,720 | 4,345 | 2,870 | 4,010 |
| | | | | | | F4 | 2,290 | 1,120 | 2,245 | 2,290 | 1,670 | 3,020 | 2,290 | 2,125 | 3,020 |
| FCB411.5 | 11½ | 8 | 1½ | Min. | 4 | F2 | 1,100 | 1,130 | 2,255 | 1,120 | 1,680 | 3,360 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,185 | 1,130 | 1,720 | 1,185 | 1,470 | 1,720 | 1,185 | 1,470 | 1,720 |
| | | | | | | F4 | 380 | 210 | 415 | 380 | 310 | 620 | 380 | 580 | 830 |
| | | | | Max. | 12 | F2 | 1,100 | 2,025 | 2,880 | 1,120 | 2,425 | 3,720 | 1,105 | 2,680 | 4,110 |
| | | | | | | F3 | 1,260 | 2,285 | 3,245 | 1,260 | 2,425 | 3,645 | 4,015 | 2,870 | 3,645 |
| | | | | | | F4 | 2,290 | 1,195 | 2,390 | 2,290 | 1,780 | 3,020 | 2,290 | 2,125 | 3,020 |

1. Tabulated values are for the connector and attachment to the stud-wall framing.
   The assembly strengths are the minimum of those listed and the anchorage values listed in Table 5 and 6 on pp. 66, 67.
2. Service Load Limit is the load at ⅛" deflection for use in evaluating the performance under service-level loads.
3. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, $\phi$.
4. Nominal Strength is defined in AISI S100-07.

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## Table 5A: Anchor Values (lb.) in the $F_2$ and $F_3$ Direction for SCB, FCB, MSCB and SSB

| Anchorage Type | Minimum Base Material | No. of Anchors | SCB and FCB | | MSCB | | SSB | |
|---|---|---|---|---|---|---|---|---|
| | | | LRFD Design Strength | Nominal Strength | LRFD Design Strength | Nominal Strength | LRFD Design Strength | Nominal Strength |
| #12 self-drilling screws<br>Simpson Strong-Tie® X Metal screws<br>XQ1S1214, X1S1214 | A36 steel<br>3/16" thick | 2 | 1,270 | 2,010 | 1,635 | 2,505 | 1,875 | 3,280 |
| | | 3 | 1,790 | 2,745 | 2,440 | 3,740 | 2,140 | 3,280 |
| | | 4 | 2,540 | 4,015 | 3,265 | 5,005 | — | — |
| Simpson Strong-Tie #12–24 x 1¼"<br>Strong-Drive® XL Large-Head Metal screws<br>XLQ114T1224, XLQ114B1224-2K | A36 steel<br>3/16" thick | 2 | 1,780 | 2,730 | 2,175 | 3,330 | — | — |
| | | 3 | 2,630 | 4,035 | 3,260 | 5,000 | — | — |
| | | 4 | 3,565 | 5,465 | 4,345 | 6,660 | — | — |
| Simpson Strong-Tie<br>0.157" x 5/8" power-actuated fasteners<br>PDPAT-62KP | A36 steel<br>3/16" thick | 2 | 700 | 1,130 | 830 | 1,710 | 1,980 | 3,435 |
| | | 3 | 935 | 1,550 | 1,250 | 2,430 | 2,240 | 3,435 |
| | | 4 | 1,430 | 2,175 | 1,665 | 3,415 | — | — |
| Simpson Strong-Tie<br>0.157" x 5/8" power-actuated fasteners<br>PDPAT-62KP | A572 or<br>A992 steel<br>3/16" thick | 2 | 935 | 1,435 | 975 | 1,710 | — | — |
| | | 3 | 1,275 | 2,000 | 1,465 | 2,430 | — | — |
| | | 4 | 1,875 | 2,870 | 1,950 | 3,415 | — | — |
| Simpson Strong-Tie<br>¼" x 1¾" Titen® Hex-Head Masonry screws<br>TTN25134H | Concrete<br>$f'_c$ = 2,500 psi | 2 | 605 | 1,515 | 605 | 1,515 | — | — |
| | | 3 | 710 | 1,775 | 710 | 1,775 | — | — |
| | | 4 | 815 | 2,035 | 815 | 2,035 | — | — |
| Welded<br>E70XX electrodes | A36 steel<br>3/16" thick | Hard side: 2"<br>Free side: 1" | 2,780 | 4,265 | 3,265 | 5,005 | 3,320 | 5,085 |

See footnotes below.

## Table 5B: Anchor Values (lb.) in $F_1$, $F_2$, $F_3$, and $F_4$ Direction for FSB

| Anchorage Type | No. of Anchors | FSB | | | | | |
|---|---|---|---|---|---|---|---|
| | | $F_1$ | | $F_2$ / $F_3$ | | $F_4$ | |
| | | LRFD Design Strength | Nominal Strength | LRFD Design Strength | Nominal Strength | LRFD Design Strength | Nominal Strength |
| #12–14 self-drilling screws | 2 | 435 | 495 | 1,875 | 3,200 | 875 | 1,285 |
| | 4 | 435 | 495 | 3,745 | 6,075 | 875 | 1,285 |
| Simpson Strong-Tie<br>0.157" x 5/8" power-actuated fasteners<br>PDPAT-62KP | 2 | — | — | 1,310 | 2,530 | — | — |
| | 4 | 435 | 495 | 2,620 | 6,075 | 875 | 1,285 |
| Welded | Hard side: 2"<br>Free side: 1" | 435 | 495 | 5,330 | 6,020 | 875 | 1,285 |

1. Tabulated values are for the anchorage only. The assembly strengths are the minimum of those listed above and the connector capacity and attachment to the stud-wall framing listed in Tables 1–4 on pp. 63–65.
2. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, $\phi$.
3. Nominal Strength is defined in AISI S100-07.
4. For the Service Load Limit, use the values listed for the connectors in Tables 1–4 on pp. 63–65.

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## Table 6: Anchor Values (lb.) in the $F_4$ Direction

| Anchorage Type | No. of Anchors | Load Type | FCB43.5 | FCB45.5 | FCB47.5 | | FCB49.5 | | FCB411.5 | | SCW3.25 | SCW5.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min./ Max. | Min./ Max. | Min. | Max. | Min. | Max. | Min. | Max. | | |
| #12–24 self-drilling screws | 2 | LRFD Design Strength | 1,000 | 655 | 410 | 710 | 295 | 425 | 190 | 305 | 1,020 | 1,875 |
| | | Nominal Strength | 1,530 | 1,005 | 625 | 1,090 | 455 | 650 | 295 | 465 | 1,565 | 2,945 |
| | 3 | LRFD Design Strength | 1,105 | 720 | 450 | 785 | 320 | 470 | 215 | 335 | 1,330 | — |
| | | Nominal Strength | 1,690 | 1,105 | 685 | 1,200 | 490 | 725 | 330 | 515 | 2,040 | — |
| | 4 | LRFD Design Strength | 2,010 | 1,310 | 785 | 1,425 | 570 | 855 | 440 | 610 | — | 2,295 |
| | | Nominal Strength | 3,075 | 2,010 | 915 | 2,180 | 665 | 1,310 | 515 | 930 | — | 3,805 |
| Simpson Strong-Tie® 0.157" PDPAT powder-actuated fasteners | 2 | LRFD Design Strength | 655 | 425 | 265 | 465 | 190 | 280 | 120 | 200 | 830 | 1,470 |
| | | Nominal Strength | 1,005 | 650 | 405 | 710 | 295 | 430 | 185 | 305 | 1,270 | 2,255 |
| | 3 | LRFD Design Strength | 745 | 490 | 305 | 530 | 215 | 310 | 135 | 225 | 895 | — |
| | | Nominal Strength | 1,140 | 745 | 465 | 810 | 330 | 480 | 210 | 345 | 1,370 | — |
| | 4 | LRFD Design Strength | 1,345 | 880 | 545 | 950 | 390 | 570 | 230 | 410 | — | 2,385 |
| | | Nominal Strength | 2,060 | 1,350 | 835 | 1,460 | 600 | 870 | 355 | 625 | — | 3,660 |
| Simpson Strong-Tie ¼" x 1¾" Titen® hex-head screws | 2 | LRFD Design Strength | 580 | 380 | 230 | 415 | 170 | 245 | 300 | 175 | — | — |
| | | Nominal Strength | 1,660 | 1,080 | 660 | 1,180 | 480 | 700 | 400 | 500 | — | — |
| | 3 | LRFD Design Strength | 660 | 435 | 265 | 470 | 195 | 280 | 140 | 205 | — | — |
| | | Nominal Strength | 1,880 | 1,240 | 700 | 1,340 | 515 | 800 | 400 | 580 | — | — |
| | 4 | LRFD Design Strength | 905 | 590 | 365 | 635 | 265 | 385 | 390 | 275 | — | — |
| | | Nominal Strength | 2,580 | 1,680 | 915 | 1,820 | 670 | 1,100 | 525 | 780 | — | — |
| Welded | Hard side: 2" Free side: 1" | LRFD Design Strength | 5,070 | 3,320 | 1,265 | 3,210 | 910 | 1,920 | 720 | 1,375 | — | — |
| | | Nominal Strength | 7,765 | 5,085 | 1,475 | 3,750 | 1,065 | 2,245 | 1,280 | 1,610 | — | — |

1. Tabulated values are for the anchorage only. The assembly strengths are the minimum of those listed above and the connector capacity and attachment to the stud-wall framing listed in Tables 1–4 on pp. 63–65.
2. LRFD Design Strength is the Nominal Strength multiplied by a resistance factor, $\phi$.
3. Nominal Strength is defined in AISI S100-07.
4. For the Service Load Limit, use the values listed for the connectors in Tables 1–4 on pp. 63–65.



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# Raise Your Expectations, Lower Your Installed Costs!

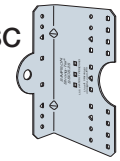
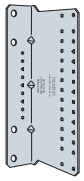
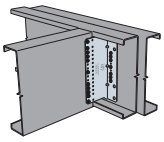
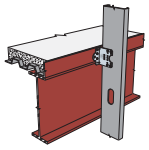
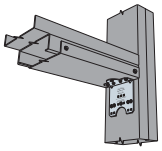
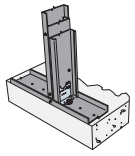
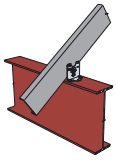
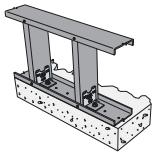
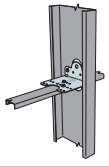
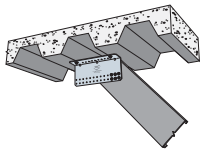
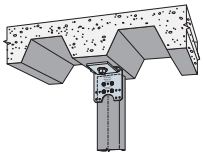


## Utility Clip Connectors

The SSC steel stud connector, the SJC steel joist connector and the SFC steel framing connector, are designed so that a minimum number of clips can be stocked to accommodate a wide array of applications. Prepunched 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.

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

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# Innovative Design Lets You Work Smarter — Not Harder!

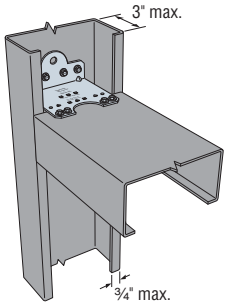


Simpson Strong-Tie® utility clip connectors have been designed with both the contractor and Designer in mind. Connector dimensions and fastener/anchor locations have been developed to maximize design flexibility and installation efficiency.

## Intelligent Connector Dimensions

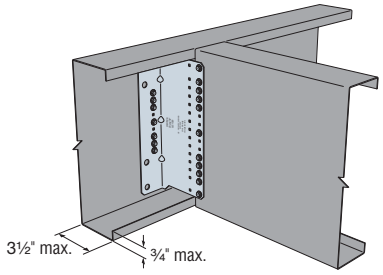
### SSC Steel Stud Connectors

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



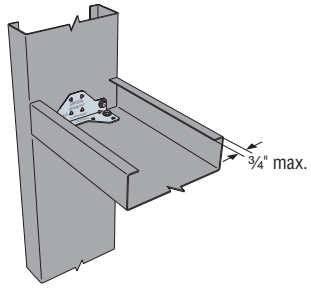

### SJC Steel Joist Connectors

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 pp. 90–91.**

## Intuitive Fastener Patterns

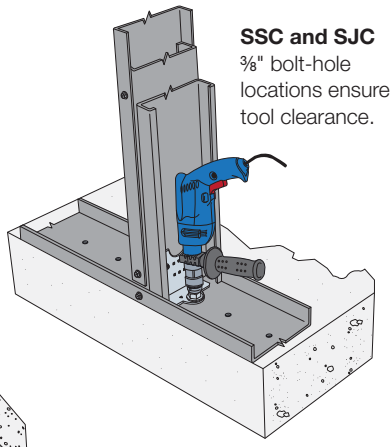


**SSC and SJC** Connectors include prepunched holes for ⅜" diameter anchors that enable easy anchorage to concrete.

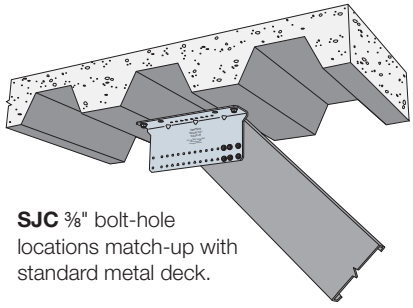
**SSC and SJC** anchorage leg also includes prepunched holes for #10 self-drilling screws.



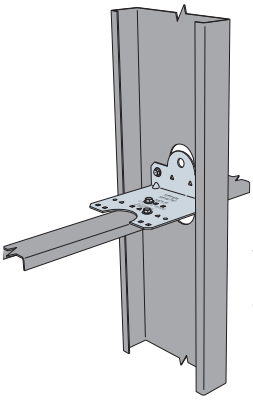
**SSC and SJC** clips include round and triangle holes for minimum and maximum tabulated load values. Square holes are also provided, and can be combined with round and triangle holes for custom screw patterns per installation needs.



**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:**

- Prepunched 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 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:**

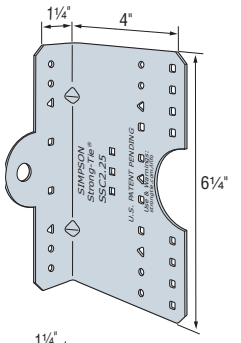
**Material:** LSSC — 54 mil (50 ksi); SSC — 68 mil (50 ksi); MSSC — 97 mil (50 ksi)

**Finish:** Galvanized (G90)

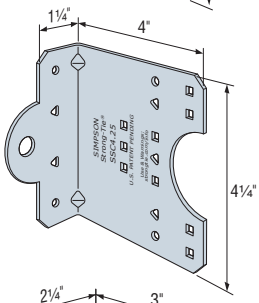
**Installation:** Use all specified fasteners/anchors

**Codes:** See p. 11 for Code Reference Key Chart

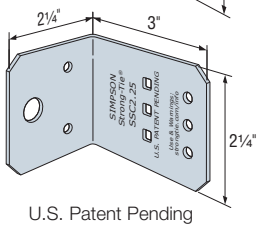
**For detailed product dimensions, refer to p. 90.**




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




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



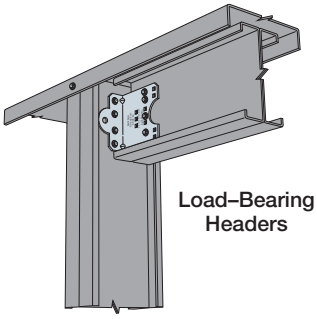

**SSC2.25**
*(MSSC2.25 similar)*

U.S. Patent Pending

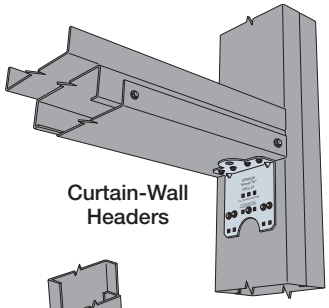
## Ordering Information

| Model No. | Ordering SKU | Package Quantity |
|---|---|---|
| SSC2.25 | SSC2.25-R125[1] | Bucket of 125 |
| MSSC2.25 | MSSC2.25-R90[1] | Bucket of 90 |
| LSSC4.25 | LSSC4.25-R50[2] | Bucket of 50 |
| SSC4.25 | SSC4.25-R50[2] | |
| MSSC4.25 | MSSC4.25-R50[2] | |
| LSSC6.25 | LSSC6.25-R30 | Bucket of 30 |
| SSC6.25 | SSC6.25-R30 | |
| MSSC6.25 | MSSC6.25-R30 | |

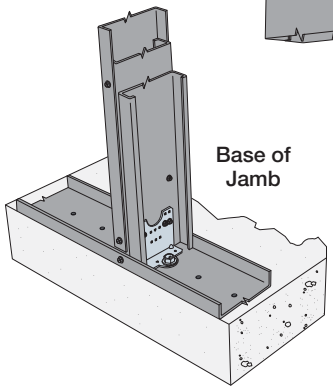
1. By leaving off the "-RXXX" suffix, items can also be ordered in cartons of 50.
2. By leaving off the "-RXX" suffix, items can be ordered in cartons of 25.



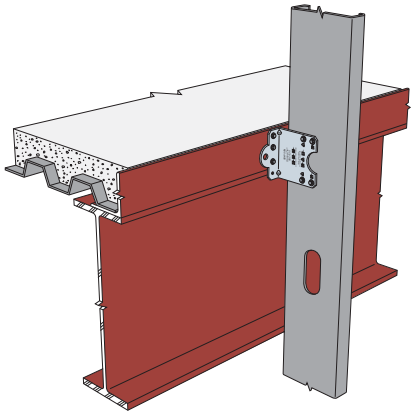
Load–Bearing Headers



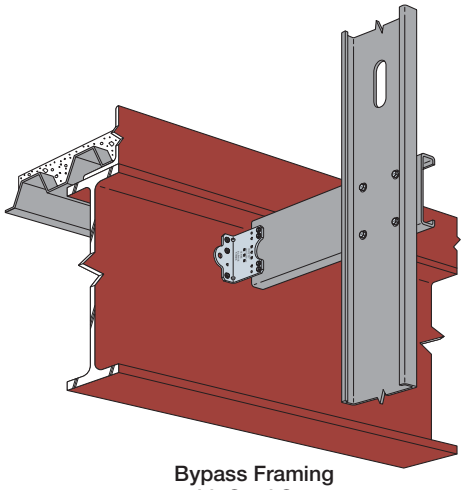
Curtain-Wall Headers



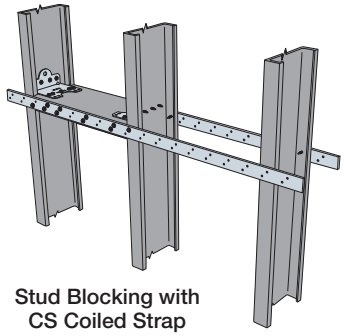
Base of Jamb



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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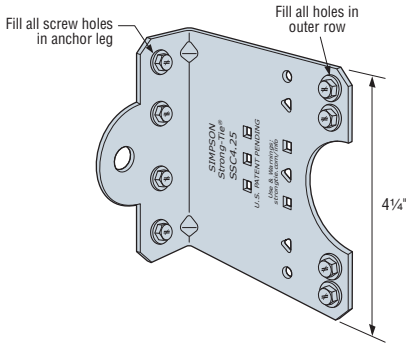
# **SSC** Steel-Stud Connector



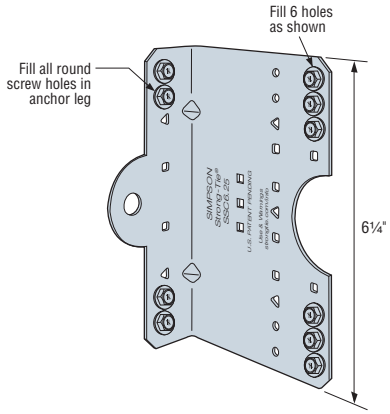
## SSC Connectors — Steel-to-Steel Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Framing Member Depth (in.) | Fasteners | | | Allowable $F_4$ Load (lb.) | | | | 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 | IP2 |
| 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 | 1,615 | |
| | | | | 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 | 1,615 | |
| | | | | Max. | (5) #10 | (4) #10 | 365 | 600 | 1,005 | | |
| | | | | Outer | (4) #10 | (4) #10 | 235 | 330 | 625 | | |
| MSSC4.25 | 97 (12) | 4¼ | 6 | Min. | (2) #10 | (2) #10 | 355 | 525 | 890 | 1,615 | |
| | | | | Max. | (5) #10 | (4) #10 | 365 | 600 | 1,005 | | |
| | | | | Outer | (4) #10 | (4) #10 | 235 | 330 | 625 | | |
| LSSC6.25 | 54 (16) | 6¼ | 8 | Min. | (4) #10 | (4) #10 | 265 | 660 | 1,190 | 2,590 | |
| | | | | Max. | (7) #10 | (6) #10 | 265 | 660 | 1,190 | | |
| | | | | Outer | (6) #10 | (4) #10 | 270 | 375 | 695 | | |
| SSC6.25 | 68 (14) | 6¼ | 8 | Min. | (4) #10 | (4) #10 | 385 | 720 | 1,190 | 2,590 | |
| | | | | Max. | (7) #10 | (6) #10 | 385 | 720 | 1,190 | | |
| | | | | Outer | (6) #10 | (4) #10 | 270 | 460 | 725 | | |
| MSSC6.25 | 97 (12) | 6¼ | 8 | Min. | (4) #10 | (4) #10 | 385 | 720 | 1,190 | 2,590 | |
| | | | | Max. | (7) #10 | (6) #10 | 385 | 720 | 1,365 | | |
| | | | | Outer | (6) #10 | (4) #10 | 270 | 460 | 725 | | |

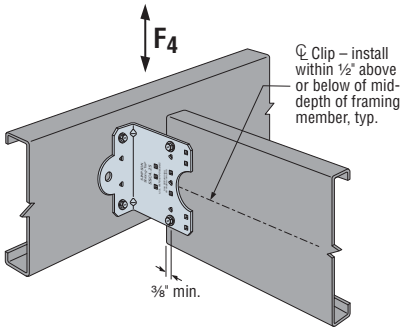
1. Min. fastener quantity and load values — fill all round holes; Max. fastener quantity and load values — fill all round and triangular holes; Outer fastener quantity and load values — see illustrations for fastener placement.
2. Allowable loads are based on bracing of the members located within 12" 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.
5. Reference pp. 76–81 for supplemental information and alternate screw patterns.



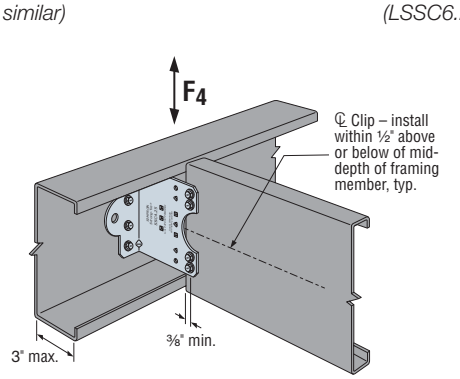

**SSC4.25 – Outer Fastener Pattern**
*(LSSC4.25 and MSSC4.25 similar)*



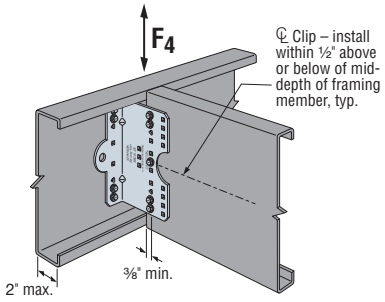

**SSC6.25 – Outer Fastener Pattern**
*(LSSC6.25 and MSSC6.25 similar)*




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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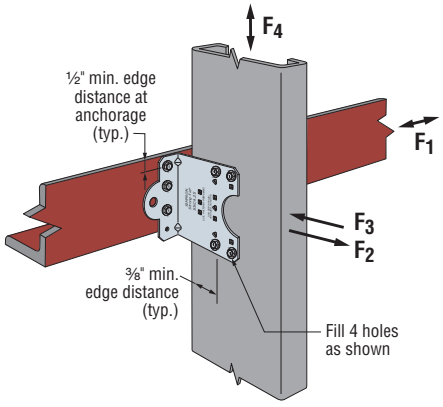
# **SSC** Steel-Stud Connector



## SSC Connectors — Bypass Framing Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Fasteners[1,4] | | Stud Thickness | | | | | | | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) | | | | 43 mil (18 ga.) | | | | 54 mil (16 ga.) | | | | |
| | | | Anchorage[2] | Stud | $F_1$[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) #10 | (4) #10 | 40 | 705 | 705 | 700 | 40 | 870 | 1,050 | 850 | 40 | 935 | 1,210 | 850 | IP2 |
| | | | (3) PDPAT-62K | (4) #10 | 40 | 705 | 705 | 700 | 40 | 780 | 1,050 | 850 | 40 | 780 | 1,210 | 850 | 160 |
| MSSC4.25 | 97 (12) | 4¼ | (3) #10 | (4) #10 | 105 | 705 | 705 | 705 | 105 | 1,050 | 1,050 | 880 | 105 | 1,385 | 1,210 | 880 | IP2 |
| | | | (3) PDPAT-62K | (4) #10 | 105 | 705 | 705 | 705 | 105 | 780 | 1,050 | 880 | 105 | 780 | 1,210 | 880 | 160 |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

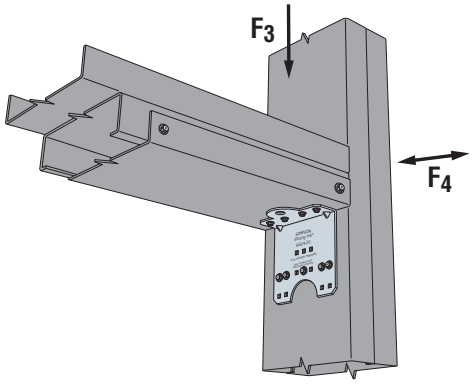



Typical SSC Installation

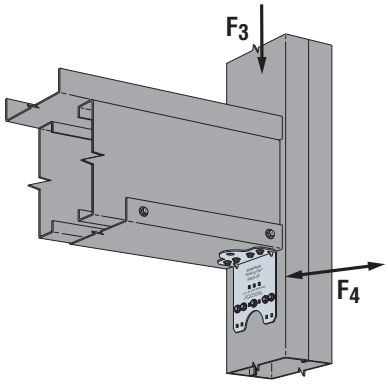
## SSC Connectors — Headers Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Jamb Stud Depth (in.) | Fasteners[4] | | | Jamb and Header Thickness mil (ga.) | Allowable $F_3$ Load (lb.) | | Allowable $F_4$ Load (lb.) | 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 | IP2 |
| | | | | | | | 43 (18) | 220 | 660 | 440 | |
| SSC4.25 | 68 (14) | 4¼ | 6 | Max. | (5) #10 | (4) #10 | 54 (16) | 375 | 1,055 | 1,005 | |
| | | | | | | | 68 (14) | 570 | 1,055 | 1,005 | |
| 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 | 1,110 | 1,190 | |
| | | | | | | | 68 (14) | 640 | 1,110 | 1,190 | |

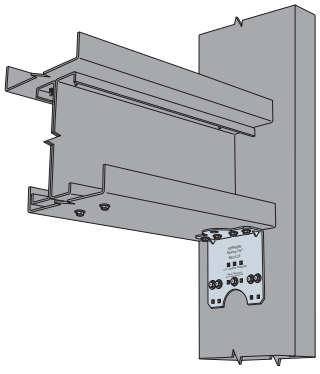
1. Max. fastener quantity and load values—fill all round and triangular holes.
2. Designer is responsible for checking web crippling of the header and reducing allowable loads accordingly.
3. Also applies to box header per illustration below.
4. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Nested Stud and Track




Box Header



Back-to-Back Header

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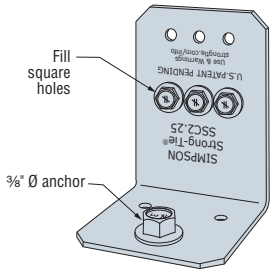
# **SSC** Steel-Stud Connector



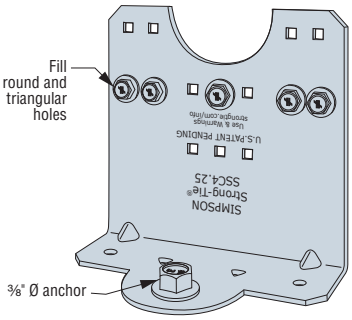
## SSC Connectors — Base of Jamb Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Stud Member Depth (in.) | Fasteners | | Stud Thickness mil (ga.) | Allowable $F_4$ Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | | | Anchor Diameter | Stud Fasteners[3] | | | |
| SSC2.25 | 68 (14) | 2¼ | 3⅝ | ⅜ | (3) #10 | 33 (20) | 390 | IP2 |
| | | | | | | 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) | 1,020 | |

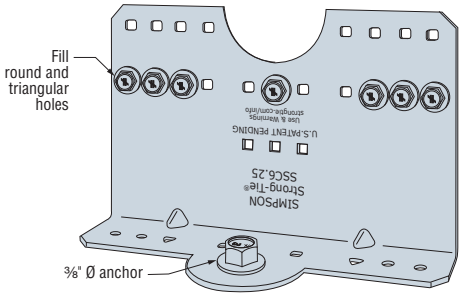
1. Allowable loads are based on minimum 33 mil (20 ga.) track for 33 mil (20 ga.) and 43 mil (18 ga.) studs, and minimum 43 mil (18 ga.) track for 54 mil (16 ga.) studs, with one #10 screw into each stud flange.
2. Allowable loads assume adequate torsional bracing is provided. Bracing design is the responsibility of the Designer.
3. See illustrations for fastener placement.
4. Designer is responsible for anchorage design.
5. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



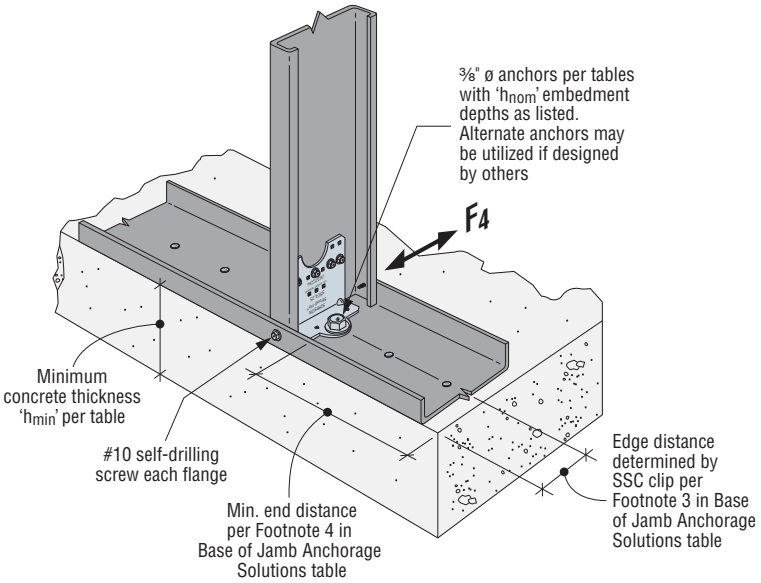

**SSC2.25 Fastener Pattern**




**SSC4.25 Fastener Pattern**




**SSC6.25 Fastener Pattern**




**Typical SSC Installation**
*(Note: This figure references the table on the following page.)*



**Titen HD® Screw Anchor**



**Strong-Bolt® 2 Wedge Anchor**




**AT-XP® Adhesive**

**See pp. 182–203 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. | Minimum Concrete Thickness ($h_{min}$) (in.) | ⅜" Diameter Simpson Strong-Tie® Anchor Type | Nominal Embedment Depth ($h_{nom}$) (in.) | Allowable Anchor Load, $F_4$ (lb.) | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 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 | 1,020 | 1,020 |
| | 6 | Titen HD | 3¼ | 960 | 1,020 | 1,020 |
| | | SET-XP | 4 | 880 | 880 | 880 |
| | | AT-XP | 4 | 880 | 880 | 880 |
| **Cracked Concrete, Wind and Seismic in SDC A&B[8]** | | | | | | |
| Model No. | Minimum Concrete Thickness ($h_{min}$) (in.) | ⅜" Diameter Simpson Strong-Tie® Anchor Type | Nominal Embedment Depth ($h_{nom}$) (in.) | Allowable Anchor Load, $F_4$ (lb.) | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 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 | 1,010 |
| | 6 | Titen HD | 3¼ | 685 | 1,020 | 1,020 |
| | | SET-XP | 4 | 810 | 880 | 880 |
| | | AT-XP | 4 | 810 | 880 | 880 |
| **Cracked Concrete, Seismic in SDC C through F[9]** | | | | | | |
| Model No. | Minimum Concrete Thickness ($h_{min}$) (in.) | ⅜" Diameter Simpson Strong-Tie® Anchor Type | Nominal Embedment Depth ($h_{nom}$) (in.) | Allowable Anchor Load, $F_4$ (lb.) | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 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 318-14 Chapter 17 calculations with the minimum concrete compressive strength, $f'_c$ and slab thickness listed. Sand-lightweight concrete is abbreviated as "SLWC" 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 p. 73.
5. Load values are for a single anchor based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, 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. Load values are based on a short-term temperature range of 150°F and 180°F for SET-XP and AT-XP. Long-term temperature range is assumed to be 110°F for both SET-XP and AT-XP. Dry hole conditions are assumed. Other conditions may be evaluated using Anchor Designer™ Software for ACI 318, ETAG and CSA. See **strongtie.com/software**.
7. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha ($\alpha$), 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 ($\Omega$) seismic factor of 2.5 for brittle failure as required by ACI 318-14 Chapter 17.
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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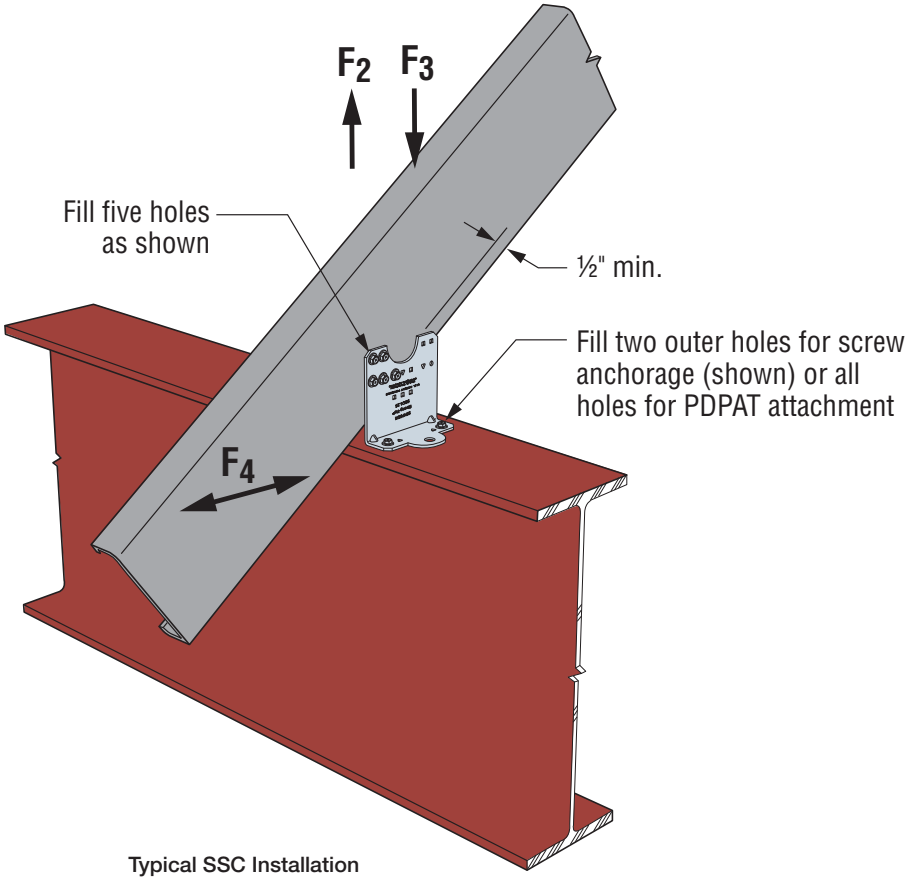
# **SSC** Steel-Stud Connector



## SSC Connectors — Rafters Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Fasteners[1,4] | | Allowable Load (lb.) | | | 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 | 1,075 | 595 | IP2 |
| | | | (4) PDPAT | (5) #10 | 1,020 | 1,075 | 630 | |
| MSSC4.25 | 97 (12) | 4¼ | (2) #12 | (5) #10 | 710 | 1,335 | 595 | |
| | | | (4) PDPAT | (5) #10 | 1,025 | 1,335 | 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical SSC Installation

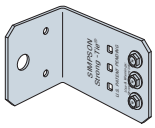
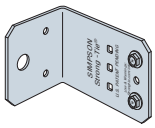
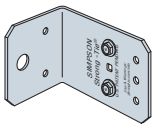
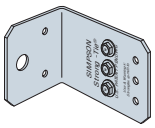
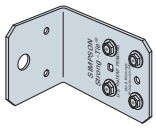
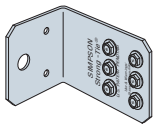
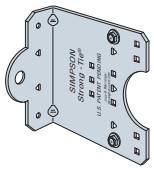
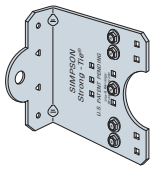
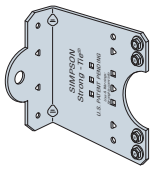
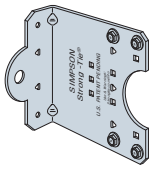
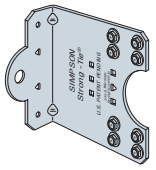
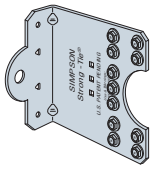
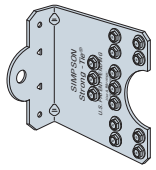
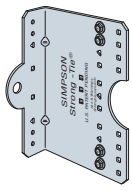
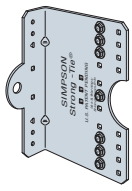
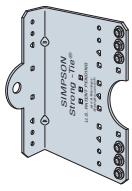
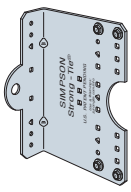
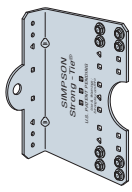
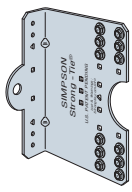
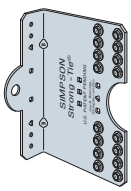
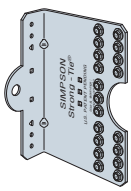
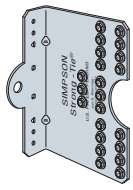
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# **SSC** Supplemental Information



The following SSC supplemental information is given to help Designers with value-engineered solutions for our SSC connectors. Loads are given for fastener patterns other than our standard "min." (fill all round holes) and "max." (fill all round and triangle holes). The tables give service, ASD, LRFD and nominal loads.

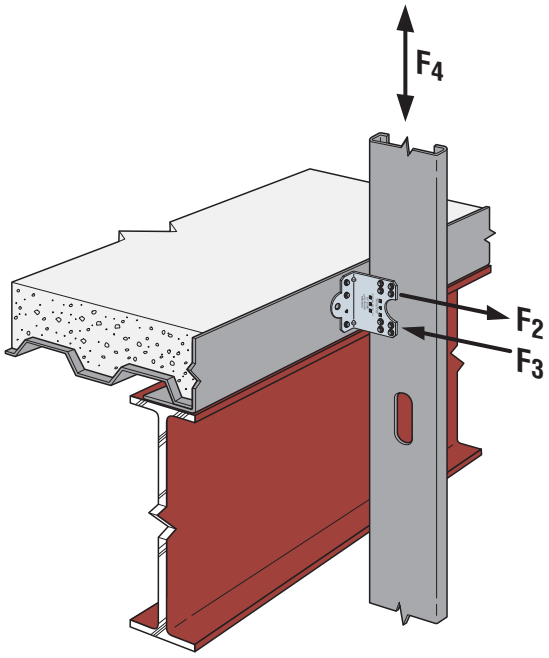
## Table 1: SSC Screw Patterns

| | | | | |
|---|---|---|---|---|
| SSC2.25, MSSC2.25 | Pattern "Min." | Pattern A | Pattern B | |
| |  |  |  | |
| | Pattern C | Pattern D | Pattern E | |
| |  |  |  | |
| LSSC4.25, SSC4.25, MSSC4.25 | Pattern "Min." | Pattern "Max." | Pattern "Outer" | |
| |  |  |  | |
| | Pattern F | Pattern G | Pattern H | Pattern I |
| |  |  |  |  |
| LSSC6.25 SSC6.25 MSSC6.25 | Pattern "Min." | Pattern "Max." | Pattern "Outer" | |
| |  |  |  | |
| | Pattern J | Pattern K | Pattern L | |
| |  |  |  | |
| | Pattern M | Pattern N | Pattern O | |
| |  |  |  | |

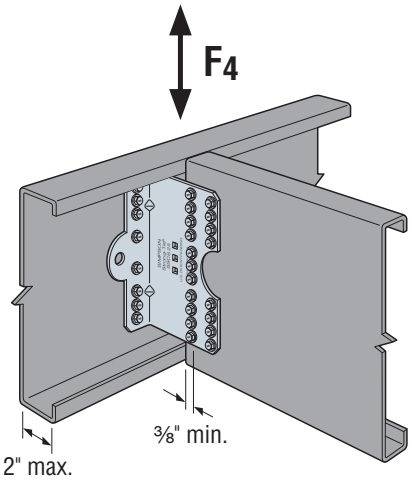
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# Footnotes for Tables 2, 3, 4 and 5

1. Calculated values are per AISI RP15-2, AISI S-100, or generally accepted industry standards. Shaded values for $F_4$ are derived from test data. Whenever possible, unshaded $F_4$ values are based on the maximum calculated value and applicable tested value.
2. The tabulated values do not account for anchorage to the support. Anchor strength must be calculated separately and may reduce the capacity of the connection when compared to the tabulated values.
3. Tabulated values do not include shear, web crippling, buckling, or other local effects in the member. The Designer must check member limit states separately.
4. For load combinations that include $F_4$ and/or $F_2$ and/or $F_3$, use an appropriate interaction equation.
5. #10–16 screws shall have $P_{ss} \geq 1{,}620$ lb. Calculated values are per AISI S-100. Screws must be installed with three (min.) exposed threads.
6. The number of screws is for one clip leg that is attached to the supported stud.
7. For the minimum screw pattern, fill all round holes. For the maximum screw pattern, fill all round and triangle holes. Reference p. 76.
8. In addition to calculations of net and gross section tension, and screw shear of the clip leg attached to the stud, $F_2$ values are also calculated for weak-axis bending of the anchored clip leg with the line of bending at the smaller anchor holes. The Designer is responsible for calculating pullover, pullout, and tension strength of the anchors, and this may reduce $F_2$ strength compared to the tabulated values.
9. $F_3$ values are computed using the plate buckling provisions of AISI RP15-2.
10. For the $F_4$ calculated values, it's assumed that the connection eccentricity is taken by screws in the supported stud.
11. Service load limits for $F_2$ and $F_3$ are not given since there are no generally accepted industry methods available to compute these values. $F_4$ service load limits are based on AISI Research Report RP15-2 for ⅛" deflection or applicable test data.
12. For 50 ksi studs, 68 mil (14 ga.) and thicker, use tabulated values for 54 mil (16 ga.) — 50 ksi studs.




**Installation Example #1 — SSC4.25 Typical Bypass Framing Installation**




**Installation Example #2 — SSC6.25 Typical Joist-to-Girder Installation**



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## Table 2: SSC Steel Stud Connectors (SSC2.25 and MSSC2.25) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| SSC2.25 | 3 | Min. | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 455 | 740 | 1,475 | 455 | 740 | 1,475 | 455 | 740 | 1,475 |
| | | | $F_4$ | 810 | 165 | 265 | 295 | 225 | 360 | 410 | 345 | 550 | 675 |
| | 2 | A | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 330 | 495 | 990 | 355 | 575 | 1,150 | 355 | 575 | 1,150 |
| | | | $F_4$ | 190 | 65 | 95 | 190 | 100 | 145 | 295 | 195 | 295 | 585 |
| | 2 | B | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 330 | 495 | 990 | 465 | 755 | 1,515 | 465 | 755 | 1,515 |
| | | | $F_4$ | 310 | 100 | 150 | 300 | 155 | 235 | 465 | 310 | 465 | 935 |
| | 3 | C | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 600 | 975 | 1,945 | 600 | 975 | 1,945 |
| | | | $F_4$ | 810 | 165 | 265 | 310 | 225 | 360 | 480 | 345 | 550 | 960 |
| | 4 | D | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 465 | 755 | 1,515 | 465 | 755 | 1,515 | 465 | 755 | 1,515 |
| | | | $F_4$ | 810 | 180 | 270 | 535 | 275 | 415 | 830 | 555 | 830 | 1,660 |
| | 6 | E | $F_2$ | — | 235 | 350 | 390 | 235 | 350 | 390 | 235 | 350 | 390 |
| | | | $F_3$ | — | 600 | 975 | 1,945 | 600 | 975 | 1,945 | 600 | 975 | 1,945 |
| | | | $F_4$ | 810 | 230 | 350 | 695 | 360 | 540 | 1,075 | 690 | 1,075 | 1,830 |
| MSSC2.25 | 3 | Min. | $F_2$ | — | 475 | 710 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 765 | 1,150 | 2,295 | 785 | 1,280 | 2,560 |
| | | | $F_4$ | 810 | 165 | 265 | 295 | 225 | 360 | 410 | 345 | 550 | 675 |
| | 2 | A | $F_2$ | — | 330 | 495 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 610 | 995 | 1,990 |
| | | | $F_4$ | 270 | 65 | 95 | 190 | 100 | 145 | 295 | 195 | 295 | 585 |
| | 2 | B | $F_2$ | — | 330 | 495 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 810 | 1,315 | 2,625 |
| | | | $F_4$ | 445 | 100 | 150 | 300 | 155 | 235 | 465 | 310 | 465 | 935 |
| | 3 | C | $F_2$ | — | 475 | 710 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 765 | 1,150 | 2,295 | 1,040 | 1,690 | 3,375 |
| | | | $F_4$ | 810 | 165 | 265 | 310 | 225 | 360 | 480 | 345 | 550 | 960 |
| | 4 | D | $F_2$ | — | 475 | 710 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 810 | 1,315 | 2,625 | 810 | 1,315 | 2,625 |
| | | | $F_4$ | 810 | 180 | 270 | 535 | 275 | 415 | 830 | 555 | 830 | 1,660 |
| | 6 | E | $F_2$ | — | 475 | 710 | 790 | 475 | 710 | 790 | 475 | 710 | 790 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,040 | 1,690 | 3,375 | 1,040 | 1,690 | 3,375 |
| | | | $F_4$ | 810 | 230 | 350 | 695 | 360 | 540 | 1,075 | 690 | 1,075 | 1,830 |

See footnotes on p. 77.

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# **SSC** Supplemental Information



## Table 3: SSC Steel Stud Connectors (LSSC4.25 and SSC4.25) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| LSSC4.25 | 2 | Min. | $F_2$ | — | 330 | 495 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 250 | 410 | 815 | 250 | 410 | 815 | 250 | 410 | 815 |
| | | | $F_4$ | 2,135 | 215 | 345 | 490 | 440 | 705 | 800 | 675 | 1,080 | 1,205 |
| | 5 | Max. | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 610 | 990 | 1,980 | 610 | 990 | 1,980 | 610 | 990 | 1,980 |
| | | | $F_4$ | 2,135 | 215 | 345 | 490 | 440 | 705 | 800 | 725 | 1,160 | 1,465 |
| | 4 | Outer | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 420 | 680 | 1,360 | 420 | 680 | 1,360 | 420 | 680 | 1,360 |
| | | | $F_4$ | 1,550 | 200 | 320 | 375 | 310 | 495 | 555 | 520 | 830 | 1,020 |
| | 4 | F | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 250 | 410 | 815 | 250 | 410 | 815 | 250 | 410 | 815 |
| | | | $F_4$ | 1,550 | 300 | 450 | 895 | 460 | 690 | 1,385 | 670 | 1,035 | 1,880 |
| | 8 | G | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 500 | 815 | 1,630 | 500 | 815 | 1,630 | 500 | 815 | 1,630 |
| | | | $F_4$ | 1,550 | 495 | 740 | 1,480 | 670 | 1,035 | 1,880 | 670 | 1,035 | 1,880 |
| | 11 | H | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 610 | 990 | 1,980 | 610 | 990 | 1,980 | 610 | 990 | 1,980 |
| | | | $F_4$ | 1,550 | 545 | 820 | 1,640 | 670 | 1,035 | 1,880 | 670 | 1,035 | 1,880 |
| | 14 | I | $F_2$ | — | 435 | 650 | 725 | 435 | 650 | 725 | 435 | 650 | 725 |
| | | | $F_3$ | — | 610 | 990 | 1,980 | 610 | 990 | 1,980 | 610 | 990 | 1,980 |
| | | | $F_4$ | 1,550 | 670 | 1,015 | 1,880 | 670 | 1,035 | 1,880 | 670 | 1,035 | 1,880 |
| SSC4.25 | 2 | Min. | $F_2$ | — | 330 | 495 | 990 | 510 | 765 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 330 | 495 | 990 | 350 | 565 | 1,130 | 350 | 565 | 1,130 |
| | | | $F_4$ | 2,450 | 355 | 570 | 635 | 525 | 840 | 990 | 890 | 1,425 | 1,590 |
| | 5 | Max. | $F_2$ | — | 660 | 995 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 845 | 1,375 | 2,750 | 845 | 1,375 | 2,750 |
| | | | $F_4$ | 2,450 | 365 | 585 | 650 | 600 | 960 | 1,070 | 1,005 | 1,610 | 1,795 |
| | 4 | Outer | $F_2$ | — | 660 | 990 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 580 | 945 | 1,890 | 580 | 945 | 1,890 | 580 | 945 | 1,890 |
| | | | $F_4$ | 1,930 | 235 | 375 | 430 | 330 | 530 | 650 | 625 | 1,000 | 1,225 |
| | 4 | F | $F_2$ | — | 660 | 990 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 350 | 565 | 1,130 | 350 | 565 | 1,130 | 350 | 565 | 1,130 |
| | | | $F_4$ | 1,930 | 300 | 450 | 895 | 460 | 690 | 1,385 | 920 | 1,385 | 2,745 |
| | 8 | G | $F_2$ | — | 660 | 995 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 695 | 1,130 | 2,265 | 695 | 1,130 | 2,265 | 695 | 1,130 | 2,265 |
| | | | $F_4$ | 1,930 | 495 | 740 | 1,480 | 765 | 1,145 | 2,290 | 980 | 1,510 | 2,745 |
| | 11 | H | $F_2$ | — | 660 | 995 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 845 | 1,375 | 2,750 | 845 | 1,375 | 2,750 | 845 | 1,375 | 2,750 |
| | | | $F_4$ | 1,930 | 545 | 820 | 1,640 | 845 | 1,270 | 2,535 | 980 | 1,510 | 2,745 |
| | 14 | I | $F_2$ | — | 660 | 995 | 1,105 | 660 | 995 | 1,105 | 660 | 995 | 1,105 |
| | | | $F_3$ | — | 845 | 1,375 | 2,750 | 845 | 1,375 | 2,750 | 845 | 1,375 | 2,750 |
| | | | $F_4$ | 1,930 | 675 | 1,015 | 2,030 | 980 | 1,510 | 2,745 | 980 | 1,510 | 2,745 |

See footnotes on p. 77.

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## Table 4: SSC Steel Stud Connectors (MSSC4.25 and LSSC6.25) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| MSSC4.25 | 2 | Min. | $F_2$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 1,020 | 1,530 | 2,235 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 605 | 980 | 1,965 |
| | | | $F_4$ | 2,450 | 355 | 570 | 635 | 525 | 840 | 990 | 890 | 1,425 | 1,590 |
| | 5 | Max. | $F_2$ | — | 825 | 1,240 | 2,235 | 1,275 | 1,915 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 1,275 | 1,915 | 3,825 | 1,465 | 2,385 | 4,770 |
| | | | $F_4$ | 2,450 | 365 | 585 | 650 | 600 | 960 | 1,070 | 1,005 | 1,610 | 1,820 |
| | 4 | Outer | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,010 | 1,530 | 3,060 | 1,010 | 1,640 | 3,280 |
| | | | $F_4$ | 1,930 | 235 | 375 | 430 | 330 | 530 | 650 | 625 | 1,000 | 1,225 |
| | 4 | F | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 605 | 980 | 1,965 | 605 | 980 | 1,965 | 605 | 980 | 1,965 |
| | | | $F_4$ | 1,930 | 300 | 450 | 895 | 460 | 690 | 1,385 | 920 | 1,385 | 2,765 |
| | 8 | G | $F_2$ | — | 1,320 | 1,980 | 2,235 | 1,340 | 2,015 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 1,210 | 1,965 | 3,925 | 1,210 | 1,965 | 3,925 | 1,210 | 1,965 | 3,925 |
| | | | $F_4$ | 1,930 | 495 | 740 | 1,480 | 765 | 1,145 | 2,290 | 1,525 | 2,290 | 4,280 |
| | 11 | H | $F_2$ | — | 1,340 | 2,015 | 2,235 | 1,340 | 2,015 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 1,465 | 2,385 | 4,770 | 1,465 | 2,385 | 4,770 | 1,465 | 2,385 | 4,770 |
| | | | $F_4$ | 1,930 | 545 | 820 | 1,640 | 845 | 1,270 | 2,535 | 1,615 | 2,535 | 4,280 |
| | 14 | I | $F_2$ | — | 1,340 | 2,015 | 2,235 | 1,340 | 2,015 | 2,235 | 1,340 | 2,015 | 2,235 |
| | | | $F_3$ | — | 1,465 | 2,385 | 4,770 | 1,465 | 2,385 | 4,770 | 1,465 | 2,385 | 4,770 |
| | | | $F_4$ | 1,930 | 675 | 1,015 | 2,030 | 1,045 | 1,570 | 3,135 | 1,615 | 2,585 | 4,280 |
| LSSC6.25 | 4 | Min. | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 500 | 815 | 1,630 | 500 | 815 | 1,630 | 500 | 815 | 1,630 |
| | | | $F_4$ | 2,440 | 265 | 425 | 635 | 660 | 1,055 | 1,185 | 1,190 | 1,905 | 2,125 |
| | 7 | Max. | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 880 | 1,425 | 2,855 | 880 | 1,425 | 2,855 | 880 | 1,425 | 2,855 |
| | | | $F_4$ | 2,440 | 265 | 425 | 635 | 660 | 1,055 | 1,185 | 1,190 | 1,905 | 2,350 |
| | 6 | Outer | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 630 | 1,020 | 2,040 | 630 | 1,020 | 2,040 | 630 | 1,020 | 2,040 |
| | | | $F_4$ | 1,940 | 270 | 430 | 480 | 375 | 600 | 670 | 695 | 1,110 | 1,365 |
| | 4 | J | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 250 | 410 | 815 | 250 | 410 | 815 | 250 | 410 | 815 |
| | | | $F_4$ | 415 | 405 | 610 | 1,215 | 625 | 940 | 1,880 | 1,015 | 1,565 | 2,850 |
| | 8 | K | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 500 | 815 | 1,630 | 500 | 815 | 1,630 | 500 | 815 | 1,630 |
| | | | $F_4$ | 1,940 | 730 | 1,100 | 2,195 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 |
| | 12 | L | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 750 | 1,225 | 2,445 | 750 | 1,225 | 2,445 | 750 | 1,225 | 2,445 |
| | | | $F_4$ | 1,940 | 975 | 1,465 | 2,850 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 |
| | 16 | M | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 |
| | | | $F_4$ | 1,940 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 |
| | 19 | N | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 |
| | | | $F_4$ | 1,940 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 |
| | 22 | O | $F_2$ | — | 640 | 960 | 1,065 | 640 | 960 | 1,065 | 640 | 960 | 1,065 |
| | | | $F_3$ | — | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 | 895 | 1,455 | 2,910 |
| | | | $F_4$ | 1,940 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 | 1,015 | 1,565 | 2,850 |

See footnotes on p. 77.

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# SSC Supplemental Information



## Table 5: SSC Steel Stud Connectors (SSC6.25 and MSSC6.25) — Service Load Limits and Strengths (lb.)

| Model No. | No. of #10 Screws | Screw Pattern | Load Direction | Service Load Limit | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| SSC6.25 | 4 | Min. | $F_2$ | — | 660 | 990 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 695 | 1,130 | 2,265 | 695 | 1,130 | 2,265 |
| | | | $F_4$ | 2,440 | 385 | 615 | 685 | 720 | 1,150 | 1,380 | 1,190 | 1,905 | 2,270 |
| | 7 | Max. | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 1,155 | 1,735 | 3,465 | 1,220 | 1,980 | 3,965 | 1,220 | 1,980 | 3,965 |
| | | | $F_4$ | 2,440 | 385 | 615 | 685 | 720 | 1,150 | 1,375 | 1,190 | 1,905 | 2,205 |
| | 6 | Outer | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 870 | 1,420 | 2,835 | 870 | 1,420 | 2,835 | 870 | 1,420 | 2,835 |
| | | | $F_4$ | 1,940 | 270 | 430 | 480 | 460 | 735 | 820 | 725 | 1,160 | 1,330 |
| | 4 | J | $F_2$ | — | 660 | 990 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 350 | 565 | 1,130 | 350 | 565 | 1,130 | 350 | 565 | 1,130 |
| | | | $F_4$ | 515 | 405 | 610 | 1,215 | 625 | 940 | 1,880 | 1,255 | 1,880 | 3,760 |
| | 8 | K | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 695 | 1,130 | 2,265 | 695 | 1,130 | 2,265 | 695 | 1,130 | 2,265 |
| | | | $F_4$ | 1,940 | 730 | 1,100 | 2,195 | 1,130 | 1,700 | 3,395 | 1,485 | 2,290 | 4,165 |
| | 12 | L | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 1,045 | 1,700 | 3,395 | 1,045 | 1,700 | 3,395 | 1,045 | 1,700 | 3,395 |
| | | | $F_4$ | 1,940 | 975 | 1,465 | 2,930 | 1,485 | 2,265 | 4,165 | 1,485 | 2,290 | 4,165 |
| | 16 | M | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 |
| | | | $F_4$ | 1,940 | 1,140 | 1,710 | 3,425 | 1,485 | 2,290 | 4,165 | 1,485 | 2,290 | 4,165 |
| | 19 | N | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 |
| | | | $F_4$ | 1,940 | 1,210 | 1,815 | 3,630 | 1,485 | 2,290 | 4,165 | 1,485 | 2,290 | 4,165 |
| | 22 | O | $F_2$ | — | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 | 975 | 1,460 | 1,625 |
| | | | $F_3$ | — | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 | 1,245 | 2,020 | 4,045 |
| | | | $F_4$ | 1,940 | 1,350 | 2,020 | 4,045 | 1,485 | 2,290 | 4,165 | 1,485 | 2,290 | 4,165 |
| MSSC6.25 | 4 | Min. | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,210 | 1,965 | 3,925 |
| | | | $F_4$ | 2,440 | 385 | 615 | 685 | 720 | 1,150 | 1,380 | 1,190 | 1,905 | 2,270 |
| | 7 | Max. | $F_2$ | — | 1,155 | 1,735 | 3,290 | 1,785 | 2,680 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 1,155 | 1,735 | 3,465 | 1,785 | 2,680 | 5,355 | 2,115 | 3,435 | 6,870 |
| | | | $F_4$ | 2,440 | 385 | 615 | 685 | 720 | 1,150 | 1,375 | 1,365 | 2,185 | 2,490 |
| | 6 | Outer | $F_2$ | — | 990 | 1,485 | 2,970 | 1,530 | 2,295 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,515 | 2,295 | 4,590 | 1,515 | 2,460 | 4,915 |
| | | | $F_4$ | 1,940 | 270 | 430 | 480 | 460 | 735 | 820 | 725 | 1,160 | 1,330 |
| | 4 | J | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 605 | 980 | 1,965 | 605 | 980 | 1,965 | 605 | 980 | 1,965 |
| | | | $F_4$ | 735 | 405 | 610 | 1,215 | 625 | 940 | 1,880 | 1,255 | 1,880 | 3,760 |
| | 8 | K | $F_2$ | — | 1,320 | 1,980 | 3,290 | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 1,210 | 1,965 | 3,925 | 1,210 | 1,965 | 3,925 | 1,210 | 1,965 | 3,925 |
| | | | $F_4$ | 1,940 | 730 | 1,100 | 2,195 | 1,130 | 1,700 | 3,395 | 2,265 | 3,395 | 6,790 |
| | 12 | L | $F_2$ | — | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 1,810 | 2,945 | 5,890 | 1,810 | 2,945 | 5,890 | 1,810 | 2,945 | 5,890 |
| | | | $F_4$ | 1,940 | 975 | 1,465 | 2,930 | 1,510 | 2,265 | 4,525 | 2,590 | 4,145 | 6,865 |
| | 16 | M | $F_2$ | — | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 |
| | | | $F_4$ | 1,940 | 1,140 | 1,710 | 3,425 | 1,765 | 2,645 | 5,290 | 2,590 | 4,145 | 6,865 |
| | 19 | N | $F_2$ | — | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 |
| | | | $F_4$ | 1,940 | 1,210 | 1,815 | 3,630 | 1,870 | 2,805 | 5,610 | 2,590 | 4,145 | 6,865 |
| | 22 | O | $F_2$ | — | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 | 1,970 | 2,960 | 3,290 |
| | | | $F_3$ | — | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 | 2,160 | 3,505 | 7,010 |
| | | | $F_4$ | 1,940 | 1,350 | 2,020 | 4,045 | 2,085 | 3,125 | 6,250 | 2,590 | 4,145 | 6,865 |

See footnotes on p. 77.

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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 prepunched ⅜" holes easily accommodate 6", 8", 10" and 12" on-center metal-deck flutes.

**Features:**

- Prepunched 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)

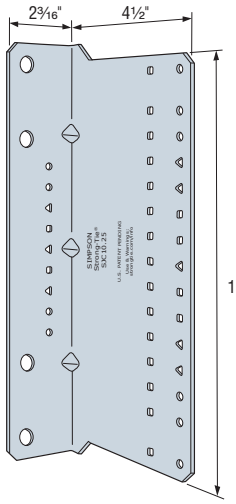
**Finish:** Galvanized (G90)

**Installation:**

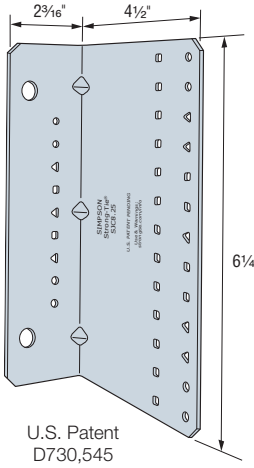
- Use all specified fasteners/anchors

**Codes:** See p. 11 for Code Reference Key Chart

**For detailed product dimensions, refer to p. 91.**




**SJC10.25**
*(MSJC10.25 similar)*

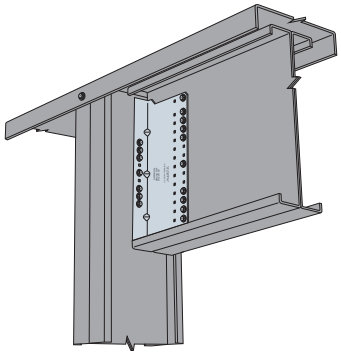



**SJC8.25**
*(MSJC8.25 similar)*

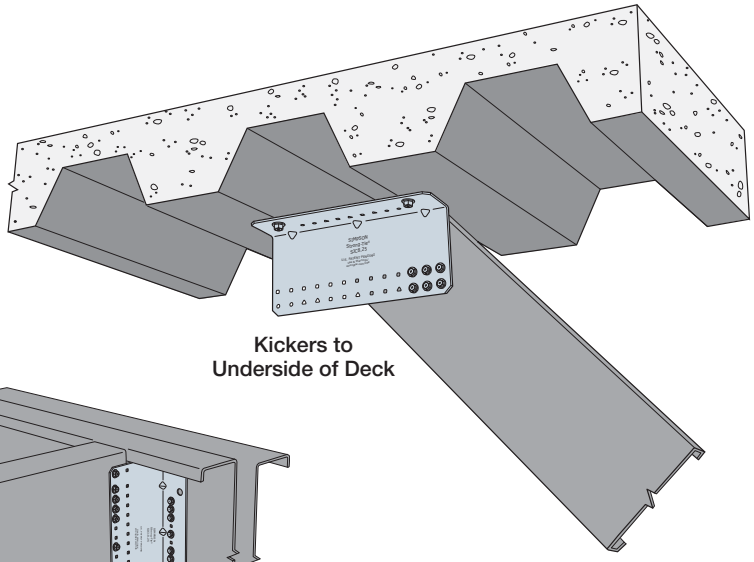
U.S. Patent D730,545

## Ordering Information

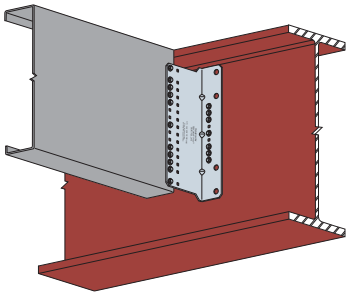
| Model No. | Ordering SKU | Package Quantity |
|---|---|---|
| SJC8.25 | SJC8.25-R15 | Box of 15 |
| MSJC8.25 | MSJC8.25-R15 | |
| SJC10.25 | SJC10.25-R15 | Box of 15 |
| MSJC10.25 | MSJC10.25-R15 | |



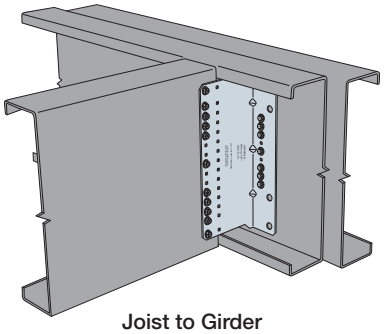
Header to Jamb



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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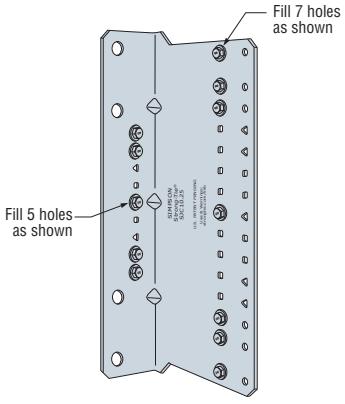
# SJC Steel-Joist Connectors



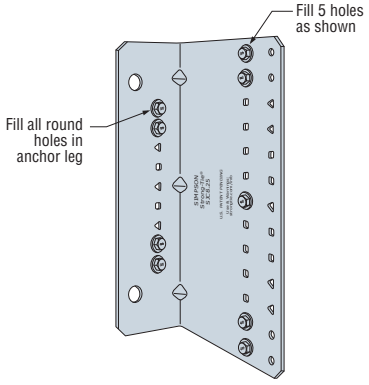
## SJC Connectors — Steel-to-Steel Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Framing Member Depth[4] (in.) | Fasteners[5] | | | Allowable $F_4$ Load (lb.)[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 | 2,930 | IP2 |
| | | | | Max. | (9) #10 | (7) #10 | 1,005 | 1,490 | | |
| | | | | Inner | (5) #10 | (4) #10 | 1,345 | 2,005 | | |
| MSJC8.25 | 97 (12) | 8¼ | 10 | Min. | (4) #10 | (4) #10 | 1,005 | 1,710 | 2,930 | |
| | | | | Max. | (9) #10 | (7) #10 | 1,135 | 1,765 | | |
| | | | | Inner | (5) #10 | (4) #10 | 1,535 | 2,220 | | |
| SJC10.25 | 68 (14) | 10¼ | 12 | Min. | (6) #10 | (4) #10 | 1,170 | 1,625 | 3,935 | |
| | | | | Max. | (11) #10 | (7) #10 | 1,265 | 1,625 | | |
| | | | | Inner | (7) #10 | (5) #10 | 1,620 | 2,170 | | |
| MSJC10.25 | 97 (12) | 10¼ | 12 | Min. | (6) #10 | (4) #10 | 1,200 | 2,045 | 3,935 | |
| | | | | Max. | (11) #10 | (7) #10 | 1,265 | 2,045 | | |
| | | | | Inner | (7) #10 | (5) #10 | 1,730 | 2,635 | | |

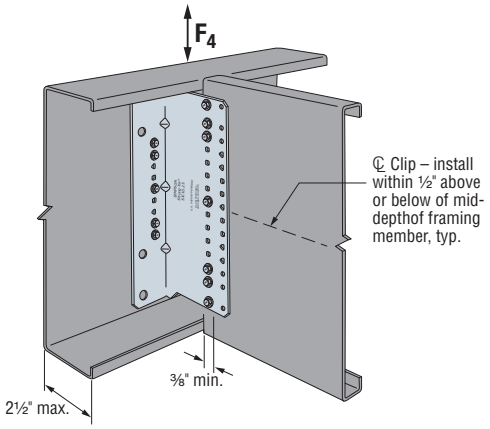
1. Min. fastener quantity and load values — fill all round holes; Max. fastener quantity and load values — fill all round and triangular holes; Inner fastener quantity and load values — see illustrations for fastener placement.
2. Allowable loads are based on bracing of the members located within 12" 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



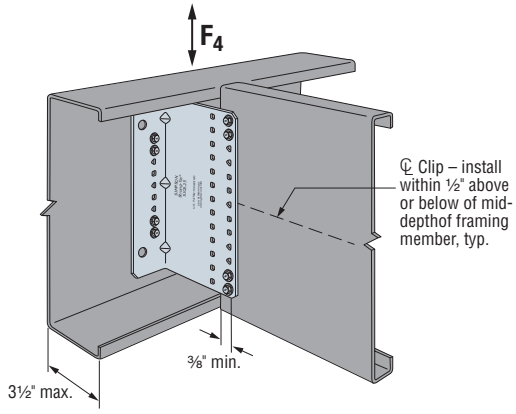

**SJC10.25-Inner Fastener Pattern**
*(MSJC10.25 similar)*




**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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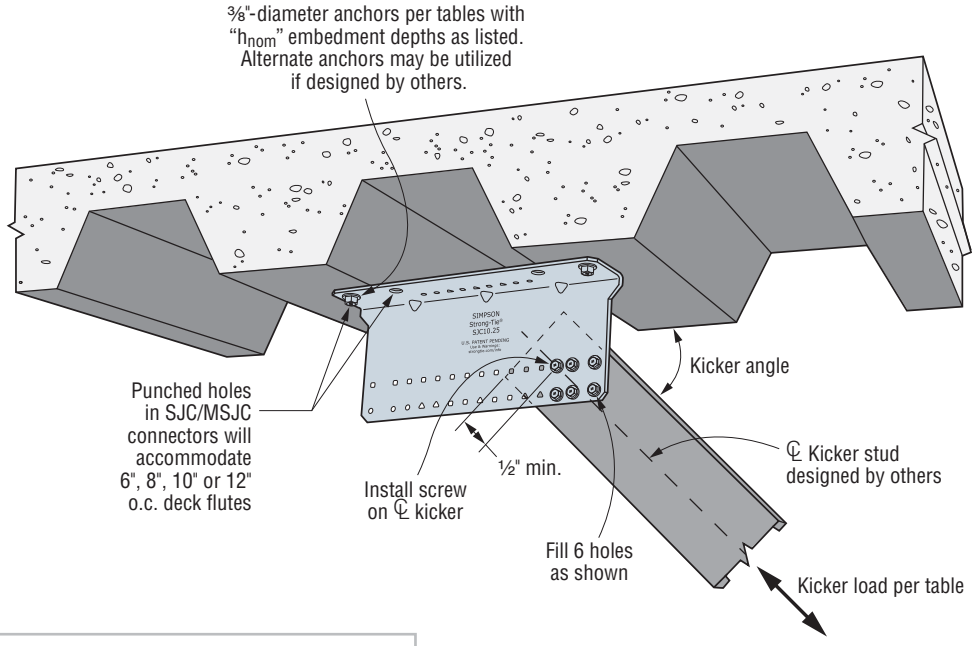
# **SJC** Steel-Joist Connectors



## SJC Connectors — Kicker Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Fasteners to Kicker | Kicker Angle[2] | Maximum Kicker Load (lb.) | Anchor Tension at Maximum Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|
| SJC8.25 | 68 (14) | 8¼ | (6) #10 | 30° | 490 | 345 | IP2 |
| | | | | 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 pp. 85 and 86. Alternate anchors may be utilized if designed by others.
4. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




**Typical SJC Installation**
*(MSJC similar)*



Titen HD® Screw Anchor

Strong-Bolt® 2 Wedge Anchor

See pp. 182–203 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 (3,000 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 (3,000 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 318-14 Chapter 17 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 3,000 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 for STB2 anchors and ICC-ES ESR-2713 for Titen HD anchors.
6. Load values are based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, 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 ($\alpha$), 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 and MSJC Kicker Anchorage Solutions

| Cracked Concrete, Seismic in SDC C through F | | | | | | | |
|---|---|---|---|---|---|---|---|
| Minimum 2.5" Slab (3,000 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 318-14 Chapter 17 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 3,000 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 for STB2 anchors and ICC-ES ESR-2713 for Titen HD anchors.
6. Load values are based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, 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 ($\alpha$), 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 ($\Omega$) seismic factor of 1.5 or 2.5 for brittle failure as required by ACI 318-14 Chapter 17.

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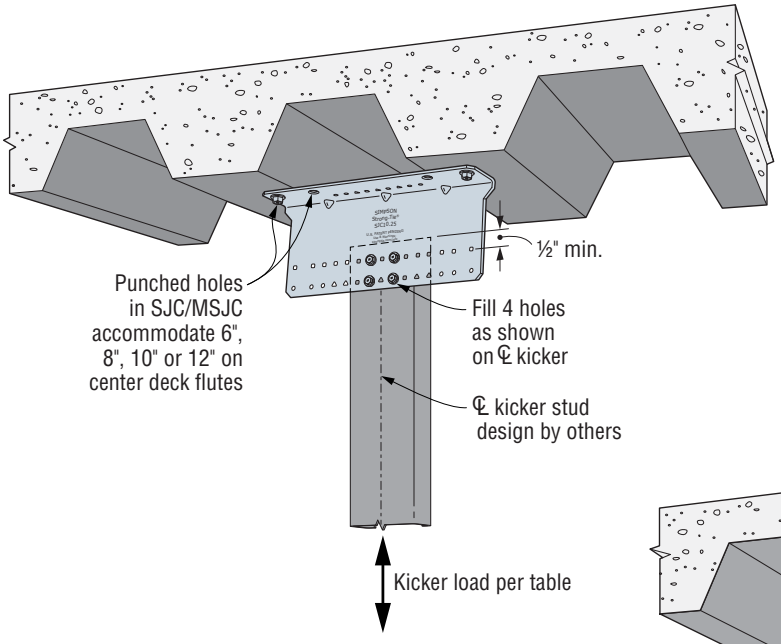
# **SJC** Steel-Joist Connectors



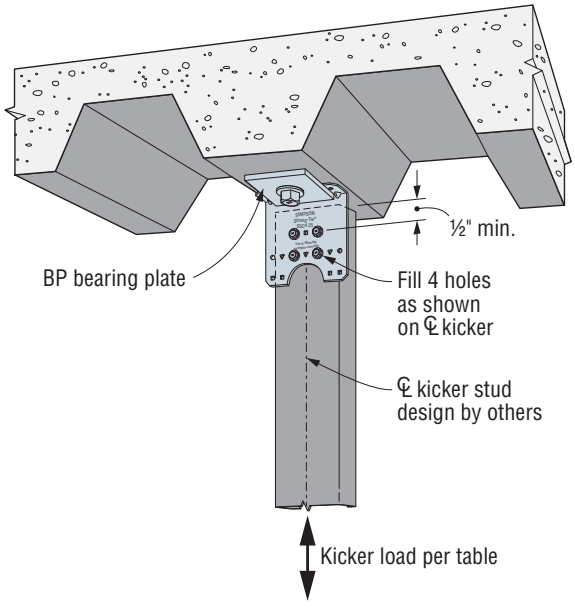
## SJC and SSC Connectors — Soffit Stud Hanger Allowable Loads

| Model No. | Connector Thickness mil (ga.) | L (in.) | Anchors | Fasteners to Stud | Allowable Tension Load | |
|---|---|---|---|---|---|---|
| | | | | | No Bearing Plate | BP½-3 Bearing Plate |
| SJC8.25 | 68 (14) | 8¼ | (2) ⅜" | (4) #10 | 465 | 930 |
| SJC10.25 | 68 (14) | 10¼ | (2) ⅜" | (4) #10 | 465 | 930 |
| SSC4.25 | 68 (14) | 4¼ | (1) ⅜" | (4) #10 | 220 | 585 |

1. Loads apply to connectors installed perpendicular or parallel to metal-deck flutes.
2. Stud member design per Designer. Tabulated loads for stud fasteners are based on a minimum stud thickness of 33 mil (20 ga.) with a yield stress of 33 ksi. For 30 mil interior studs with a yield strength of 33 ksi, multiply the tabulated values by 0.9.
3. Anchor design per Designer. Note that the SJC requires the symmetrical placement of one anchor on each side of the stud centerline.
4. For the bearing plate option, use Simpson Strong-Tie® BP½-3 bearing plates at each ⅜"-diameter anchor. Bearing plates are sold separately.




**Typical SJC Soffit Installation**
*(MSJC similar)*




**Typical SSC Soffit Installation**

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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
- Prepunched 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)

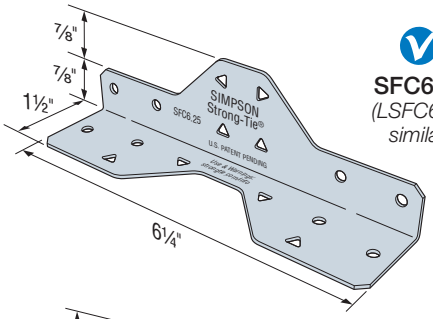
**Finish:** Galvanized (G90)

**Installation:**

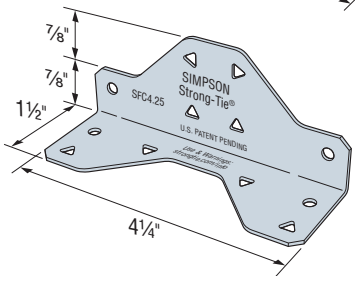
- Use all specified fasteners/anchors.

**Codes:** See p. 11 for Code Reference Key Chart

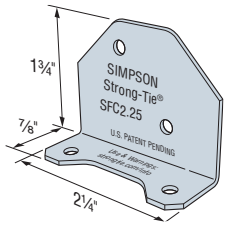
**For detailed product dimensions, refer to p. 90.**




**SFC6.25**
*(LSFC6.25 similar)*




**SFC4.25**
*(LSFC4.25 similar)*



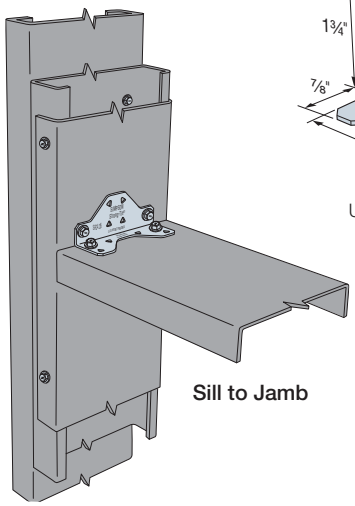

**SFC2.25**
*(LSFC2.25 similar)*

U.S. Patent 9,016,024

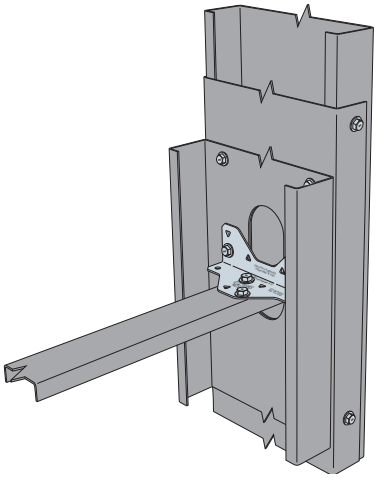
## Ordering Information

| Model No. | Ordering SKU[1] | 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-R100 | Bucket of 100 |
| LSFC6.25 | LSFC6.25-R100 | Bucket of 100 |

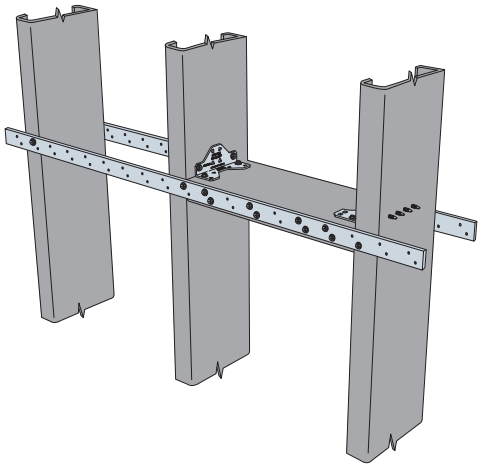
1. By leaving off the "-RXXX" suffix, items can also be ordered in cartons of 50.



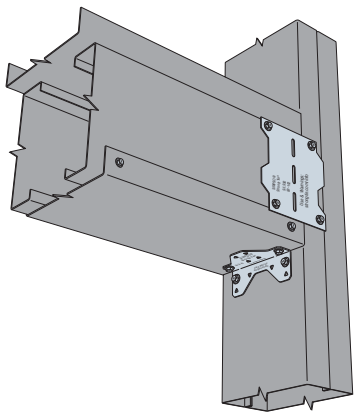
**Sill to Jamb**



**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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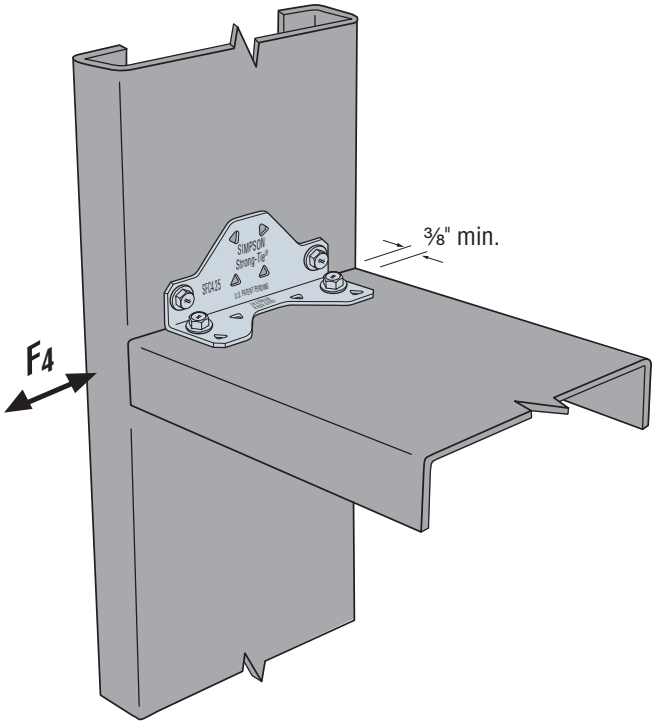
# **SFC** Steel Framing Connectors



## SFC Connectors — Steel-to-Steel Allowable Loads

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Framing Member Depth (in.) | Fasteners | | | Allowable $F_4$ Load (lb.) | | | | 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 | IP2 |
| 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 | 1,750 | |
| | | | | Max. | (6) #10 | (6) #10 | 440 | 865 | 1,320 | | |
| SFC4.25 | 54 (16) | 4¼ | 6 | Min. | (2) #10 | (2) #10 | 355 | 525 | 745 | 1,750 | |
| | | | | Max. | (6) #10 | (6) #10 | 575 | 985 | 1,750 | | |
| LSFC6.25 | 43 (18) | 6¼ | 8 | Min. | (4) #10 | (4) #10 | 490 | 920 | 1,050 | 2,640 | |
| | | | | Max. | (8) #10 | (8) #10 | 510 | 980 | 1,495 | | |
| SFC6.25 | 54 (16) | 6¼ | 8 | Min. | (4) #10 | (4) #10 | 590 | 1,035 | 1,840 | 2,640 | |
| | | | | Max. | (8) #10 | (8) #10 | 590 | 1,055 | 1,880 | | |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

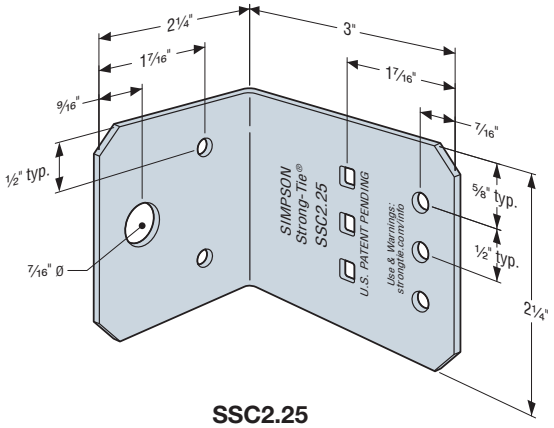



**Typical SFC Installation**

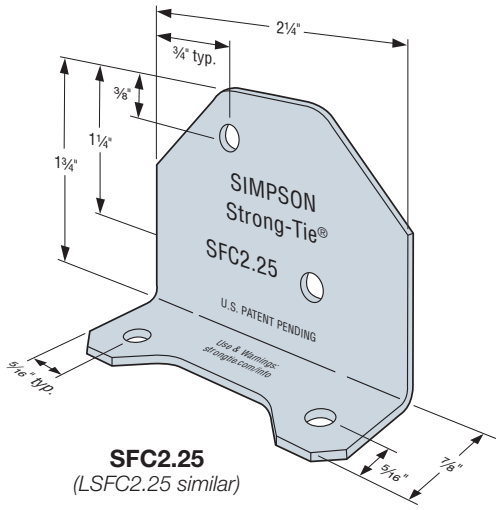
C-CF-2017 ©2017 SIMPSON STRONG-TIE COMPANY INC.

# Utility Clip Dimensions

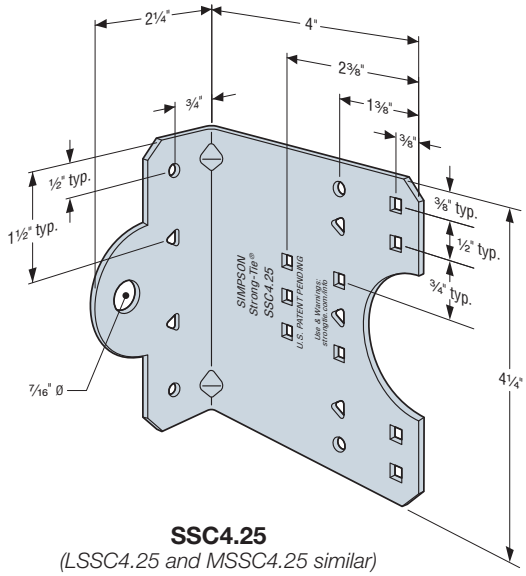




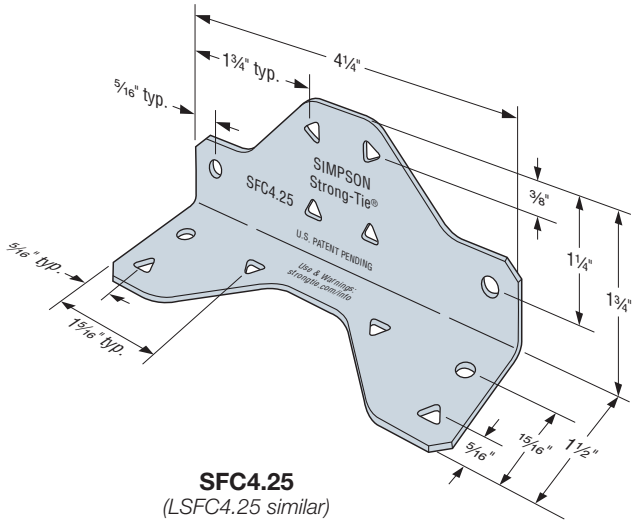

**SSC2.25**
*(MSSC2.25 similar)*



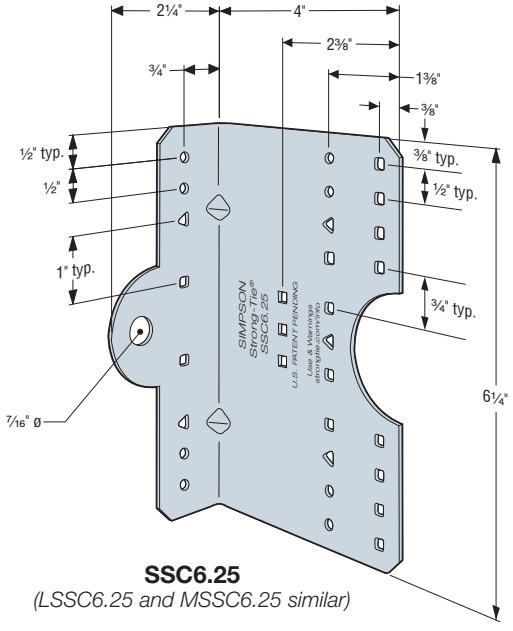

**SFC2.25**
*(LSFC2.25 similar)*



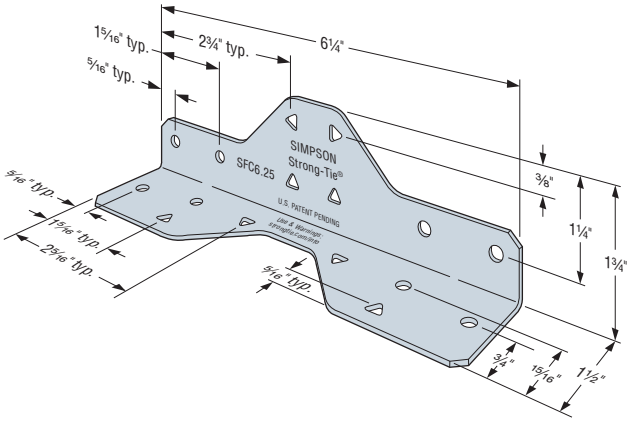

**SSC4.25**
*(LSSC4.25 and MSSC4.25 similar)*




**SFC4.25**
*(LSFC4.25 similar)*




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

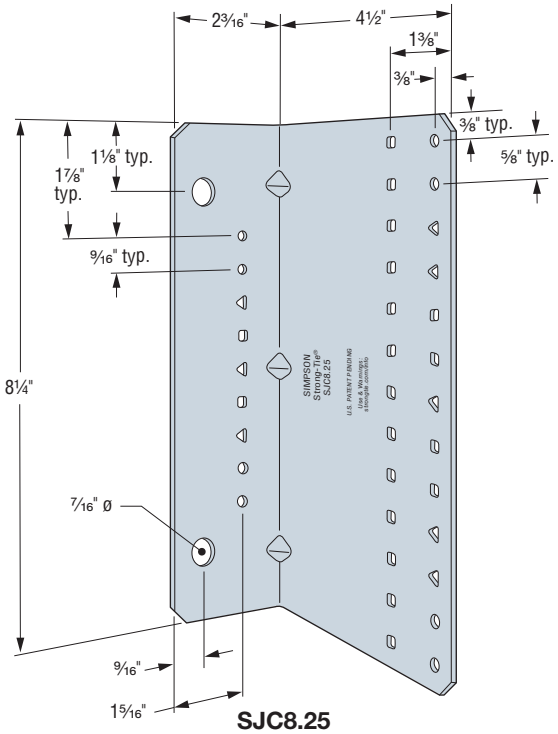



**SFC6.25**
*(LSFC6.25 similar)*

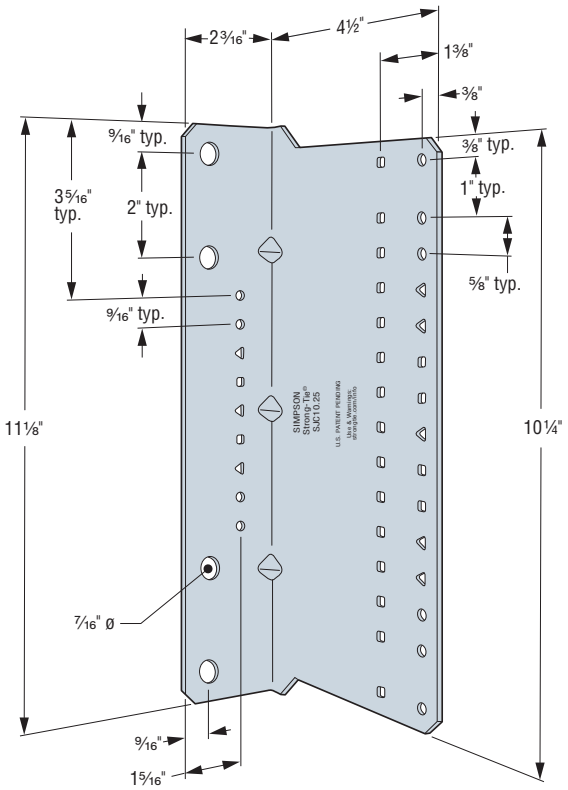
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# Utility Clip Dimensions






**SJC8.25**
*(MSJC8.25 similar)*




**SJC10.25**
*(MSJC10.25 similar)*

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# **RCA** Rigid Connector Angles



The Simpson Strong-Tie® rigid connector angle is a general-purpose clip angle designed for a wide range of cold-formed steel construction applications. With prepunched holes for fastener attachment, these L-shaped clips save time and labor on the job.

**Features:**

- Use with miscellaneous header/sill connections to jamb studs, jamb stud reinforcement at track, u-channel bridging, stud-blocking, bypass curtain-wall framing and more
- Easy to install, with prepunched holes for quick and accurate fastener attachment

**Material:** RCA223/54, RCA225/54, RCA227/54, RCA333/54, RCA335/54 — 54 mil (16 ga.), 50 ksi; RCA223/68, RCA225/68, RCA227/68, RCA333/68, RCA335/68 — 68 mil (14 ga.), 50 ksi; RCA223/97, RCA225/97, RCA227/97, RCA333/97, RCA335/97 — 97 mil (12 ga.), 50 ksi

**Finish:** Galvanized (G90)

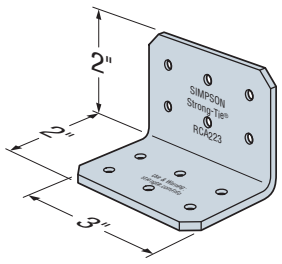
**Installation:**

- Use all specified anchors/fasteners

**Codes:** See p. 11 for Code Reference Key Chart

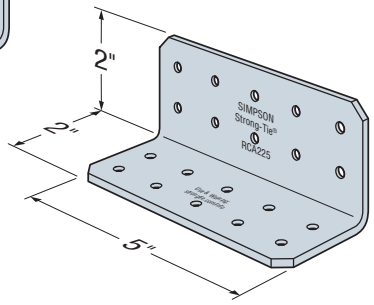
## Ordering Information

| Model No. | Ordering SKU | Bucket Quantity |
|---|---|---|
| RCA223/54 | RCA223/54-R150 | 150 |
| RCA223/68 | RCA223/68-R125 | 125 |
| RCA223/97 | RCA223/97-R90 | 90 |
| RCA225/54 | RCA225/54-R90 | 90 |
| RCA225/68 | RCA225/68-R75 | 75 |
| RCA225/97 | RCA225/97-R55 | 55 |
| RCA227/54 | RCA227/54-R65 | 65 |
| RCA227/68 | RCA227/68-R55 | 55 |
| RCA227/97 | RCA227/97-R40 | 40 |
| RCA333/54 | RCA333/54-R100 | 100 |
| RCA333/68 | RCA333/68-R85 | 85 |
| RCA333/97 | RCA333/97-R60 | 60 |
| RCA335/54 | RCA335/54-R60 | 60 |
| RCA335/68 | RCA335/68-R50 | 50 |
| RCA335/97 | RCA335/97-R35 | 35 |

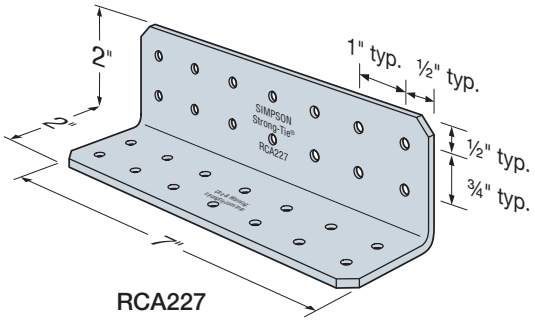



NEW

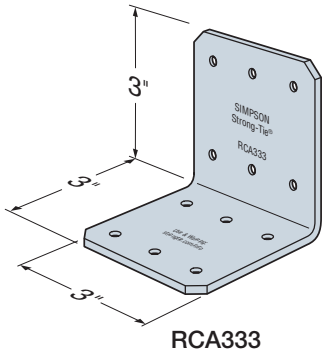
RCA223



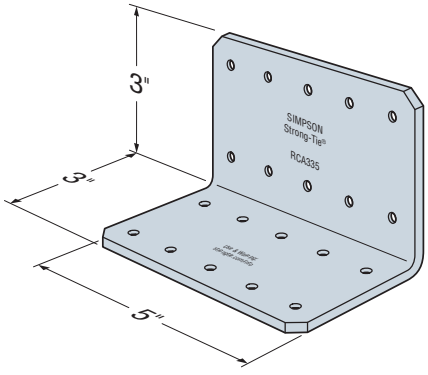

RCA225




RCA227




RCA333

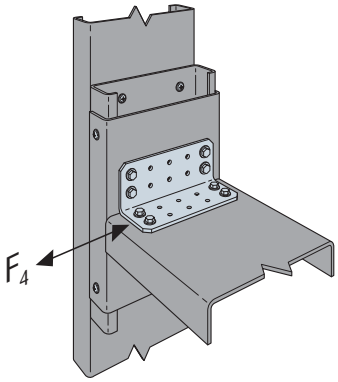



RCA335

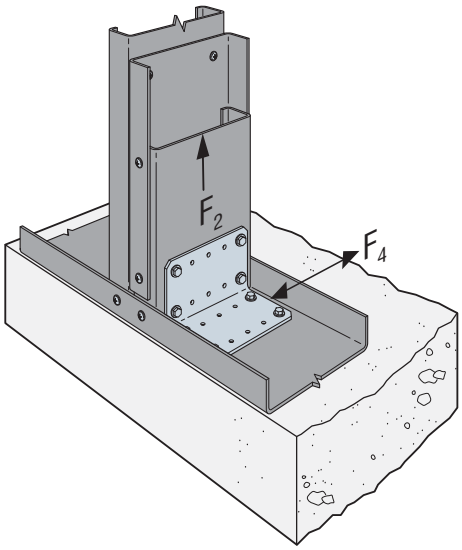
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# **RCA** Rigid Connector Angles

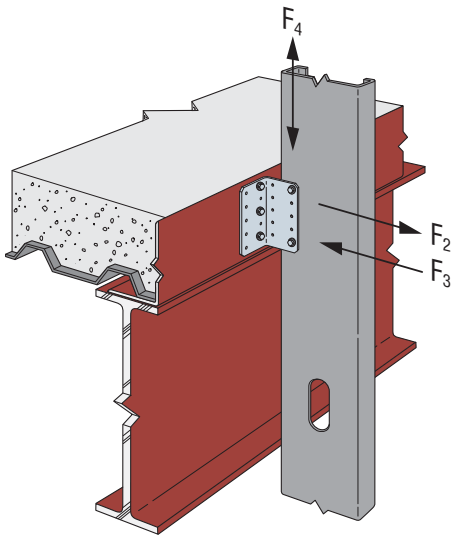





Typical RCA225
Installation at Sill/Jamb

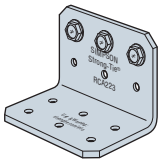
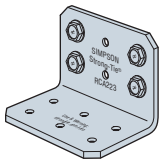
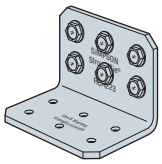
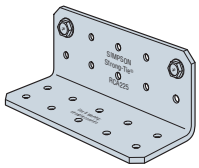
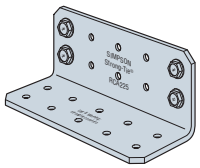
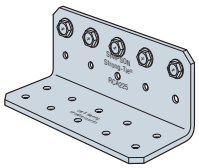
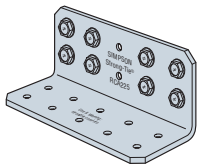
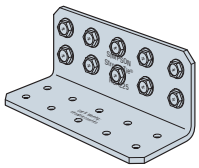
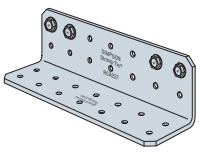
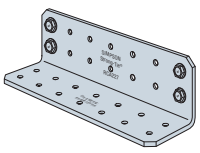
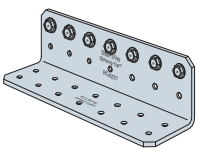
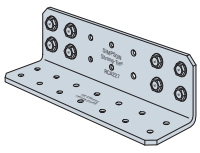
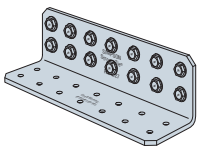



Typical RCA335 Installation
at Base of Jamb




Typical RCA335 Installation
at Bypass Framing

## Screw Patterns for Rigid Connector Angles

| Models | Pattern 1 | Pattern 2 | Pattern 3 | | |
|---|---|---|---|---|---|
| RCA223/54<br>RCA223/68<br>RCA223/97<br>RCA333/54<br>RCA333/68<br>RCA333/97 |  |  |  | | |
| **Models** | **Pattern 4** | **Pattern 5** | **Pattern 6** | **Pattern 7** | **Pattern 8** |
| RCA225/54<br>RCA225/68<br>RCA225/97<br>RCA335/54<br>RCA335/68<br>RCA335/97 |  |  |  |  |  |
| **Models** | **Pattern 9** | **Pattern 10** | **Pattern 11** | **Pattern 12** | **Pattern 13** |
| RCA227/54<br>RCA227/68<br>RCA227/97 |  |  |  |  |  |

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# Footnotes for RCA Load Tables

1. As applicable, the tabulated values are calculated based on AISI RP15-2, AISI S100 or generally accepted industry standards.
2. The tabulated values do not account for anchorage to the support. Anchor strength must be calculated separately and may reduce the capacity of the connection when compared to the tabulated values.
3. Tabulated values do not include shear, web crippling, buckling or other local effects in the member. The Designer must check member limit states separately.
4. For load combinations that include $F_4$ and/or $F_2$ and/or $F_3$, use an appropriate interaction equation.
5. #10–16 screws shall have $P_{ss} \geq 1{,}620$ lb. Calculated values are per AISI S100. Screws must be installed with three (minimum) exposed threads.
6. The number of screws is for one clip leg that is attached to the supported stud.
7. In addition to calculations of net and gross section tension, $F_2$ values are also calculated and normally controlled by weak-axis bending of the anchored clip leg with the line of bending at the holes nearest the bend radius of the angle. The Designer is responsible for calculating pullover, pullout and tension strength of the anchors and this may reduce $F_2$ strength compared to the tabulated values.
8. $F_3$ strength values are computed using the plate buckling provisions of AISI RP15-2.
9. For the $F_4$ strength values it's assumed that all of the connection eccentricity is taken by the screws in the supported stud. $F_4$ values are also limited by plate shear buckling per AISI RP15-2. The Designer is responsible for calculating the shear capacity of the anchorage, which may reduce $F_4$ strength compared to the tabulated values.
10. In addition to the limit states given in notes 7, 8 and 9, $F_2$, $F_3$ and $F_4$ are also limited by screw shear according to the thinnest connected part of the connector and stud.
11. Service load limits for $F_2$ and $F_3$ are not given since there are no generally accepted industry methods available to compute these values. $F_4$ service load limits are based on AISI Research Report RP15-2, using a safety factor of three for ⅛" deflection.
12. For 50 ksi studs, 68 mil (14 ga.) and thicker, use the tabulated values for 54 mil (16 ga.) — 50 ksi studs.

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# **RCA** Rigid Connector Angles

## RCA Rigid Connector Angles (2"x2"x3" and 2"x2"x5") — Service Load Limits and Strengths (lb.)

| Model | No. of #10 Screws[5,6] | Screw Pattern | Load Direction | Service Load Limit[11] | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| RCA223/54 | 3 | 1 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 590 | 955 | 1,910 | 590 | 955 | 1,910 |
| | | | $F_4$ | 350 | 200 | 300 | 605 | 310 | 465 | 930 | 620 | 930 | 1,865 |
| | 4 | 2 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 580 | 940 | 1,880 | 580 | 940 | 1,880 | 580 | 940 | 1,880 |
| | | | $F_4$ | 700 | 390 | 585 | 1,175 | 605 | 905 | 1,815 | 1,095 | 1,685 | 3,065 |
| | 6 | 3 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 865 | 1,410 | 2,820 | 865 | 1,410 | 2,820 | 865 | 1,410 | 2,820 |
| | | | $F_4$ | 700 | 480 | 720 | 1,440 | 740 | 1,110 | 2,225 | 1,095 | 1,685 | 3,065 |
| RCA223/68 | 3 | 1 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 765 | 1,150 | 2,295 | 815 | 1,330 | 2,655 |
| | | | $F_4$ | 435 | 200 | 300 | 605 | 310 | 465 | 930 | 620 | 930 | 1,865 |
| | 4 | 2 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 805 | 1,305 | 2,610 | 805 | 1,305 | 2,610 |
| | | | $F_4$ | 865 | 390 | 585 | 1,175 | 605 | 905 | 1,815 | 1,210 | 1,815 | 3,625 |
| | 6 | 3 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,205 | 1,960 | 3,915 | 1,205 | 1,960 | 3,915 |
| | | | $F_4$ | 865 | 480 | 720 | 1,440 | 740 | 1,110 | 2,225 | 1,350 | 2,080 | 3,785 |
| RCA223/97 | 3 | 1 | $F_2$ | — | 495 | 745 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 765 | 1,150 | 2,295 | 1,415 | 2,295 | 4,590 |
| | | | $F_4$ | 615 | 200 | 300 | 605 | 310 | 465 | 930 | 620 | 930 | 1,865 |
| | 4 | 2 | $F_2$ | — | 630 | 945 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,265 | 2,050 | 4,105 |
| | | | $F_4$ | 1,230 | 390 | 585 | 1,175 | 605 | 905 | 1,815 | 1,210 | 1,815 | 3,625 |
| | 6 | 3 | $F_2$ | — | 630 | 945 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,530 | 2,295 | 4,590 | 1,895 | 3,080 | 6,155 |
| | | | $F_4$ | 1,230 | 480 | 720 | 1,440 | 740 | 1,110 | 2,225 | 1,485 | 2,225 | 4,450 |
| RCA225/54 | 2 | 4 | $F_2$ | — | 330 | 495 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 330 | 495 | 990 | 390 | 635 | 1,275 | 390 | 635 | 1,275 |
| | | | $F_4$ | 585 | 265 | 395 | 790 | 410 | 610 | 1,225 | 815 | 1,225 | 2,450 |
| | 4 | 5 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 580 | 940 | 1,880 | 580 | 940 | 1,880 | 580 | 940 | 1,880 |
| | | | $F_4$ | 1,170 | 535 | 805 | 1,610 | 830 | 1,245 | 2,490 | 1,660 | 2,490 | 4,980 |
| | 5 | 6 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 980 | 1,595 | 3,185 | 980 | 1,595 | 3,185 |
| | | | $F_4$ | 585 | 460 | 685 | 1,375 | 705 | 1,060 | 2,120 | 1,310 | 2,015 | 3,665 |
| | 8 | 7 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 |
| | | | $F_4$ | 1,170 | 915 | 1,375 | 2,750 | 1,420 | 2,125 | 4,255 | 1,825 | 2,810 | 5,110 |
| | 10 | 8 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 1,445 | 2,350 | 4,695 | 1,445 | 2,350 | 4,695 | 1,445 | 2,350 | 4,695 |
| | | | $F_4$ | 1,170 | 1,035 | 1,555 | 3,105 | 1,600 | 2,400 | 4,800 | 1,825 | 2,810 | 5,110 |

See footnotes on p. 94.



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# RCA Rigid Connector Angles



## RCA Rigid Connector Angles (2"x2"x5" and 2"x2"x7") — Service Load Limits and Strengths (lb.)

| Model | No. of #10 Screws[5,6] | Screw Pattern | Load Direction | Service Load Limit[11] | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| RCA225/68 | 2 | 4 | $F_2$ | — | 330 | 495 | 865 | 510 | 765 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 545 | 885 | 1,770 |
| | | | $F_4$ | 720 | 265 | 395 | 790 | 410 | 610 | 1,225 | 815 | 1,225 | 2,450 |
| | 4 | 5 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 805 | 1,305 | 2,610 | 805 | 1,305 | 2,610 |
| | | | $F_4$ | 1,440 | 535 | 805 | 1,610 | 830 | 1,245 | 2,490 | 1,660 | 2,490 | 4,980 |
| | 5 | 6 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 1,275 | 1,915 | 3,825 | 1,360 | 2,215 | 4,425 |
| | | | $F_4$ | 720 | 460 | 685 | 1,375 | 705 | 1,060 | 2,120 | 1,415 | 2,120 | 4,245 |
| | 8 | 7 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 1,605 | 2,610 | 5,220 | 1,605 | 2,610 | 5,220 |
| | | | $F_4$ | 1,440 | 915 | 1,375 | 2,750 | 1,420 | 2,125 | 4,255 | 2,255 | 3,470 | 6,310 |
| | 10 | 8 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 1,650 | 2,475 | 4,950 | 2,010 | 3,265 | 6,525 | 2,010 | 3,265 | 6,525 |
| | | | $F_4$ | 1,440 | 1,035 | 1,555 | 3,105 | 1,600 | 2,400 | 4,800 | 2,255 | 3,470 | 6,310 |
| RCA225/97 | 2 | 4 | $F_2$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 1,020 | 1,530 | 1,755 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 945 | 1,530 | 3,060 |
| | | | $F_4$ | 1,025 | 265 | 395 | 790 | 410 | 610 | 1,225 | 815 | 1,225 | 2,450 |
| | 4 | 5 | $F_2$ | — | 660 | 990 | 1,755 | 1,020 | 1,530 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,265 | 2,050 | 4,105 |
| | | | $F_4$ | 2,050 | 535 | 805 | 1,610 | 830 | 1,245 | 2,490 | 1,660 | 2,490 | 4,980 |
| | 5 | 6 | $F_2$ | — | 825 | 1,240 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 1,275 | 1,915 | 3,825 | 2,360 | 3,825 | 7,650 |
| | | | $F_4$ | 1,025 | 460 | 685 | 1,375 | 705 | 1,060 | 2,120 | 1,415 | 2,120 | 4,245 |
| | 8 | 7 | $F_2$ | — | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 2,040 | 3,060 | 6,120 | 2,525 | 4,105 | 8,210 |
| | | | $F_4$ | 2,050 | 915 | 1,375 | 2,750 | 1,420 | 2,125 | 4,255 | 2,835 | 4,255 | 8,505 |
| | 10 | 8 | $F_2$ | — | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 1,650 | 2,475 | 4,950 | 2,550 | 3,825 | 7,650 | 3,155 | 5,130 | 10260 |
| | | | $F_4$ | 2,050 | 1,035 | 1,555 | 3,105 | 1,600 | 2,400 | 4,800 | 3,200 | 4,800 | 8,980 |
| RCA227/54 | 4 | 9 | $F_2$ | — | 475 | 715 | 795 | 475 | 715 | 795 | 475 | 715 | 795 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 785 | 1,275 | 2,550 | 785 | 1,275 | 2,550 |
| | | | $F_4$ | 820 | 545 | 815 | 1,630 | 840 | 1,260 | 2,515 | 1,675 | 2,515 | 5,030 |
| | 4 | 10 | $F_2$ | — | 475 | 715 | 795 | 475 | 715 | 795 | 475 | 715 | 795 |
| | | | $F_3$ | — | 580 | 940 | 1,880 | 580 | 940 | 1,880 | 580 | 940 | 1,880 |
| | | | $F_4$ | 1,635 | 595 | 890 | 1,785 | 920 | 1,380 | 2,760 | 1,840 | 2,760 | 5,515 |
| | 7 | 11 | $F_2$ | — | 475 | 715 | 795 | 475 | 715 | 795 | 475 | 715 | 795 |
| | | | $F_3$ | — | 1,155 | 1,735 | 3,465 | 1,280 | 2,080 | 4,160 | 1,280 | 2,080 | 4,160 |
| | | | $F_4$ | 720 | 765 | 1,150 | 2,300 | 1,185 | 1,780 | 3,560 | 1,685 | 2,595 | 4,720 |
| | 8 | 12 | $F_2$ | — | 475 | 715 | 795 | 475 | 715 | 795 | 475 | 715 | 795 |
| | | | $F_3$ | — | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 |
| | | | $F_4$ | 1,635 | 1,120 | 1,680 | 3,360 | 1,730 | 2,595 | 5,190 | 2,555 | 3,935 | 7,155 |
| | 14 | 13 | $F_2$ | — | 475 | 715 | 795 | 475 | 715 | 795 | 475 | 715 | 795 |
| | | | $F_3$ | — | 2,025 | 3,290 | 6,575 | 2,025 | 3,290 | 6,575 | 2,025 | 3,290 | 6,575 |
| | | | $F_4$ | 1,635 | 1,685 | 2,530 | 5,055 | 2,555 | 3,905 | 7,155 | 2,555 | 3,935 | 7,155 |
| RCA227/68 | 4 | 9 | $F_2$ | — | 660 | 990 | 1,215 | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,090 | 1,770 | 3,540 |
| | | | $F_4$ | 1,010 | 545 | 815 | 1,630 | 840 | 1,260 | 2,515 | 1,675 | 2,515 | 5,030 |
| | 4 | 10 | $F_2$ | — | 660 | 990 | 1,215 | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 805 | 1,305 | 2,610 | 805 | 1,305 | 2,610 |
| | | | $F_4$ | 2,020 | 595 | 890 | 1,785 | 920 | 1,380 | 2,760 | 1,840 | 2,760 | 5,515 |
| | 7 | 11 | $F_2$ | — | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 |
| | | | $F_3$ | — | 1,155 | 1,735 | 3,465 | 1,780 | 2,680 | 5,355 | 1,780 | 2,890 | 5,775 |
| | | | $F_4$ | 890 | 765 | 1,150 | 2,300 | 1,185 | 1,780 | 3,560 | 2,370 | 3,560 | 6,900 |
| | 8 | 12 | $F_2$ | — | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 1,605 | 2,610 | 5,220 | 1,605 | 2,610 | 5,220 |
| | | | $F_4$ | 2,020 | 1,120 | 1,680 | 3,360 | 1,730 | 2,595 | 5,190 | 3,155 | 4,860 | 8,830 |
| | 14 | 13 | $F_2$ | — | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 | 725 | 1,090 | 1,215 |
| | | | $F_3$ | — | 2,310 | 3,465 | 6,930 | 2,810 | 4,570 | 9,135 | 2,810 | 4,570 | 9,135 |
| | | | $F_4$ | 2,020 | 1,685 | 2,530 | 5,055 | 2,605 | 3,905 | 7,815 | 3,155 | 4,860 | 8,830 |

See footnotes on p. 94.

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# **RCA** Rigid Connector Angles



## RCA Rigid Connector Angles (2"x2"x7" and 3"x3"x3") — Service Load Limits and Strengths (lb.)

| Model | No. of #10 Screws[5,6] | Screw Pattern | Load Direction | Service Load Limit[11] | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| RCA227/97 | 4 | 9 | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 2,455 | 1,470 | 2,210 | 2,455 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,890 | 3,060 | 6,120 |
| | | | $F_4$ | 1,435 | 545 | 815 | 1,630 | 840 | 1,260 | 2,515 | 1,675 | 2,515 | 5,030 |
| | 4 | 10 | $F_2$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 2,455 | 1,470 | 2,210 | 2,455 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,265 | 2,050 | 4,105 |
| | | | $F_4$ | 2,875 | 595 | 890 | 1,785 | 920 | 1,380 | 2,760 | 1,840 | 2,760 | 5,515 |
| | 7 | 11 | $F_2$ | — | 1,155 | 1,735 | 2,455 | 1,470 | 2,210 | 2,455 | 1,470 | 2,210 | 2,455 |
| | | | $F_3$ | — | 1,155 | 1,735 | 3,465 | 1,785 | 2,680 | 5,355 | 3,080 | 5,010 | 10015 |
| | | | $F_4$ | 1,265 | 765 | 1,150 | 2,300 | 1,185 | 1,780 | 3,560 | 2,370 | 3,560 | 7,115 |
| | 8 | 12 | $F_2$ | — | 1,320 | 1,980 | 2,455 | 1,470 | 2,210 | 2,455 | 1,470 | 2,210 | 2,455 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 2,040 | 3,060 | 6,120 | 2,525 | 4,105 | 8,210 |
| | | | $F_4$ | 2,875 | 1,120 | 1,680 | 3,360 | 1,730 | 2,595 | 5,190 | 3,460 | 5,190 | 10385 |
| | 14 | 13 | $F_2$ | — | 1,470 | 2,210 | 2,455 | 1,470 | 2,210 | 2,455 | 1,470 | 2,210 | 2,455 |
| | | | $F_3$ | — | 2,310 | 3,465 | 6,930 | 3,570 | 5,355 | 10710 | 4,420 | 7,180 | 14365 |
| | | | $F_4$ | 2,875 | 1,685 | 2,530 | 5,055 | 2,605 | 3,905 | 7,815 | 4,490 | 6,915 | 12570 |
| RCA333/54 | 3 | 1 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 440 | 720 | 1,435 | 440 | 720 | 1,435 | 440 | 720 | 1,435 |
| | | | $F_4$ | 210 | 130 | 190 | 385 | 195 | 295 | 590 | 395 | 590 | 1,185 |
| | 4 | 2 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 580 | 940 | 1,880 | 580 | 940 | 1,880 | 580 | 940 | 1,880 |
| | | | $F_4$ | 700 | 325 | 490 | 975 | 505 | 755 | 1,510 | 1,005 | 1,510 | 3,020 |
| | 6 | 3 | $F_2$ | — | 205 | 305 | 340 | 205 | 305 | 340 | 205 | 305 | 340 |
| | | | $F_3$ | — | 865 | 1,410 | 2,820 | 865 | 1,410 | 2,820 | 865 | 1,410 | 2,820 |
| | | | $F_4$ | 700 | 430 | 650 | 1,295 | 665 | 1,000 | 2,000 | 1,095 | 1,685 | 3,065 |
| RCA333/68 | 3 | 1 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 615 | 1,000 | 1,995 | 615 | 1,000 | 1,995 |
| | | | $F_4$ | 260 | 130 | 190 | 385 | 195 | 295 | 590 | 395 | 590 | 1,185 |
| | 4 | 2 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 805 | 1,305 | 2,610 | 805 | 1,305 | 2,610 |
| | | | $F_4$ | 865 | 325 | 490 | 975 | 505 | 755 | 1,510 | 1,005 | 1,510 | 3,020 |
| | 6 | 3 | $F_2$ | — | 310 | 470 | 520 | 310 | 470 | 520 | 310 | 470 | 520 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,205 | 1,960 | 3,915 | 1,205 | 1,960 | 3,915 |
| | | | $F_4$ | 865 | 430 | 650 | 1,295 | 665 | 1,000 | 2,000 | 1,335 | 2,000 | 3,785 |
| RCA333/97 | 3 | 1 | $F_2$ | — | 495 | 745 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 495 | 745 | 1,485 | 765 | 1,150 | 2,295 | 1,065 | 1,730 | 3,460 |
| | | | $F_4$ | 370 | 130 | 190 | 385 | 195 | 295 | 590 | 395 | 590 | 1,185 |
| | 4 | 2 | $F_2$ | — | 630 | 945 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,265 | 2,050 | 4,105 |
| | | | $F_4$ | 1,230 | 325 | 490 | 975 | 505 | 755 | 1,510 | 1,005 | 1,510 | 3,020 |
| | 6 | 3 | $F_2$ | — | 630 | 945 | 1,055 | 630 | 945 | 1,055 | 630 | 945 | 1,055 |
| | | | $F_3$ | — | 990 | 1,485 | 2,970 | 1,530 | 2,295 | 4,590 | 1,895 | 3,080 | 6,155 |
| | | | $F_4$ | 1,230 | 430 | 650 | 1,295 | 665 | 1,000 | 2,000 | 1,335 | 2,000 | 4,005 |

See footnotes on p. 94.

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## RCA Rigid Connector Angles (3"x3"x5") – Service Load Limits and Strengths (lb.)

| Model | No. of #10 Screws[5,6] | Screw Pattern | Load Direction | Service Load Limit[11] | Stud Thickness and Yield Strength | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 33 mil (20 ga.) – 33 ksi | | | 43 mil (18 ga.) – 33 ksi | | | 54 mil (16 ga.) – 50 ksi | | |
| | | | | | ASD | LRFD | Nominal | ASD | LRFD | Nominal | ASD | LRFD | Nominal |
| RCA335/54 | 2 | 4 | $F_2$ | — | 330 | 495 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 295 | 480 | 955 | 295 | 480 | 955 | 295 | 480 | 955 |
| | | | $F_4$ | 350 | 205 | 310 | 620 | 320 | 480 | 955 | 635 | 955 | 1,910 |
| | 4 | 5 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 580 | 940 | 1,880 | 580 | 940 | 1,880 | 580 | 940 | 1,880 |
| | | | $F_4$ | 1,170 | 450 | 675 | 1,350 | 695 | 1,045 | 2,085 | 1,390 | 2,085 | 4,175 |
| | 5 | 6 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 735 | 1,195 | 2,395 | 735 | 1,195 | 2,395 | 735 | 1,195 | 2,395 |
| | | | $F_4$ | 350 | 305 | 460 | 920 | 475 | 710 | 1,420 | 835 | 1,285 | 2,335 |
| | 8 | 7 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 | 1,155 | 1,880 | 3,760 |
| | | | $F_4$ | 1,170 | 755 | 1,135 | 2,265 | 1,170 | 1,750 | 3,505 | 1,825 | 2,810 | 5,110 |
| | 10 | 8 | $F_2$ | — | 340 | 510 | 570 | 340 | 510 | 570 | 340 | 510 | 570 |
| | | | $F_3$ | — | 1,445 | 2,350 | 4,695 | 1,445 | 2,350 | 4,695 | 1,445 | 2,350 | 4,695 |
| | | | $F_4$ | 1,170 | 860 | 1,290 | 2,585 | 1,330 | 1,995 | 3,990 | 1,825 | 2,810 | 5,110 |
| RCA335/68 | 2 | 4 | $F_2$ | — | 330 | 495 | 865 | 510 | 765 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 330 | 495 | 990 | 410 | 665 | 1,330 | 410 | 665 | 1,330 |
| | | | $F_4$ | 435 | 205 | 310 | 620 | 320 | 480 | 955 | 635 | 955 | 1,910 |
| | 4 | 5 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 805 | 1,305 | 2,610 | 805 | 1,305 | 2,610 |
| | | | $F_4$ | 1,440 | 450 | 675 | 1,350 | 695 | 1,045 | 2,085 | 1,390 | 2,085 | 4,175 |
| | 5 | 6 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 1,025 | 1,665 | 3,325 | 1,025 | 1,665 | 3,325 |
| | | | $F_4$ | 435 | 305 | 460 | 920 | 475 | 710 | 1420 | 945 | 1,420 | 2,840 |
| | 8 | 7 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 1,605 | 2,610 | 5,220 | 1,605 | 2,610 | 5,220 |
| | | | $F_4$ | 1,440 | 755 | 1,135 | 2,265 | 1,170 | 1,750 | 3,505 | 2,255 | 3,470 | 6,310 |
| | 10 | 8 | $F_2$ | — | 520 | 780 | 865 | 520 | 780 | 865 | 520 | 780 | 865 |
| | | | $F_3$ | — | 1,650 | 2,475 | 4,950 | 2,010 | 3,265 | 6,525 | 2,010 | 3,265 | 6,525 |
| | | | $F_4$ | 1,440 | 860 | 1,290 | 2,585 | 1,330 | 1,995 | 3,990 | 2,255 | 3,470 | 6,310 |
| RCA335/97 | 2 | 4 | $F_2$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 1,020 | 1,530 | 1,755 |
| | | | $F_3$ | — | 330 | 495 | 990 | 510 | 765 | 1,530 | 710 | 1,155 | 2,305 |
| | | | $F_4$ | 615 | 205 | 310 | 620 | 320 | 480 | 955 | 635 | 955 | 1,910 |
| | 4 | 5 | $F_2$ | — | 660 | 990 | 1,755 | 1,020 | 1,530 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 660 | 990 | 1,980 | 1,020 | 1,530 | 3,060 | 1,265 | 2,050 | 4,105 |
| | | | $F_4$ | 2,050 | 450 | 675 | 1,350 | 695 | 1,045 | 2,085 | 1,390 | 2,085 | 4,175 |
| | 5 | 6 | $F_2$ | — | 825 | 1,240 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 825 | 1,240 | 2,475 | 1,275 | 1,915 | 3,825 | 1,775 | 2,885 | 5,765 |
| | | | $F_4$ | 615 | 305 | 460 | 920 | 475 | 710 | 1,420 | 945 | 1,420 | 2,840 |
| | 8 | 7 | $F_2$ | — | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 1,320 | 1,980 | 3,960 | 2,040 | 3,060 | 6,120 | 2,525 | 4,105 | 8,210 |
| | | | $F_4$ | 2,050 | 755 | 1,135 | 2,265 | 1,170 | 1,750 | 3,505 | 2,335 | 3,505 | 7,010 |
| | 10 | 8 | $F_2$ | — | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 | 1,050 | 1,580 | 1,755 |
| | | | $F_3$ | — | 1,650 | 2,475 | 4,950 | 2,550 | 3,825 | 7,650 | 3,155 | 5,130 | 10,260 |
| | | | $F_4$ | 2,050 | 860 | 1,290 | 2,585 | 1,330 | 1,995 | 3,990 | 2,660 | 3,990 | 7,985 |

See footnotes on p. 94.

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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)

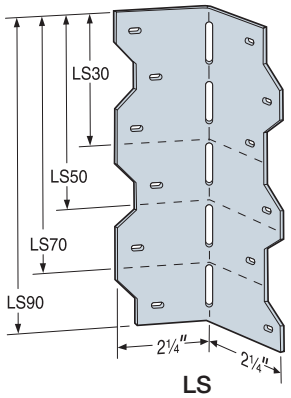
**Installation:**

- 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

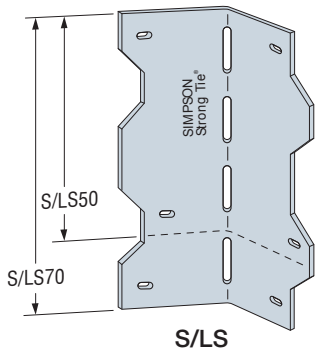
**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Length (in.) | Fasteners | Allowable Load (lb.) | | | | | | 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 | 1,100 | 110 | |
| L90 | 9 | (10) #10 | 795 | — | 945 | 110 | 1,740 | 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 | — | |

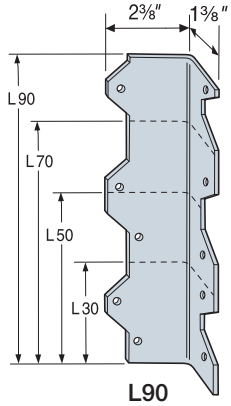
1. Loads are for one part only.
2. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



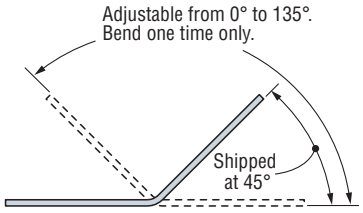
LS



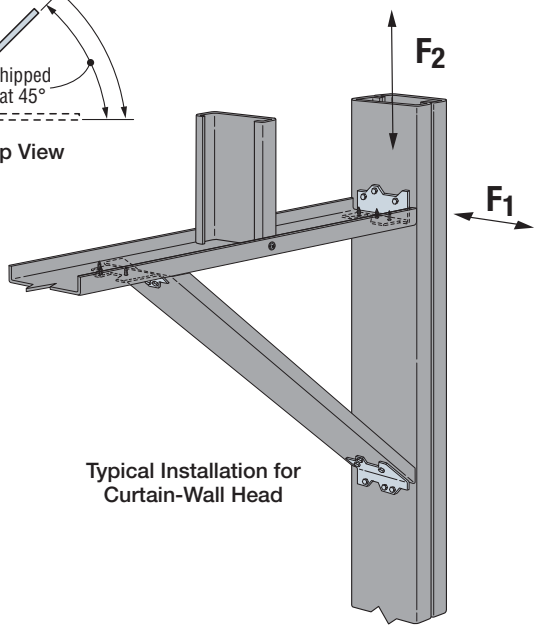
S/LS



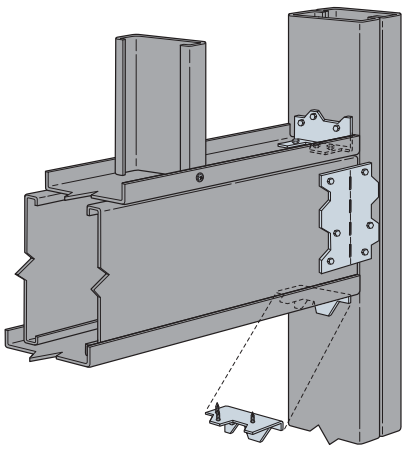
L90



LS and S/LS Top View



Typical Installation for Curtain-Wall Head


Typical Installation for Gravity Headers



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# RCKW Kneewall 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.***

The Simpson Strong-Tie® RCKW rigid connectors have been developed to resist overturning moment at the base of exterior kneewalls and parapets as well as interior partial-height walls. These connectors offer a unique anchor-hole pattern that permits anchorage to both concrete and structural steel, with the larger hole designed to accommodate ½"-diameter concrete screws such as the Simpson Strong-Tie Titen HD®. The RCKWS is a heavy 171 mil (7 ga.) stiffener that nests onto the RCKW clip. The screw holes and anchor holes in the stiffener line up with those in the RCKW clip, making fastener and anchor installation a snap. The RCKW clip and RCKWS stiffener are sold separately.

**Features:**

- Anchorage legs incorporate stiffened flanges, improving overturning moment resistance
- Large-diameter anchor hole accommodates ½"-diameter concrete screws and wedge anchors, such as the Simpson Strong-Tie Titen HD heavy-duty screw and the Strong-Bolt® 2 wedge anchor
- Additional smaller-diameter anchor holes enable attachment to structural steel through use of #12 self-drilling screws
- Attachment to CMU can be achieved with use of Titen® concrete and masonry screws
- For the RCKWS: 171 mil (7 ga.) stiffeners are secured to the RCKW clip with screws, optimizing overturning moment resistance and stiffness

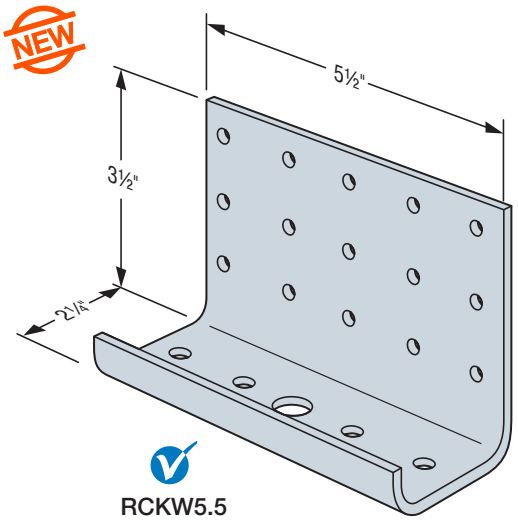
**Material:** RCKW and RCKWS — 171 mil (7 ga.), 33 ksi

**Coating:** Galvanized (G90)

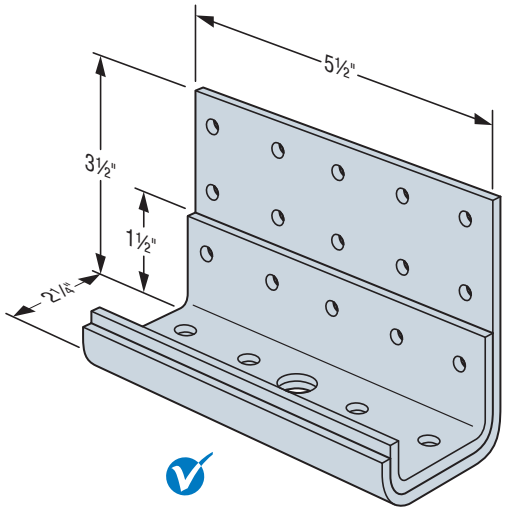
**Installation:**

- Use all specified screw fasteners. To achieve tabulated load values, use #12–14 screws according to the screw patterns below.
- When using the RCKWS, secure the stiffener to the clip with the specified screw fasteners. Screws must be at least 1" long and extend through the connection with a minimum of three exposed threads.
- Use all specified anchors. To achieve tabulated stiffness values, the installation torque for ½"-diameter anchors shall be at least 17 ft.-lb.
- When using the ½"-diameter Simpson Strong-Tie Titen HD® anchor, the bottom track must be pre-drilled or punched with a ¾"-diameter hole.

**Codes:** See p. 11 for Code Reference Key Chart




**RCKW5.5**
*(RCKW3 and RCKW7.5 models also available)*




**RCKW5.5 shown with RCKW5.5S stiffener**
*(RCKW5.5S can also be used with the RCKW7.5; RCKW3S can be used with RCKW3)*
U.S. Patent Pending

## Ordering Information

| Model No. | Ordering SKU | Package Quantity |
|---|---|---|
| RCKW3 | RCKW3-R10 | 10 RCKW3 clips |
| RCKW5.5 | RCKW5.5-R10 | 10 RCKW5.5 clips |
| RCKW7.5 | RCKW7.5-R10 | 10 RCKW7.5 clips |
| RCKW3S | RCKW3S-R10 | 10 RCKW3S stiffeners |
| RCKW5.5S | RCKW5.5S-R10 | 10 RCKW5.5S stiffeners |

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# Ease of Specification

Many cold-formed steel connector manufacturers provide limited technical data for their products. As a result, Designers often rely on detailed and time-consuming hand calculations for CFS connection design. This often involves assumptions regarding connection eccentricity, prying and connection stiffness.

Simpson Strong-Tie strives for ease of specification by providing comprehensive load tables based on tests that simulate real-world conditions. These load tables ensure that tabulated values reflect not only the strength of the connector, but also the strength of the fasteners, the anchorage, the member near the connection, and the overall stiffness. The photo to the right is an example of member failure near the connection. Such failures are reflected in our tabulated loads because of our assembly testing.

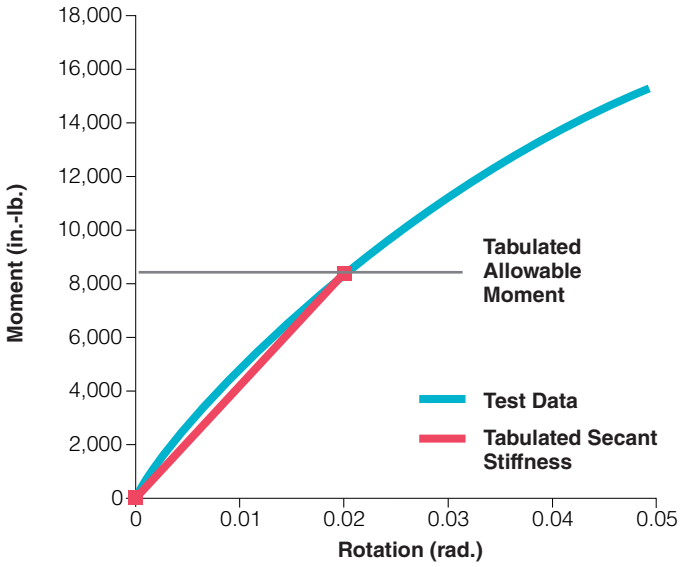


**RCKW Assembly Test with Member Failure**

# Simplified Stiffness Calculations

Some manufacturers tabulate stiffness values only for the connector. It's often unknown or unclear if their stiffness includes the screw fastener slip and how this varies with the thickness of the stud. Additionally, with some manufacturers, the deflection of the stud must be added to the deflection from the rotation of the connector in order to arrive at the final deflection for design.

Because we have tested the entire assembly, Simpson Strong-Tie tabulates stiffness that includes connector deflection, fastener slip and stud deflection for walls up to 38" in height. Our stiffness also takes into account the thickness of the stud, making it simple for the Designer to calculate deflections: Simply divide the required moment by the tabulated stiffness, and then multiply the result by the stud length (Ref. Example #1 on p. 104). For walls over 38", a different approach is required (Ref. Example #2 on pp. 105–106).




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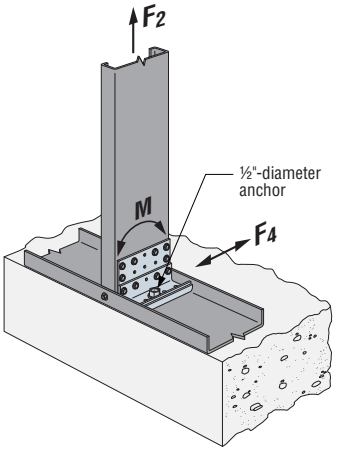
# RCKW Kneewall Connectors



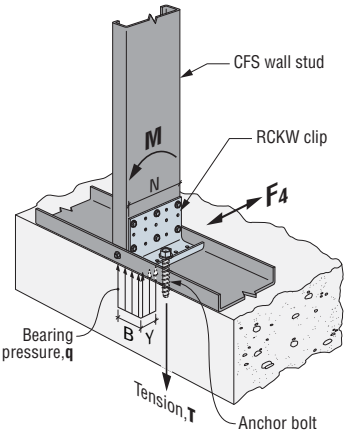
## RCKW Allowable Loads — Concrete Anchorage

| Model No. | Fastener Pattern | Fasteners to Stud | Framing Members Thickness mil (ga.) | Allowable Moment M (in.-lb.) | Assembly Rotational Stiffness β (in.-lb./rad.) | Connector Rotational Stiffness βc (in.-lb./rad.) | Anchor Tension, T at Allowable Moment (lb.) | | Allowable Tension Load $F_2$ (lb.) | Anchor Tension, T at Allowable Tension Load $F_2$ (lb.) | | Allowable Shear Load $F_4$ (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $f'_c$ = 3,000 psi | $f'_c$ = 4,000 psi | | $f'_c$ = 3,000 psi | $f'_c$ = 4,000 psi | | |
| RCKW3 | 1 | (4) #12 | 33 (20) | 2,425 | 87,000 | 92,900 | 1,870 | 1,790 | 860 | 1,080 | 1,055 | 620 | IP2 |
| | | | 43 (18) | 3,080 | 112,800 | 115,000 | 2,510 | 2,355 | 1,340 | 1,780 | 1,705 | 755 | |
| | | | 54 (16) | 4,330 | 127,900 | 136,600 | 4,120 | 3,585 | 1,850 | 2,645 | 2,470 | 1,120 | |
| | | | 68 (14) | 5,150 | 141,400 | 153,000 | 6,515 | 4,570 | 1,850 | 2,645 | 2,470 | 1,120 | 160 |
| RCKW3 and RCKW3S (Stiffener) | 2 | (9) #12 | 33 (20) | 3,335 | 177,200 | 198,000 | 2,790 | 2,590 | 1,310 | 1,730 | 1,665 | 620 | 160 |
| | | | 43 (18) | 4,215 | 162,200 | 179,100 | 3,935 | 3,465 | 1,710 | 2,390 | 2,250 | 795 | IP2 |
| | | | 54 (16) | 5,160 | 139,600 | 149,800 | 6,700 | 4,585 | 2,220 | 3,410 | 3,085 | 1,120 | |
| | | | 68 (14) | 5,160 | 130,900 | 136,600 | 6,700 | 4,585 | 2,410 | 3,875 | 3,425 | 1,415 | |
| RCKW5.5 | 3 | (6) #12 | 30 (20 DW)[6,7] | 3,775 | 240,500 | 266,600 | 1,460 | 1,435 | 1,030 | 1,250 | 1,235 | 600 | 160 |
| | | | 33 (20 STR)[7] | 4,670 | 259,700 | 281,000 | 1,830 | 1,795 | 1,140 | 1,395 | 1,375 | 665 | |
| | | | 33 (20) | 4,670 | 303,900 | 328,200 | 1,830 | 1,795 | 1,140 | 1,395 | 1,375 | 665 | IP2 |
| | | | 43 (18) | 6,245 | 333,100 | 355,300 | 2,525 | 2,450 | 1,440 | 1,790 | 1,755 | 1,035 | |
| | | | 54 (16) | 8,225 | 306,000 | 320,500 | 3,470 | 3,320 | 2,455 | 3,255 | 3,125 | 1,390 | |
| | | | 68 (14) | 10,290 | 422,400 | 441,400 | 4,570 | 4,290 | 2,455 | 3,255 | 3,125 | 1,390 | 160 |
| RCKW5.5 and RCKW5.5S (Stiffener) | 4 | (10) #12 | 33 (20) | 4,855 | 255,500 | 271,800 | 1,910 | 1,870 | 1,660 | 2,090 | 2,040 | 665 | 160 |
| | | | 43 (18) | 8,445 | 449,800 | 489,600 | 3,580 | 3,420 | 2,165 | 2,815 | 2,720 | 1,035 | IP2 |
| | | | 54 (16) | 11,575 | 467,000 | 502,300 | 5,340 | 4,935 | 2,980 | 4,115 | 3,895 | 1,390 | |
| | | | 68 (14) | 13,935 | 432,300 | 456,300 | 7,020 | 6,215 | 2,980 | 4,115 | 3,895 | 1,830 | |
| RCKW7.5 | 5 | (6) #12 | 33 (20) | 6,445 | 388,500 | 402,000 | 1,815 | 1,790 | 1,095 | 1,315 | 1,300 | 795 | IP2 |
| | | | 43 (18) | 8,200 | 510,400 | 535,800 | 2,345 | 2,305 | 1,280 | 1,550 | 1,530 | 1,200 | |
| | | | 54 (16) | 11,400 | 553,900 | 571,200 | 3,370 | 3,275 | 2,165 | 2,715 | 2,655 | 1,695 | |
| | | | 68 (14) | 13,895 | 605,200 | 627,800 | 4,225 | 4,065 | 2,165 | 2,715 | 2,655 | 1,695 | 160 |
| RCKW7.5 and RCKW5.5S (Stiffener) | 6 | (10) #12 | 33 (20) | 8,705 | 495,100 | 516,700 | 2,505 | 2,453 | 1,730 | 2,130 | 2,095 | 795 | 160 |
| | | | 43 (18) | 10,915 | 590,800 | 623,400 | 3,210 | 3,125 | 2,255 | 2,840 | 2,775 | 1,200 | IP2 |
| | | | 54 (16) | 14,045 | 762,600 | 808,400 | 4,275 | 4,115 | 2,625 | 3,360 | 3,265 | 1,695 | |
| | | | 68 (14) | 16,670 | 615,800 | 631,300 | 5,245 | 4,985 | 2,665 | 3,420 | 3,320 | 2,065 | |

1. For additional important information, see General Information on pp. 14–16.
2. The Designer is responsible for anchorage design.
3. See illustrations for fastener pattern placement.
4. Screw length shall be selected based on the total thickness of materials to be joined such that the screws extend through the steel connection a minimum of three exposed threads.
5. Tabulated values are based on framing members with track and stud of the same thickness and (1) #10 screw into each stud flange unless otherwise noted.
6. Tabulated values may be used for framing members with track and stud of thickness 20 mil, $F_y$ = 57 ksi (20 EQ).
7. Tabulated values are applicable for framing members with CFS track of thickness 20 mil, $F_y$ = 57 ksi (20 EQ).
8. EQ — equivalent, DW — drywall, STR — structural.
9. Tabulated moment values correspond to maximum connector strength without consideration of serviceability. Designer must check out-of-plane deflections using tabulated Rotational Stiffness.
10. Tabulated Assembly Rotational Stiffness is applicable for walls at 38" tall with corresponding framing member depth and thickness. Reference Example #1 on p. 104.
11. Tabulated Connector Rotational Stiffness may be used for wall heights other than 38" tall; the Designer must consider member deflection due to bending in the stud member. Reference Example #2 on pp. 105–106.
12. Per IBC 2015 Table 1604.3 footnote f, wind load is permitted to be taken as 0.42 times "component and cladding loads" for deflection checks. For IBC 2009 and earlier, the factor is 0.7 instead of 0.42.
13. Anchor Tension, (T), is the force in the anchor at maximum allowable moment (M) or maximum allowable vertical tension ($F_2$).
14. Anchor tension is calculated using AISC Steel Design Guide 1. The 'Anchor Bolt Design' illustration given below shows the anchor tension (T) based on an applied moment (M). An illustration for the anchor tension (T) based on a vertical tension load ($F_2$) is not shown. The bearing pressure for $F_2$ load is similar along the length of the clip as opposed to the width of the clip as shown.
15. Anchor tension may be interpolated.
16. For LRFD loads, multiply the ASD tabulated loads by 1.6.




RCKW5.5 and RCKW5.5S Anchored Into Concrete

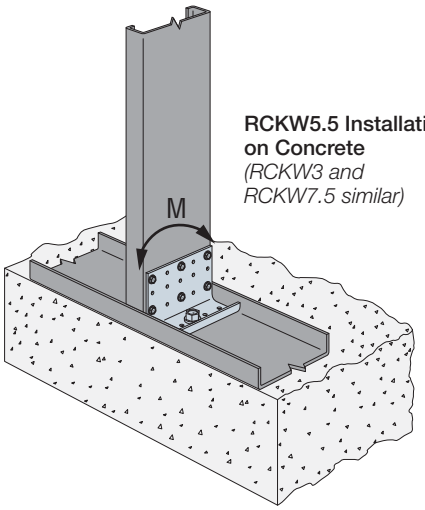



Anchor Bolt Design

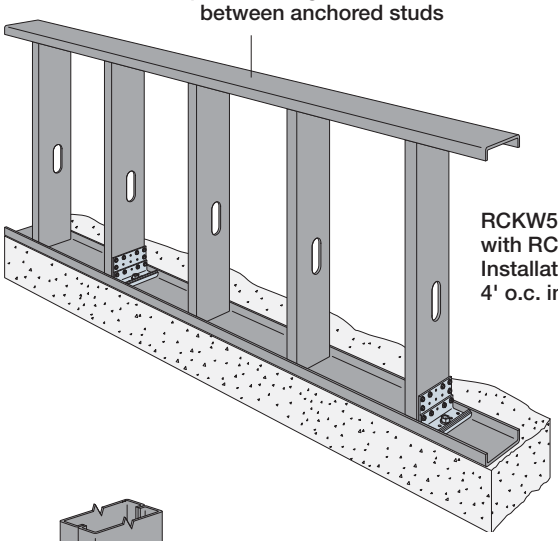
C-CF-2017 © 2017 SIMPSON STRONG-TIE COMPANY INC.

# **RCKW** Kneewall Connectors



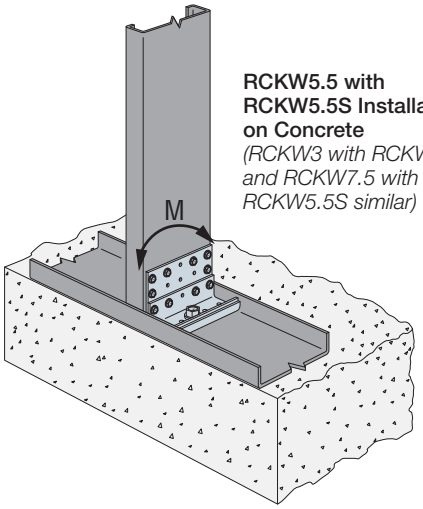



**RCKW5.5 Installation on Concrete**
*(RCKW3 and RCKW7.5 similar)*

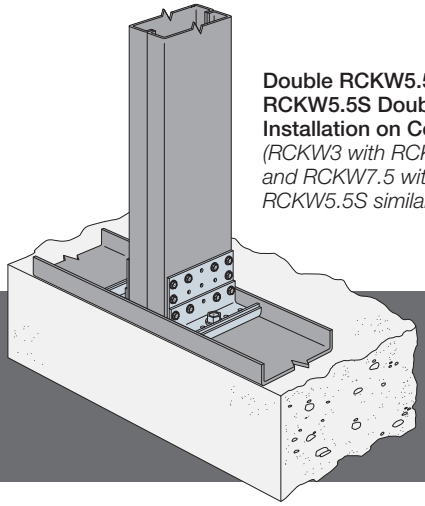


Top track designed as a header between anchored studs

**RCKW5.5 with RCKW5.5S Installation at 4' o.c. in Concrete**

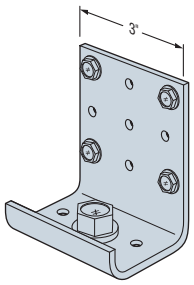



**RCKW5.5 with RCKW5.5S Installation on Concrete**
*(RCKW3 with RCKW3S and RCKW7.5 with RCKW5.5S similar)*

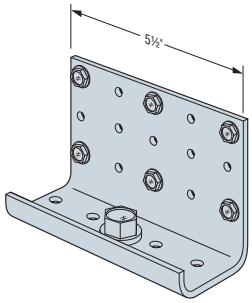


**Double RCKW5.5 with RCKW5.5S Double-Stud Installation on Concrete**
*(RCKW3 with RCKW3S and RCKW7.5 with RCKW5.5S similar)*

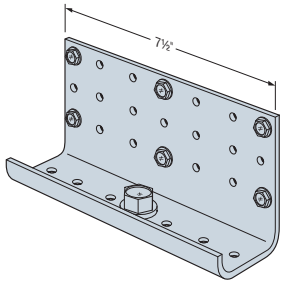
**Need to replace a prefabricated post, or having trouble with concrete anchorage? Consider using this detail.**



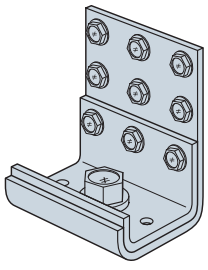

**RCKW3**
**Screw Pattern 1**



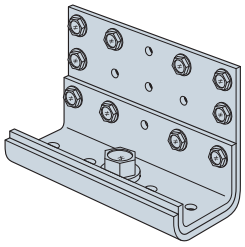

**RCKW5.5**
**Screw Pattern 3**



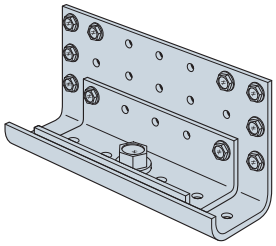

**RCKW7.5**
**Screw Pattern 5**



**RCKW3 with RCKW3S**
**Screw Pattern 2**



**RCKW5.5 with RCKW5.5S**
**Screw Pattern 4**



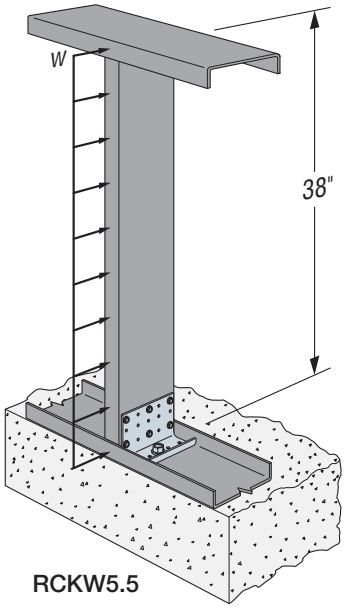
**RCKW7.5 with RCKW5.5S**
**Screw Pattern 6**

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# Example #1: Exterior Parapet Stud

## Given:

- 2015 IBC (ASCE 7-10 and AISI S100-2012)
- 600S162-33 (33 ksi) studs @ 16" o.c. supported at the base
- Parapet height, L = 38"-tall studs
- Wind design pressure = 49.67 psf (LRFD)
- Deflection Limits, $\Delta_{allow}$ = L/240 (Ref. IBC Table 1604.3)



RCKW5.5

## Calculations:

**Determine ASD wind pressure:**

$p = (0.6)(49.67\ psf) = 29.8\ psf$

**Note:** 2015 IBC load combinations for ASD include a factor of 0.6 for wind loads.

$$w = (29.8\ psf)\frac{16\ in.}{12\ in.} = 39.7\ plf$$

**Determine Required Moment:**

$$M_{req} = \frac{wL^2}{2} = \frac{(39.7\ plf)(38\ in.)^2}{2\left(12\frac{in.}{ft.}\right)} = 2{,}389\ in.\text{-}lb.$$

From Allowable Loads table (p. 102) for 600S162-33, 6"-deep 33-mil stud:

- Select RCKW5.5 connector, screw pattern 3, with ½" anchor diameter and (6) #12 self-drilling screws, attaching to each stud @ 16" o.c.
- Allowable Moment = 4,670 in.-lb. > 2,389 in.-lb. **OK**
- Assembly Rotational Stiffness, β = 303,900 in.-lb. / rad. for RCKW5.5 connector at 38" wall height

Select Anchorage:

Normal weight concrete with $f'_c$ = 3,000 psi
Table 1 — Cracked Concrete, Wind and Seismic in SDC A&B
Titen HD® with 3¼" embedment

$M_{allow}$ = 3,010 in.-lb. > 2,389 in.-lb. **OK**

## Check Deflection at Required Moment:

$$\Delta_{req} = \left(\frac{(0.7)(M_{req})}{\beta}\right)L = \left(\frac{(0.7)(2{,}389\ in.\text{-}lb.)}{303{,}900\frac{in.\text{-}lb.}{rad.}}\right)38\ in. = 0.209\ in.$$

**Note:** Per IBC Table 1604.3 footnote f, 0.7 factor can be used to calculate deflections for components and cladding wind load.

**Allowable Deflection:**

$$\Delta_{allow} = \frac{2L}{240} = \frac{2(38\ in.)}{240} = 0.317\ in. > 0.209\ in.$$ **OK**

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# Example #2: High Interior Half-Wall

## Given:

- 2015 IBC (ASCE 7-10 and AISI S100-2012)
- The top track 600T125-54 (50 ksi) spans between 600S162-54 (50 ksi) studs @ spacing, S = 32" o.c. supported at the base
- 6" drywall studs at 16" o.c. as infill between the bottom and top track
- Wall height, L = 48"-tall studs
- Design Load: w = 50 plf or P = 200 lb. concentrated load for guard or handrail applications in accordance with Section 4.5.1 of ASCE (Ref. IBC 1607.8.1 and 1607.8.1.1)
- Deflection Limit, $\Delta_{allow}$ = L/120 (Ref. IBC Table 1604.3)

## Calculations:

### Design criteria #1 for linear load of 50 lb./ft.

**Determine Required Concentrated Load, $P_{req}$:**

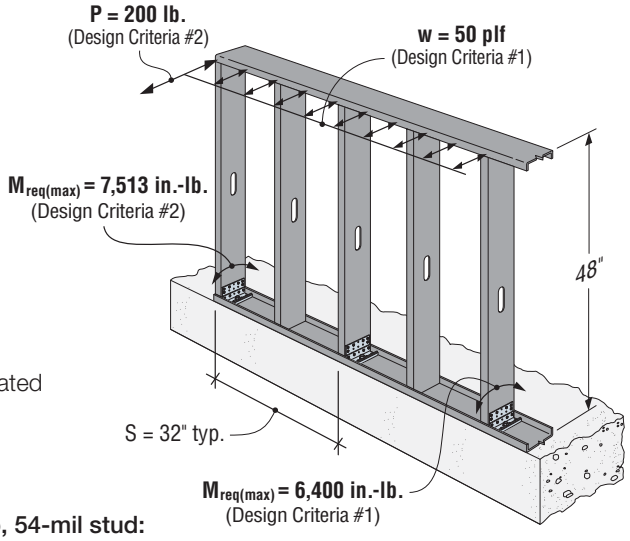
$$P = (w)(S) = (50\ plf)(32\ in.)\left(\frac{1\ ft.}{12\ in.}\right) = 133.3\ lb.$$

**Determine Required Moment, $M_{req}$:**

$$M_{req} = (P_{req})(L) = (133.3\ lb.)(48\ in.) = 6{,}400\ in.\text{-}lb.$$

### Design criteria #2 for concentrated load of 200 lb.

**Note:** From a 3D structural analysis with the 200 lb. concentrated load at the end stud, a continuous top track distributes some load to adjacent studs so that the worst-case moment is $M_{req(max)}$ = 7,513 in.-lb. as indicated in the illustration.




RCKW5.5 with RCKW5.5S Installation on Concrete

**From Allowable Loads table (p. 102) for 600S162-54, 6"-deep, 54-mil stud:**

- Select an RCKW5.5 connector with the RCKW5.5S stiffener, screw pattern 4 with (10) #12 self-drilling screws and a ½"-diameter anchor
- Allowable Moment = 11,575 in.-lb. > 6,400 in.-lb. (for linear load) **OK**
- Allowable Moment = 11,575 in.-lb. > 7,513 in.-lb. (for concentrated load) **OK**
- Connector Rotational Stiffness, $\beta_C$ = 502,300 in.-lb./rad.

## Check Deflection for Design Criteria #1 at Required Load:

**Determine Stud Deflection, $\Delta_S$, at $P_{req}$ = 133.3 lb.**

$$\Delta_S = \frac{P_{req}L^3}{3EI_{xe}} = \left(\frac{(133.3\ lb.)(48\ in.)^3}{3(29{,}500{,}000\ psi)(2.86\ in.^4)}\right) = 0.058\ in.$$

**Note:** Effective moment of inertia for a 600S162-54 stud is $I_{xe}$ = 2.86 in.$^4$

**Determine Connector Deflection, $\Delta_C$, at $M_{req}$ = 6,400 in.-lb. by utilizing the Connector Rotational Stiffness, $\beta_C$ = 502,300 in.-lb./rad. for RCKW5.5 and RCKW5.5S.**

$$\Delta_C = \frac{M_{req}}{\beta_C}L = \frac{6{,}400\ in.\text{-}lb.}{502{,}300\ \frac{in.\text{-}lb.}{rad.}}(48\ in.) = 0.612\ in.$$

**Note:** The Connector Rotational Stiffness may be used for wall heights other than 38"; the Designer must consider member deflection due to bending in the stud member. See footnote 11 of the Allowable Loads Table (p. 102).



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# Example #2: High Interior Half-Wall (cont.)

**Total Deflection is the sum of the Stud Deflection and the Connector Deflection.**

$$\Delta_{total} = \Delta_s + \Delta_c = 0.058\ in. + 0.612\ in. = 0.670\ in.$$

**Allowable Deflection:**

$$\Delta_{allow} = \frac{2L}{120} = \frac{(2)(48\ in.)}{120} = 0.800\ in. > 0.670\ in.$$ **OK**

## Check Deflection for Design Criteria #2 at Required Load:

**Determine Stud Deflection, $\Delta_s$, at $M_{req}$ = 7,513 in.-lb. from concentrated load.**

$$\Delta_s = \frac{M_{req}L^2}{3EI_{xe}} = \left(\frac{(7{,}513\ in.\text{-}lb.)(48\ in.)^2}{3(29{,}500{,}000\ psi)(2.86\ in.^4)}\right) = 0.068\ in.$$

**Determine Connector Deflection, $\Delta_c$, at $M_{req}$ = 7,513 in.-lb. by utilizing the Connector Rotational Stiffness, $\beta_c$ = 502,300 in.-lb. / rad. for RCKW5.5 and RCKW5.5S.**

$$\Delta_c = \frac{M_{req}}{\beta_c} L = \frac{7{,}513\ in.\text{-}lb.}{502{,}300\ \frac{in.\text{-}lb.}{rad.}} (48\ in.) = 0.718\ in.$$

**Total Deflection is the sum of Stud Deflection and Connector Deflection.**

$$\Delta_{total} = \Delta_s + \Delta_c = 0.068\ in. + 0.718\ in. = 0.786\ in.$$

**Allowable Deflection:**

$$\Delta_{allow} = \frac{2L}{120} = \frac{(2)(48\ in.)}{120} = 0.800\ in. > 0.786\ in.$$ **OK**

**Note:** Per ASCE Section 4.5.1, for handrail and guardrail systems, there is no need to apply the 50 plf linear load and the 200 lb. concentrated load concurrently. Example #2 demonstrates the design for both loading cases, and the outermost anchored stud governs when using the 200 lb. concentrated load.



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## Table 1: RCKW Allowable Moments Using Simpson Strong-Tie® Anchorage Solutions — Edge of Slab

| Model No. | Simpson Strong-Tie Anchor Model ½" Diameter | Edge of Concrete Slab Allowable Moment, M (in.-lb.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Titen HD® | Titen HD | Strong-Bolt® 2 | AT-XP® | SET-XP® | SET-XP | AT-XP | SET-XP |
| | Minimum Concrete Thickness, $h_{min}$ (in.) | 5 | 6 | 6 | 6 | 6 | 6½ | 9½ | 9½ |
| | Nominal Embedment Depth, $h_{nom}$ (in.) | 3¼ | 3¾ | 3⅞ | 3½ | 3½ | 4 | 7 | 7 |
| **Uncracked Concrete, Wind and Seismic in SDC A&B[8,10]** | | | | | | | | | |
| **f'c = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 1,020 | 1,130 | — | 630 | 770 | — | — | — |
| | NWC | 1,635 | 1,795 | — | 1,200 | 1,440 | — | — | — |
| RCKW5.5 | SLWC | 2,960 | 3,150 | — | 1,755 | 2,085 | — | — | — |
| | NWC | 4,800 | 5,255 | — | 3,365 | 3,980 | — | — | — |
| RCKW7.5 | SLWC | 4,280 | 4,845 | 4,545 | 3,225 | 3,765 | — | — | — |
| | NWC | 7,120 | 8,080 | 7,430 | 6,200 | 7,010 | — | — | — |
| **f'c = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 875 | 970 | — | 630 | 805 | — | — | — |
| | NWC | 1,390 | 1,530 | — | 1,175 | 1,295 | — | — | — |
| RCKW5.5 | SLWC | 2,545 | 2,715 | — | 2,185 | 1,750 | — | — | — |
| | NWC | 4,110 | 4,680 | — | 3,825 | 3,330 | — | — | — |
| RCKW7.5 | SLWC | 3,680 | 3,990 | 3,920 | 3,945 | 3,225 | — | — | — |
| | NWC | 6,125 | 6,945 | 6,385 | 6,800 | 6,155 | — | — | — |
| **Cracked Concrete, Wind and Seismic in SDC A&B[8,10]** | | | | | | | | | |
| **$f'_c$ = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 740 | 815 | — | 520 | — | 470 | 1,010 | 805 |
| | NWC | 1,200 | 1,320 | — | 990 | — | 895 | 1,865 | 1,510 |
| RCKW5.5 | SLWC | 2,145 | 2,250 | — | 1,440 | — | 1,260 | 2,745 | 2,180 |
| | NWC | 3,500 | 3,770 | — | 2,770 | — | 2,435 | 4,030 | 4,030 |
| RCKW7.5 | SLWC | 3,075 | 3,470 | 3,630 | 2,645 | — | 2,270 | 4,220 | 3,935 |
| | NWC | 5,105 | 5,785 | 5,960 | 5,105 | — | 4,395 | 6,220 | 6,210 |
| **$f'_c$ = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 640 | 705 | — | 515 | — | 465 | 990 | 790 |
| | NWC | 1,030 | 1,130 | — | 970 | — | 880 | 1,610 | 1,460 |
| RCKW5.5 | SLWC | 1,845 | 1,945 | — | 1,430 | — | 1,255 | 2,370 | 2,160 |
| | NWC | 3,010 | 3,235 | — | 2,735 | — | 2,405 | 3,470 | 3,360 |
| RCKW7.5 | SLWC | 2,635 | 2,995 | 3,105 | 2,630 | — | 2,260 | 3,640 | 3,640 |
| | NWC | 4,390 | 4,970 | 5,170 | 5,050 | — | 4,355 | 5,355 | 5,545 |
| **Cracked Concrete, Seismic in SDC C Through F[9,10]** | | | | | | | | | |
| **$f'_c$ = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 265 | 295 | — | 155 | — | 165 | 310 | 290 |
| | NWC | 440 | 485 | — | 305 | — | 325 | 605 | 560 |
| RCKW5.5 | SLWC | 765 | 875 | — | 435 | — | 445 | 865 | 780 |
| | NWC | 1,265 | 1,445 | — | 845 | — | 870 | 1,675 | 1,510 |
| RCKW7.5 | SLWC | 1,180 | 1,470 | 1,440 | 795 | — | 805 | 1,585 | 1,400 |
| | NWC | 1,960 | 2,430 | 2,385 | 1,555 | — | 1,565 | 2,900 | 2,510 |
| **$f'_c$ = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 230 | 255 | — | 155 | — | 165 | 310 | 290 |
| | NWC | 380 | 420 | — | 305 | — | 325 | 595 | 555 |
| RCKW5.5 | SLWC | 660 | 755 | — | 435 | — | 445 | 860 | 775 |
| | NWC | 1,090 | 1,250 | — | 845 | — | 865 | 1,630 | 1,500 |
| RCKW7.5 | SLWC | 1,020 | 1,270 | 1,245 | 795 | — | 800 | 1,580 | 1,395 |
| | NWC | 1,695 | 2,100 | 2,060 | 1,550 | — | 1,560 | 2,500 | 2,515 |

See footnotes on p. 110.

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# RCKW Kneewall Connectors



## Table 2: RCKW Allowable Moments Using Simpson Strong-Tie® Anchorage Solutions — Center of Concrete Slab

| Model No. | Simpson Strong-Tie Anchor Model ½" Diameter | Edge of Concrete Slab Allowable Moment, M (in.-lb.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Titen HD® | Titen HD | Strong-Bolt® 2 | AT-XP® | SET-XP® | SET-XP | AT-XP | SET-XP |
| | Minimum Concrete Thickness, $h_{min}$ (in.) | 5 | 6 | 6 | 6 | 6 | 6½ | 9½ | 9½ |
| | Nominal Embedment Depth, $h_{nom}$ (in.) | 3¼ | 3¾ | 3⅞ | 3½ | 3½ | 4 | 7 | 7 |
| **Uncracked Concrete, Wind and Seismic in SDC A&B[8,10]** | | | | | | | | | |
| **$f'_c$ = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 1,785 | 2,250 | 2,135 | 2,030 | 2,470 | 2,780 | 3,705 | 4,395 |
| | NWC | 2,825 | 3,500 | 3,340 | 3,645 | 4,330 | 4,435 | 4,435 | 4,435 |
| RCKW5.5 | SLWC | 3,385 | 4,305 | 4,080 | 3,870 | 4,760 | 5,395 | 7,385 | 7,505 |
| | NWC | 5,495 | 6,930 | 6,580 | 7,255 | 7,505 | 7,505 | 7,505 | 7,505 |
| RCKW7.5 | SLWC | 4,665 | 5,955 | 5,635 | 5,340 | 6,590 | 7,485 | 7,565 | 7,515 |
| | NWC | 7,625 | 9,675 | 9,175 | 7,500 | 7,500 | 7,500 | 7,565 | 7,515 |
| **$f'_c$ = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 1,530 | 1,915 | 1,825 | 1,970 | 2,380 | 2,660 | 3,470 | 4,030 |
| | NWC | 2,400 | 2,950 | 2,820 | 3,420 | 3,810 | 4,065 | 4,065 | 4,065 |
| RCKW5.5 | SLWC | 2,915 | 3,700 | 3,505 | 3,810 | 4,670 | 5,275 | 7,150 | 7,580 |
| | NWC | 4,705 | 5,920 | 5,625 | 7,025 | 7,580 | 7,580 | 7,580 | 7,580 |
| RCKW7.5 | SLWC | 4,020 | 5,125 | 4,855 | 5,280 | 6,500 | 7,365 | 7,525 | 7,525 |
| | NWC | 6,555 | 8,295 | 7,870 | 7,525 | 7,500 | 7,500 | 7,525 | 7,525 |
| **Cracked Concrete, Wind and Seismic in SDC A&B[8,10]** | | | | | | | | | |
| **$f'_c$ = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 1,295 | 1,640 | 1,560 | 1,360 | — | 1,315 | 2,575 | 2,210 |
| | NWC | 2,080 | 2,605 | 2,485 | 2,530 | — | 2,450 | 4,435 | 3,935 |
| RCKW5.5 | SLWC | 2,425 | 3,095 | 2,940 | 2,560 | — | 2,470 | 4,965 | 4,235 |
| | NWC | 3,970 | 5,035 | 4,790 | 4,875 | — | 4,715 | 7,505 | 7,505 |
| RCKW7.5 | SLWC | 3,335 | 4,265 | 4,045 | 3,515 | — | 3,395 | 6,880 | 5,850 |
| | NWC | 5,480 | 6,980 | 6,630 | 6,755 | — | 6,525 | 7,565 | 7,515 |
| **$f'_c$ = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 1,110 | 1,405 | 1,335 | 1,335 | — | 1,295 | 2,475 | 2,140 |
| | NWC | 1,775 | 2,215 | 2,115 | 2,435 | — | 2,360 | 4,065 | 3,660 |
| RCKW5.5 | SLWC | 2,090 | 2,665 | 2,535 | 2,535 | — | 2,450 | 4,865 | 4,160 |
| | NWC | 3,410 | 4,320 | 4,110 | 4,780 | — | 4,625 | 7,580 | 7,580 |
| RCKW7.5 | SLWC | 2,875 | 3,675 | 3,490 | 3,490 | — | 3,370 | 6,780 | 5,780 |
| | NWC | 4,720 | 6,005 | 5,705 | 6,660 | — | 6,435 | 7,525 | 7,525 |
| **Cracked Concrete, Seismic in SDC C Through F[9,10]** | | | | | | | | | |
| **$f'_c$ = 4,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 470 | 600 | 570 | 420 | — | 475 | 830 | 825 |
| | NWC | 770 | 985 | 935 | 810 | — | 920 | 1,575 | 1,565 |
| RCKW5.5 | SLWC | 865 | 1,110 | 1,050 | 775 | — | 880 | 1,540 | 1,530 |
| | NWC | 1,430 | 1,835 | 1,740 | 1,510 | — | 1,710 | 2,970 | 2,735 |
| RCKW7.5 | SLWC | 1,180 | 1,515 | 1,440 | 1,060 | — | 1,205 | 2,110 | 2,095 |
| | NWC | 1,960 | 2,515 | 2,385 | 2,070 | — | 2,345 | 2,985 | 2,730 |
| **$f'_c$ = 3,000 psi** | | | | | | | | | |
| RCKW3 | SLWC | 405 | 515 | 490 | 420 | — | 475 | 820 | 815 |
| | NWC | 665 | 845 | 805 | 805 | — | 905 | 1,540 | 1,530 |
| RCKW5.5 | SLWC | 745 | 960 | 910 | 775 | — | 880 | 1,530 | 1,520 |
| | NWC | 1,235 | 1,580 | 1,500 | 1,500 | — | 1,700 | 2,935 | 2,765 |
| RCKW7.5 | SLWC | 1,020 | 1,310 | 1,245 | 1,060 | — | 1,200 | 2,100 | 2,085 |
| | NWC | 1,695 | 2,170 | 2,060 | 2,060 | — | 2,335 | 2,860 | 2,860 |

See footnotes on p. 110.

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## Table 3: RCKW Allowable Tension and Shear Loads Using Simpson Strong-Tie® Anchorage Solutions — Edge of Concrete Slab

| Model No. | Simpson Strong-Tie Anchor Model ½" Diameter | | Edge of Concrete Slab Allowable Moment, M (in.-lb.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Titen HD® | Titen HD | Strong-Bolt® 2 | AT-XP® | SET-XP® | SET-XP | AT-XP | SET-XP |
| | Minimum Concrete Thickness, $h_{min}$ (in.) | | 5 | 6 | 6 | 6 | 6 | 6½ | 9½ | 9½ |
| | Nominal Embedment Depth, $h_{nom}$ (in.) | | 3¼ | 3¾ | 3⅞ | 3½ | 3½ | 4 | 7 | 7 |
| **Uncracked Concrete, Wind and Seismic in SDC A&B[8,10] ($f'_c$ = 4,000 psi)** | | | | | | | | | | |
| RCKW3 | SLWC | Tension | 720 | 805 | — | 435 | 535 | — | — | — |
| | | Shear | 365 | 375 | — | 445 | 445 | — | — | — |
| | NWC | Tension | 1,200 | 1,340 | — | 855 | 1,045 | — | — | — |
| | | Shear | 605 | 625 | — | 655 | 655 | — | — | — |
| RCKW5.5 | SLWC | Tension | 1,120 | 1,290 | — | 655 | 760 | — | — | — |
| | | Shear | 780 | 810 | — | 960 | 960 | — | — | — |
| | NWC | Tension | 1,865 | 2,150 | — | 1,280 | 1,500 | — | — | — |
| | | Shear | 1,305 | 1,350 | — | 1,410 | 1,410 | — | — | — |
| RCKW7.5 | SLWC | Tension | 1,280 | 1,585 | 1,245 | 875 | 1,025 | — | — | — |
| | | Shear | 1,100 | 1,245 | 1,295 | 1,480 | 1,480 | — | — | — |
| | NWC | Tension | 2,130 | 2,645 | 2,080 | 1,720 | 2,015 | — | — | — |
| | | Shear | 1,830 | 2,075 | 2,160 | 1,800 | 1,800 | — | — | — |
| **Cracked Concrete, Wind and Seismic in SDC A&B[8,10] ($f'_c$ = 4,000 psi)** | | | | | | | | | | |
| RCKW3 | SLWC | Tension | 515 | 570 | — | 355 | — | 320 | 710 | 560 |
| | | Shear | 260 | 270 | — | 320 | — | 325 | 325 | 325 |
| | NWC | Tension | 860 | 950 | — | 700 | — | 630 | 1,395 | 1,100 |
| | | Shear | 430 | 445 | — | 465 | — | 480 | 480 | 480 |
| RCKW5.5 | SLWC | Tension | 800 | 920 | — | 535 | — | 465 | 1,065 | 815 |
| | | Shear | 560 | 580 | — | 685 | — | 705 | 705 | 705 |
| | NWC | Tension | 1,335 | 1,530 | — | 1,045 | — | 915 | 2,090 | 1,600 |
| | | Shear | 930 | 965 | — | 1,010 | — | 1,035 | 1,035 | 1,035 |
| RCKW7.5 | SLWC | Tension | 905 | 1,130 | 1,105 | 715 | — | 615 | 1,435 | 1,075 |
| | | Shear | 785 | 890 | 925 | 1,055 | — | 1,085 | 1,085 | 1,085 |
| | NWC | Tension | 1,510 | 1,880 | 1,845 | 1,405 | — | 1,205 | 2,810 | 2,110 |
| | | Shear | 1,310 | 1,485 | 1,540 | 1,550 | — | 1,595 | 1,595 | 1,595 |
| **Cracked Concrete, Seismic in SDC C Through F[9,10] ($f'_c$ = 4,000 psi)** | | | | | | | | | | |
| RCKW3 | SLWC | Tension | 180 | 200 | — | 105 | — | 110 | 210 | 195 |
| | | Shear | 120 | 125 | — | 150 | — | 150 | 150 | 150 |
| | NWC | Tension | 300 | 335 | — | 210 | — | 220 | 415 | 385 |
| | | Shear | 200 | 210 | — | 220 | — | 225 | 225 | 225 |
| RCKW5.5 | SLWC | Tension | 280 | 320 | — | 160 | — | 165 | 315 | 285 |
| | | Shear | 260 | 270 | — | 320 | — | 330 | 330 | 330 |
| | NWC | Tension | 470 | 535 | — | 310 | — | 320 | 620 | 560 |
| | | Shear | 435 | 450 | — | 470 | — | 485 | 485 | 485 |
| RCKW7.5 | SLWC | Tension | 315 | 395 | 385 | 215 | — | 215 | 425 | 375 |
| | | Shear | 365 | 415 | 430 | 495 | — | 505 | 505 | 505 |
| | NWC | Tension | 530 | 660 | 645 | 420 | — | 420 | 835 | 740 |
| | | Shear | 610 | 690 | 720 | 725 | — | 645 | 745 | 645 |

See footnotes on p. 110.

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# RCKW Kneewall Connectors



## Table 4: RCKW Allowable Tension and Shear Loads Using Simpson Strong-Tie® Anchorage Solutions — Center of Concrete Slab

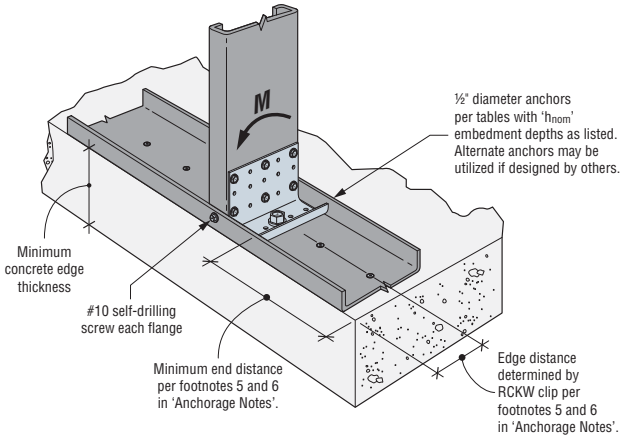
| Model No. | Simpson Strong-Tie® Anchor Model ½" Diameter | | Allowable Tension and Shear Load (lb.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mechanical Anchors | | | Epoxy Anchors | | | | |
| | | | Titen HD® | Titen HD | Strong-Bolt® 2 | AT-XP® | SET-XP® | SET-XP | AT-XP | SET-XP |
| | Minimum Concrete Thickness, $h_{min}$ (in.) | | 5 | 6 | 6 | 6 | 6 | 6½ | 9½ | 9½ |
| | Nominal Embedment Depth, $h_{nom}$ (in.) | | 3¼ | 3¾ | 3⅞ | 3½ | 3½ | 4 | 7 | 7 |
| RCKW all models | Uncracked Concrete, Wind and Seismic in SDC A&B[8,10] ($f'_c$ = 4,000 psi) | | | | | | | | | |
| | SLWC | Tension | 1,280 | 1,645 | 1,555 | 1,470 | 1,830 | 2,090 | 2,940 | 3,660 |
| | | Shear | 1,380 | 2,685 | 2,820 | 1,925 | 1,925 | 1,925 | 1,925 | 1,925 |
| | NWC | Tension | 2,130 | 2,745 | 2,595 | 2,885 | 3,360 | 3,705 | 3,705 | 3,705 |
| | | Shear | 2,295 | 2,685 | 2,820 | 1,925 | 1,925 | 1,925 | 1,925 | 1,925 |
| | Cracked Concrete, Wind and Seismic in SDC A&B[8,10] ($f'_c$ = 4,000 psi) | | | | | | | | | |
| | SLWC | Tension | 905 | 1,165 | 1,105 | 960 | — | 925 | 1,915 | 1,615 |
| | | Shear | 975 | 2,510 | 2,820 | 1,925 | — | 1,925 | 1,925 | 1,925 |
| | NWC | Tension | 1,510 | 1,945 | 1,845 | 1,880 | — | 1,810 | 3,705 | 3,170 |
| | | Shear | 1,625 | 2,685 | 2,820 | 1,925 | — | 1,925 | 1,925 | 1,925 |
| | Cracked Concrete, Seismic in SDC C Through F[9,10] ($f'_c$ = 4,000 psi) | | | | | | | | | |
| | SLWC | Tension | 315 | 410 | 385 | 285 | — | 325 | 570 | 565 |
| | | Shear | 455 | 805 | 1,185 | 765 | — | 700 | 765 | 700 |
| | NWC | Tension | 530 | 680 | 645 | 560 | — | 635 | 1,115 | 1,110 |
| | | Shear | 760 | 805 | 1,185 | 765 | — | 700 | 765 | 700 |

1. Anchor Allowable Loads have been determined using ACI 318-14 Chapter 17 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. Load values are for a single anchor based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, 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.
3. Load values are based on short-term temperature range of 150°F and 180°F for SET-XP and AT-XP adhesive, respectively. Long term temperature range is assumed to be 110°F for both SET-XP and AT-XP adhesives.
4. Allowable Stress Design (ASD) values were determined by multiplying calculated Strength Design values 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.
5. At edge of slab, edge distances are assumed to be 1⅞", 3.0" and 4.0" (½ of stud width) as determined for 3⅝", 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 this page.
6. At center of slab, edge and end distances are assumed as 'N/A' in all directions at locations away from edge of slab. See RCKW to concrete illustration below.
7. Tabulated anchorage capacities for RCKW models shown are applied to the same model size with stiffener. For example, a value for model RCKW3 is equivalent to model RCKW3 and RCKW3S.
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 seismic 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 318-14 Chapter 17, unless steel failure governs.
10. 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 RCKW allowable load value listed on p. 102.
11. Tabulated loads in Table 3 and 4 are based on $f'_c$ = 4,000 psi. For $f'_c$ = 3,000 psi use an adjustment factor of 0.86 for the blue shaded values and 1.0 for all other values.
12. Tabulated values in Table 1 and Table 2 have been checked for combine moment and shear with the following conditions: $N_a / N_{al} + V_a / V_{al} \le 1.2$
    - $N_a$ = Applied ASD anchor tension load at moment M
    - $N_{al}$ = Allowable anchor tension load from Tables 3 or 4
    - $V_a$ = 2M/L is based on uniform loading wind application. L is the wall height at 38".
    - $V_{al}$ = Allowable shear load from Tables 3 or 4

    Blue shaded values in Tables 1 and 2 exceed 1.2 combine loading limits. Designer is responsible to check.

For anchor subjected to both tension and shear loads, it shall be designed to satisfy following:
- For $N_a / N_{al} \le 0.2$, the full allowable load in shear is permitted.
- For $V_a / V_{al} \le 0.2$, the full allowable load in tension is permitted.
- For all other cases: $N_a / N_{al} + V_a / V_{al} \le 1.2$

where:
$N_a$ = Applied ASD tension load
$N_{al}$ = Allowable tension load from Tables 3 or 4
$V_a$ = Applied ASD shear load
$V_{al}$ = Allowable shear load from Tables 3 or 4.




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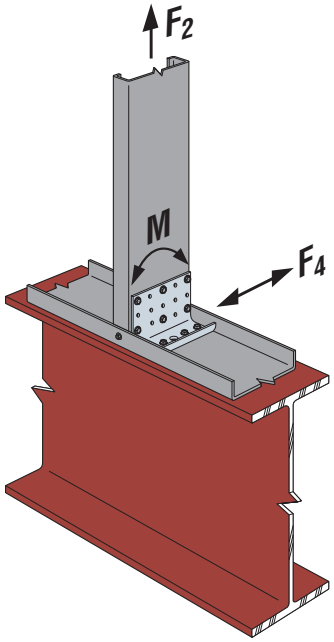
# **RCKW** Kneewall Connectors



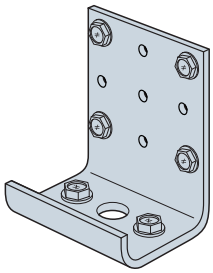
## RCKW Allowable Loads — Steel Anchorage

| Model No. | Framing Member Depth (in.) | Fastener to Structural Steel[2] | Fastener to Stud[3] | Framing Member Thickness mil (ga.) | Allowable Moment[4,5] M (in.-lb.) | Assembly Rotational Stiffness[6,8] β (in.-lb./rad) | Connector Rotational Stiffness[7,8] $\beta_C$ (in.-lb./rad) | Allowable Tension Load $F_2$ (lb.) | Allowable Shear Load $F_4$ (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| RCKW3 | 3.625 | (2) #12 | (4) #12 | 33 (20) | 2,105 | 55,500 | 58,000 | 850 | 455 | 170 |
| | | | | 43 (18) | 2,570 | 73,300 | 76,700 | 1,225 | 745 | |
| | | | | 54 (16) | 2,690 | 87,260 | 91,200 | 1,115 | 1,115 | |
| RCKW5.5 | 6.00 | (4) #12 | (6) #12 | 33 (20) | 5,165 | 199,200 | 209,200 | 1,245 | 650 | |
| | | | | 43 (18) | 6,370 | 272,600 | 287,100 | 1,900 | 1,060 | |
| | | | | 54 (16) | 6,430 | 255,900 | 266,100 | 2,310 | 1,295 | |
| RCKW7.5 | 8.00 | (6) #12 | (6) #12 | 33 (20) | 7,030 | 456,700 | 483,200 | 965 | 655 | |
| | | | | 43 (18) | 9,595 | 571,600 | 603,600 | 1,950 | 1,135 | |
| | | | | 54 (16) | 11,320 | 693,600 | 731,600 | 2,535 | 1,710 | |

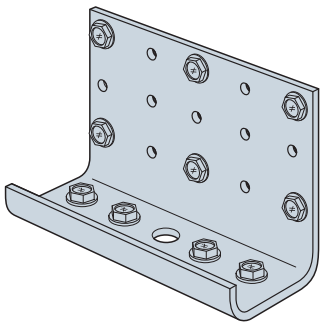
1. For additional important information, see General Information on pp. 14–16.
2. Designer is responsible for structural steel design.
3. See illustrations for fastener patterns.
4. Tabulated values are based on framing members with track and stud of the same thickness and #10 screws into each stud flange.
5. Tabulated moment values correspond to the maximum connector strength without consideration of serviceability. Designer must check out-of-plane deflections using tabulated Rotational Stiffness.
6. Tabulated Assembly Rotational Stiffness is for walls at 38" tall. Reference Example #1 on p. 104.
7. The tabulated Connector Rotational Stiffness is for walls other than 38" tall. The Designer must consider member deflection due to bending in the stud. Reference Example #2 on pp. 105–106.
8. Per IBC 2015 Table 1604.3 footnote f, wind load is permitted to be taken as 0.42 times "component and cladding loads" for deflection checks. For IBC 2009 and earlier, the factor is 0.7 instead of 0.42.



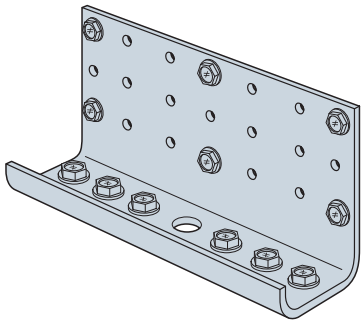

**RCKW5.5 Installation on Structural Steel**
*(RCKW3 and RCKW7.5 similar)*



**RCKW3 Screw Pattern for Steel Anchorage**



**RCKW5.5 Screw Pattern for Steel Anchorage**



**RCKW7.5 Screw Pattern for Steel Anchorage**

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# **MSSC4.25KW and MSSC6.25KW** Kneewall Connectors



MSSC connectors are designed to work in tandem with Simpson Strong-Tie® BP1½-3 bearing plates to provide solutions for moment-resisting kneewall lighter-duty applications.

**Features:**

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

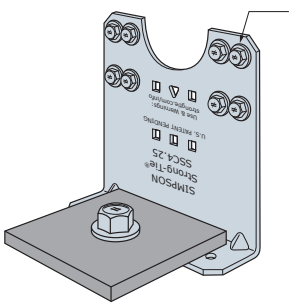
**Material:** MSSC — 97 mil (50 ksi); BP — 229 mil (33 ksi)

**Finish:** MSSC — Galvanized (G90); BP — None

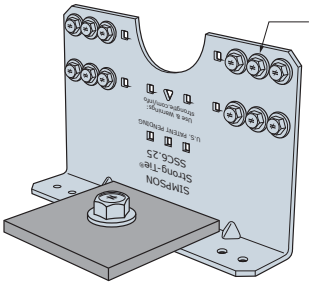
**Installation:**

- Use all specified fasteners/anchors
- Install BP1½-3 bearing plate over anchor leg of MSSC connectors as shown in the illustrations

**Codes:** See p. 11 for Code Reference Key Chart




**MSSC4.25KW Fastener Pattern**




**MSSC6.25KW Fastener Pattern**

## Ordering Information

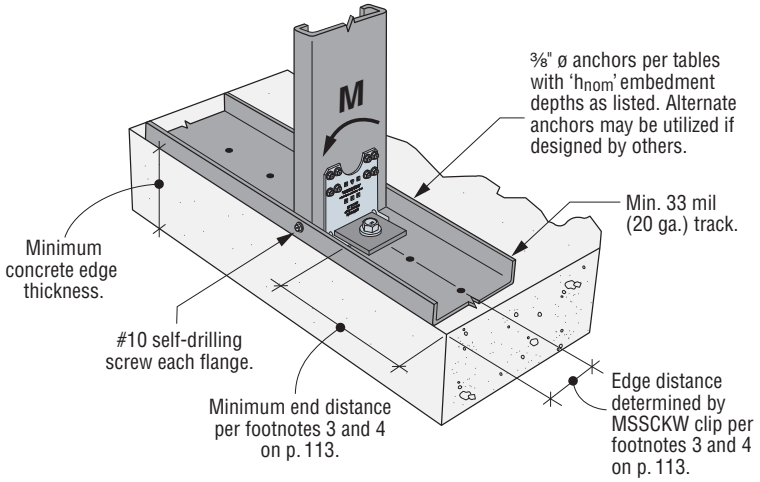
| Model No. | Ordering SKU | Package Quantity |
|---|---|---|
| MSSC4.25KW | MSSC4.25KW-KT20 | Box of 20 connectors and 20 BP bearing plates |
| MSSC6.25KW | MSSC6.25KW-KT20 | |

## 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.-lb.)[1] | Anchor Tension at Allowable Moment (lb.)[2] | Rotational Stiffness for Wind Deflection (in.-lb./rad.)[3,4] | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Anchor Diameter (in.) | Stud | | | | | |
| MSSC4.25KW | 97 (12) | 4¼ | 6 | ⅜ | (8) #10 | 33 (20) | 3,135 | 1,690 | 45,360 | IP2 |
| | | | | | | 43 (18) | 4,320 | 2,375 | | |
| | | | | | | 54 (16) | 5,830 | 2,765 | | |
| MSSC6.25KW | 97 (12) | 6¼ | 8 | ⅜ | (12) #10 | 33 (20) | 3,845 | 1,705 | 77,245 | |
| | | | | | | 43 (18) | 3,845 | 1,705 | | |
| | | | | | | 54 (16) | 8,350 | 2,885 | | |

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. Per IBC 2015 Table 1604.3 footnote f, wind load is permitted to be taken as 0.42 times "component and cladding loads" for deflection checks. For IBC 2009 and earlier, the factor is 0.7 instead of 0.42.
5. See pp. 138 through 171 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 ($h_{nom}$) (in.) | Allowable Moment, M (in-lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Edge of Slab[3] | | | Center of Slab[4] | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 psi NWC | 3,000 psi SLWC | 3,000 psi NWC | 4,000 psi NWC |
| MSSC4.25KW | 4" or thicker | STB2 | 2¼ | — | — | — | 1,220 | 2,040 | 2,365 |
| | | Titen HD® | 2½ | 1,255 | 2,090 | 2,425 | 1,255 | 2,090 | 2,425 |
| | 6" or thicker | STB2 | 2⅞ | — | — | — | 1,555 | 2,590 | 2,995 |
| | | Titen HD | 3¼ | 1,795 | 2,995 | 3,450 | 2,075 | 3,465 | 3,995 |
| | | SET-XP® | 4 | 725 | 1,425 | 1,425 | 1,930 | 3,705 | 3,705 |
| | | AT-XP® | 4 | 750 | 1,470 | 1,470 | 2,005 | 3,705 | 3,705 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 670 | 1,320 | 1,320 | 3,610 | 3,705 | 3,705 |
| | | AT-XP | 7½ | 695 | 1,360 | 1,360 | 3,690 | 3,705 | 3,705 |
| MSSC6.25KW | 4" or thicker | STB2 | 2¼ | — | — | — | 1,515 | 2,530 | 2,930 |
| | | Titen HD | 2½ | 1,555 | 2,590 | 3,005 | 1,555 | 2,590 | 3,005 |
| | 6" or thicker | STB2 | 2⅞ | — | — | — | 1,930 | 3,215 | 3,715 |
| | | Titen HD | 3¼ | 2,570 | 4,295 | 4,950 | 2,570 | 4,295 | 4,950 |
| | | SET-XP | 4 | 1,110 | 2,170 | 2,170 | 2,395 | 4,595 | 4,595 |
| | | AT-XP | 4 | 1,135 | 2,235 | 2,235 | 2,480 | 4,595 | 4,595 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 1,030 | 2,015 | 2,015 | 4,480 | 4,595 | 4,595 |
| | | AT-XP | 7½ | 1,055 | 2,065 | 2,065 | 4,575 | 4,595 | 4,595 |

**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 ($h_{nom}$) (in.) | Allowable Moment, M (in-lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Edge of Slab[3] | | | Center of Slab[4] | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 psi NWC | 3,000 psi SLWC | 3,000 psi NWC | 4,000 psi NWC |
| MSSC4.25KW | 4" or thicker | STB2 | 2¼ | — | — | — | 860 | 1,435 | 1,660 |
| | | Titen HD | 2½ | 575 | 955 | 1,100 | 575 | 955 | 1,100 |
| | 6" or thicker | STB2 | 2⅞ | — | — | — | 1,295 | 2,150 | 2,495 |
| | | Titen HD | 3¼ | 1,255 | 2,095 | 2,430 | 1,255 | 2,095 | 2,430 |
| | | SET-XP | 4 | 1,175 | 2,305 | 2,305 | 1,485 | 2,915 | 2,915 |
| | | AT-XP | 4 | 1,220 | 2,395 | 2,395 | 1,560 | 3,065 | 3,065 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 2,200 | 3,705 | 3,705 | 2,790 | 3,705 | 3,705 |
| | | AT-XP | 7½ | 2,290 | 3,705 | 3,705 | 2,935 | 3,705 | 3,705 |
| MSSC6.25KW | 4" or thicker | STB2 | 2¼ | — | — | — | 1,070 | 1,780 | 2,055 |
| | | Titen HD | 2½ | 715 | 1,185 | 1,365 | 715 | 1,185 | 1,365 |
| | 6" or thicker | STB2 | 2⅞ | — | — | — | 1,605 | 2,665 | 3,090 |
| | | Titen HD | 3¼ | 1,555 | 2,600 | 3,010 | 1,555 | 2,600 | 3,010 |
| | | SET-XP | 4 | 1,795 | 3,505 | 3,505 | 1,840 | 3,615 | 3,615 |
| | | AT-XP | 4 | 1,860 | 3,645 | 3,645 | 1,935 | 3,800 | 3,800 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 3,350 | 4,595 | 4,595 | 3,455 | 4,595 | 4,595 |
| | | AT-XP | 7½ | 3,490 | 4,595 | 4,595 | 3,640 | 4,595 | 4,595 |

**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 ($h_{nom}$) (in.) | Allowable Moment, M (in-lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Edge of Slab[3] | | | Center of Slab[4] | | |
| | | | | 3,000 psi SLWC | 3,000 psi NWC | 4,000 psi NWC | 3,000 psi SLWC | 3,000 psi NWC | 4,000 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 | 1,020 | 1,020 |
| | | AT-XP | 4 | 430 | 840 | 840 | 550 | 1,070 | 1,070 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 770 | 1,495 | 1,495 | 975 | 4,325 | 4,325 |
| | | AT-XP | 7½ | 800 | 1,575 | 1,575 | 1,025 | 4,325 | 4,325 |
| 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 | 1,080 |
| | | Titen HD | 3¼ | 545 | 910 | 1,050 | 545 | 910 | 1,050 |
| | | SET-XP | 4 | 625 | 1,225 | 1,225 | 645 | 1,265 | 1,265 |
| | | AT-XP | 4 | 650 | 1,275 | 1,275 | 680 | 1,330 | 1,330 |
| | Concrete thickness ≥ 9.5" | SET-XP | 7½ | 1,180 | 5,360 | 5,360 | 1,210 | 5,360 | 5,360 |
| | | AT-XP | 7½ | 1,220 | 5,310 | 5,310 | 1,270 | 5,310 | 5,310 |

1. Allowable Moments have been determined using ACI 318-14 Chapter 17 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 p. 112.
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 p. 112.
5. Load values are for a single anchor based on ACI 318-14, condition B, load factors from ACI 318-14 Section 5.3, 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. Load values are based on a short-term temperature range of 150°F and 180°F for SET-XP and AT-XP. Long-term temperature range is assumed to be 110°F for both SET-XP and AT-XP. Dry hole conditions are assumed.Other conditions may be evaluated using Anchor Designer™ Software for ACI 318, ETAG and CSA. See **strongtie.com/software.**
7. Allowable Stress Design (ASD) values were determined by multiplying calculated LRFD capacities by a conversion factor, Alpha ($\alpha$), 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 ($\Omega$) seismic factor of 2.5 for brittle failure as required by ACI 318-14 Chapter 17, 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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# Bridging and Bracing 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 pp. 116 through 118

**Codes:** See p. 11 for Code Reference Key Chart

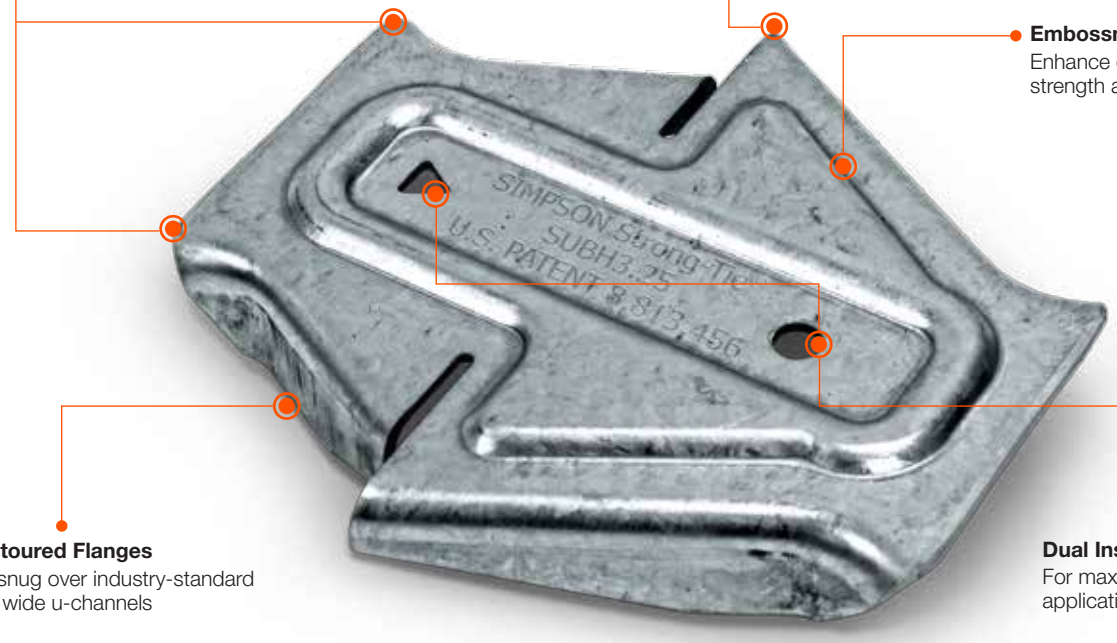
**Ordering Information:**

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



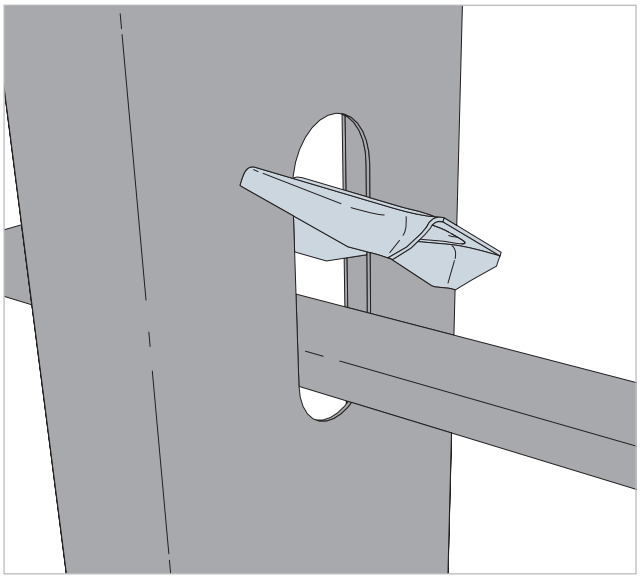

**Contoured Flanges**
Fits snug over industry-standard 1.5" wide u-channels

**Dual Installation Options**
For maximum design and application flexibility

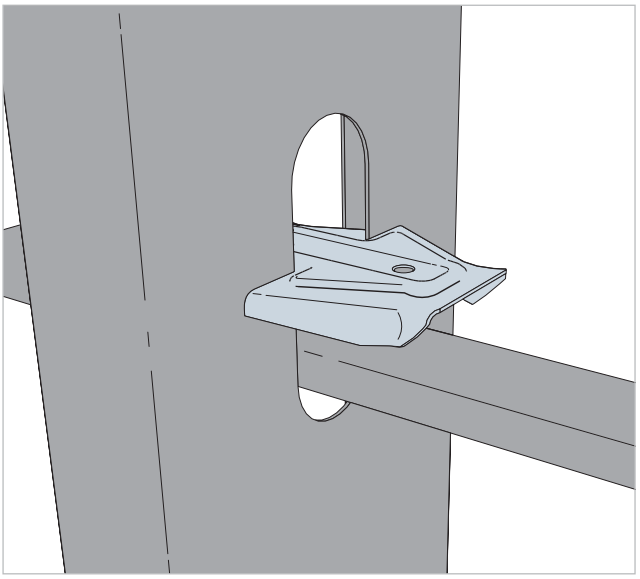
**SUBH3.25**
*(LSUBH3.25 and MSUBH3.25 similar)*
U.S. Patent 8,813,456

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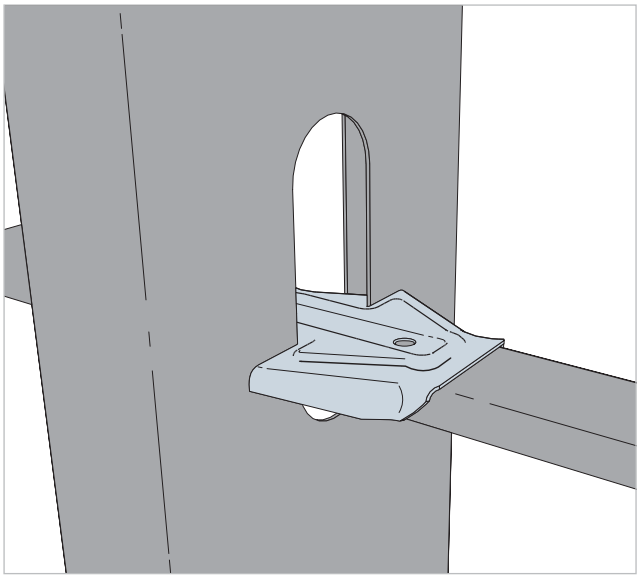
# Installation Instructions



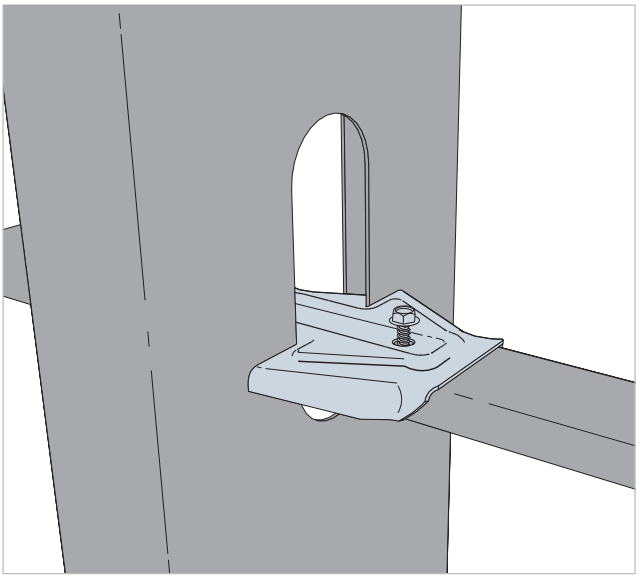
**Step 1:** With the u-channel in a stable, horizontal position, insert either end of the SUBH into the web knockout at approximately 45°.



**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 p. 117).

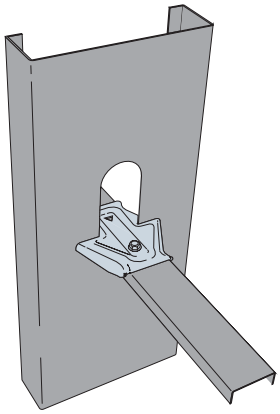


**Step 4:** Install the specified type and number of screws through the holes of the SUBH into the u-channel.

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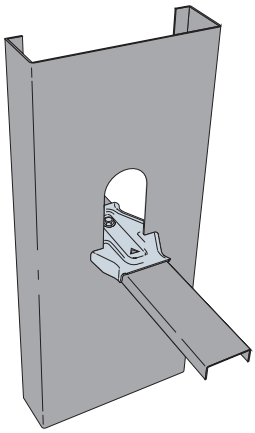
# Installation Details

## Typical Orientations



1

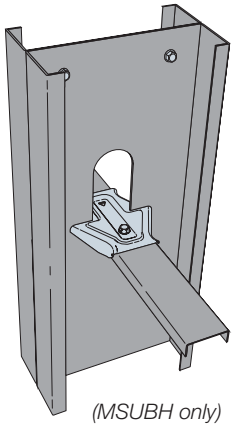
Round Hole Near Side



2

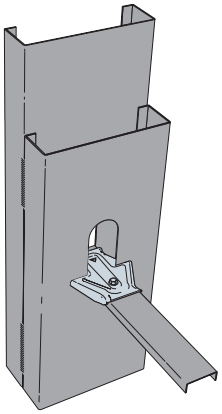
Round Hole Far Side

## Recommended Details at Built-Up Studs

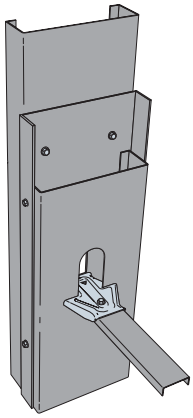


1

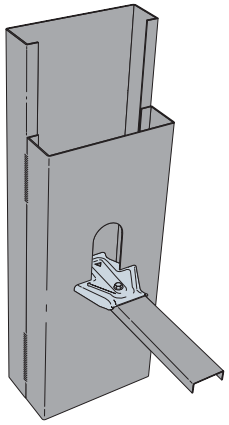
*(MSUBH only)*



3

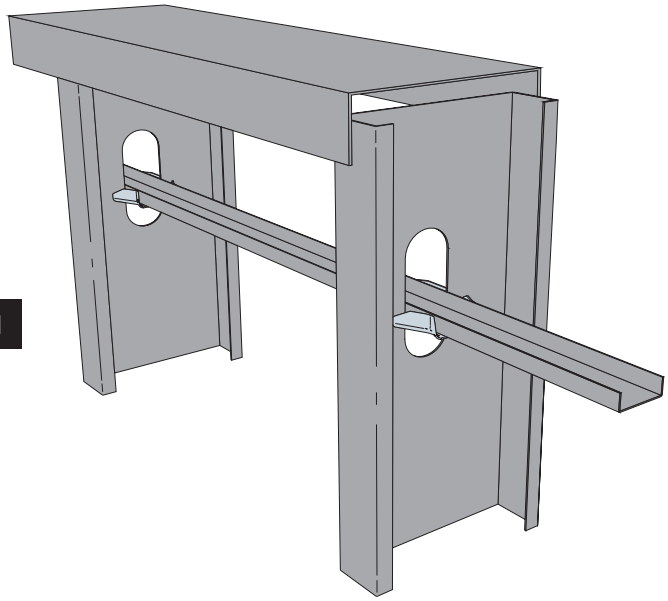


2



4

## Recommended Detail at Slip Track



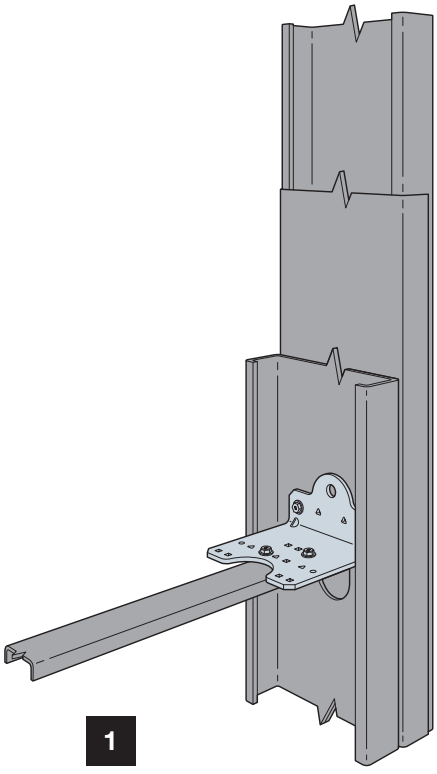
1



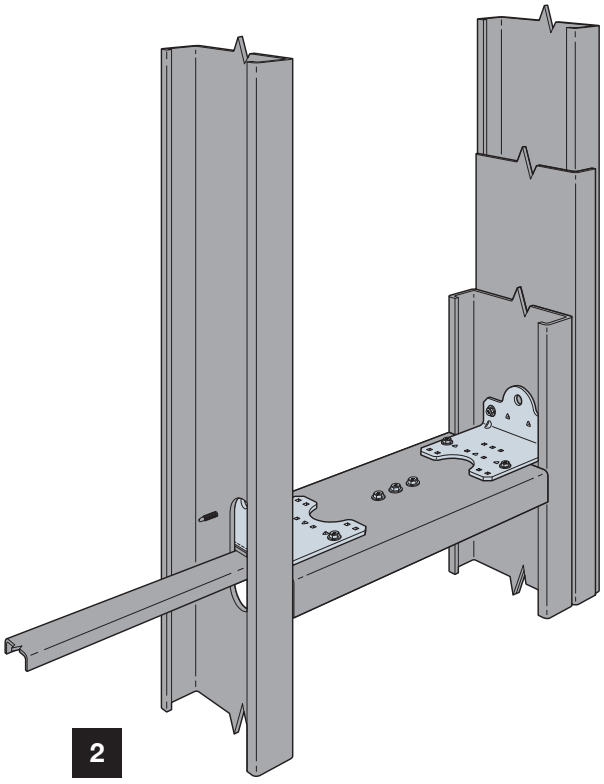
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# Alternate and Optional U-Channel Bridging Installation Details

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



1



2

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# SUBH Bridging Connectors



## 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 2012 edition of AISI North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100-2012) 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

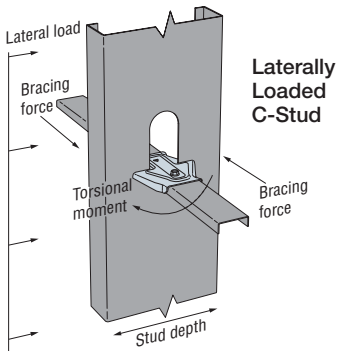
Step 3: Select connector with tabulated allowable torsional moment that exceeds torsional moment from Step 2 for the stud depth and gauge required

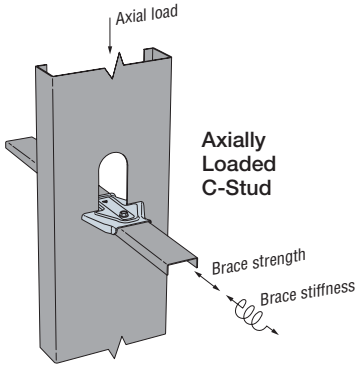
### Bracing Design for Axially Loaded C-Studs

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

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

Step 3: Select connector with tabulated allowable brace strength that exceeds strength from Step 1 and tabulated brace stiffness that exceeds stiffness from Step 2 for the stud depth and gauge required




## SUBH Bridge Clip Connector — Strength and Stiffness

| Model No. | Stud Depth (in.) | Stud Thickness mils (ga.) | Laterally Loaded C-Stud: Allowable Torsional Moment[1] (in.-lb.) Min. | Laterally Loaded C-Stud: Allowable Torsional Moment[1] (in.-lb.) Max. | Axially Loaded C-Stud: Allowable Brace Strength[1,2] (lb.) Min. | Axially Loaded C-Stud: Allowable Brace Strength[1,2] (lb.) Max. | Axially Loaded C-Stud: Brace Stiffness[3] (lb./in.) Min. | Axially Loaded C-Stud: Brace Stiffness[3] (lb./in.) Max. | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| LSUBH3.25 | 3.625 | 33 (20) | 215 | 330 | 155 | 275 | 2,300 | 2,685 | IP1 |
| | | 43 (18) | 230 | 370 | 175 | 310 | 5,075 | 7,585 | |
| | | 54 (16) | 225 | 370 | 195 | 345 | 5,075 | 8,100 | |
| SUBH3.25 | | 33 (20) | 320 | 345 | 230 | 370 | 1,450 | 1,985 | IP1, L2 |
| | | 43 (18) | 355 | 430 | 255 | 420 | 2,780 | 4,035 | |
| | | 54 (16) | 420 | 455 | 290 | 475 | 2,925 | 3,975 | |
| MSUBH3.25 | | 54 (16) | 550 | 800 | 435 | 630 | 3,440 | 4,015 | |
| | | 68 (14) | 640 | 860 | 485 | 695 | 4,040 | 6,145 | |
| | | 97 (12) | 670 | 860 | 515 | 770 | 6,860 | 14265 | |
| LSUBH3.25 | 6.00 | 33 (20) | 225 | 330 | 120 | 140 | 670 | 730 | IP1 |
| | | 43 (18) | 250 | 395 | 155 | 285 | 1,010 | 2,075 | |
| | | 54 (16) | 265 | 395 | 180 | 330 | 1,025 | 2,565 | |
| SUBH3.25 | | 33 (20) | 275 | 385 | 110 | 110 | 605 | 605 | IP1, L2 |
| | | 43 (18) | 295 | 525 | 230 | 250 | 1,050 | 1,205 | |
| | | 54 (16) | 350 | 550 | 275 | 415 | 1,130 | 1,700 | |
| MSUBH3.25 | | 54 (16) | 565 | 895 | 385 | 430 | 1,630 | 1,695 | |
| | | 68 (14) | 655 | 925 | 455 | 620 | 1,860 | 2,655 | |
| | | 97 (12) | 690 | 960 | 505 | 765 | 4,070 | 4,090 | |
| LSUBH3.25 | 8.00 | 43 (18) | 235 | 375 | 135 | 135 | 815 | 815 | IP1 |
| | | 54 (16) | 250 | 375 | 180 | 260 | 1,130 | 1,130 | |
| SUBH3.25 | | 43 (18) | 255 | 570 | 190 | 190 | 505 | 535 | IP1, L2 |
| | | 54 (16) | 325 | 605 | 250 | 300 | 895 | 1,025 | |
| MSUBH3.25 | | 54 (16) | 545 | 890 | 270 | 270 | 1,025 | 1,045 | |
| | | 68 (14) | 635 | 925 | 435 | 455 | 1,400 | 1,400 | |
| | | 97 (12) | 665 | 955 | 545 | 545 | 2,465 | 2,465 | |
| MSUBH | 10, 12 | 54 (16) | — | 820 | — | 200 | — | 510 | 170 |

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 S100-2012. Contact Simpson Strong-Tie if nominal brace strength is required.
3. Tabulated stiffness values apply to both 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 (one screw total); Max. fastener quantity and tabulated values – fill round and triangle holes (two screws total).

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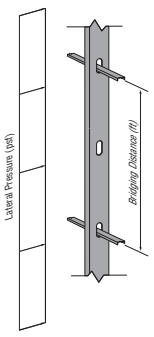
# **SUBH** Design Tables



## LSUBH — Maximum Vertical Spacing for Rows of U-Channel Bridging (ft.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mil (ga.) | Lateral Stud Pressure (psf) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | | 45 | | 50 | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 16 | 362S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 5 | — | 4 | — | 4 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 5 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 5 | — | 4 |
| | 362S200 | 33 (20) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | 362S250 | 43 (18) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 5 | — | 4 | — | 4 | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 7 | — | 5 | — | 4 | — | 4 | — | — | — | — | — | — |
| | 600S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | 4 | 6 | — | 5 | — | 4 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 |
| | 600S200 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 |
| | 600S250 | 43 (18) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — | — | — |
| | 800S162 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 6 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 7 | 4 | 6 |
| | 800S200 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 5 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | — | 5 | — | 5 | — | 4 |
| | 800S250 | 43 (18) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | — | 5 | — | 5 | — | 4 | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — |
| 24 | 362S162<br>362S162<br>362S162 | 33 (20) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 6 | — | 5 | — | 4 | — | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | — | — | — | — | — |
| | 362S200<br>362S200<br>362S200 | 33 (20) | 8 | 8 | 6 | 8 | 4 | 7 | — | 5 | — | 4 | — | — | — | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 7 | 8 | 4 | 8 | — | 6 | — | 4 | — | 4 | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 7 | 8 | 4 | 8 | — | 6 | — | 4 | — | 4 | — | — | — | — | — | — | — | — |
| | 362S250<br>362S250 | 43 (18) | 8 | 8 | 6 | 8 | 4 | 6 | — | 4 | — | — | — | — | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 5 | 8 | — | 6 | — | 4 | — | — | — | — | — | — | — | — | — | — | — | — |
| | 600S162<br>600S162<br>600S162 | 33 (20) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | 600S200<br>600S200<br>600S200 | 33 (20) | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 6 | — | 4 | — | 4 | — | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 5 | — | 4 | — | 4 | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 5 | — | 4 | — | 4 | — | — | — | — | — | — |
| | 600S250<br>600S250 | 43 (18) | 8 | 8 | 7 | 8 | 4 | 7 | — | 5 | — | 4 | — | — | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 7 | 8 | 5 | 7 | — | 5 | — | 4 | — | — | — | — | — | — | — | — | — | — |
| | 800S162<br>800S162 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 5 | — | 4 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 |
| | 800S200<br>800S200 | 43 (18) | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | — | 5 | — | 4 | — | — | — | — | — | — |
| | 800S250<br>800S250 | 43 (18) | 8 | 8 | 7 | 8 | 5 | 7 | — | 5 | — | 4 | — | — | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 6 | — | 4 | — | 4 | — | — | — | — | — | — | — | — |

1. See General Notes on pp. 14–16.
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 and later, wind pressures are at strength level and must be multiplied by 0.6 for ASD load combinations.
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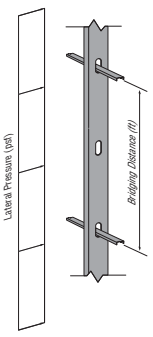
# **SUBH** Design Tables



## SUBH — Maximum Vertical Spacing for Rows of U-Channel Bridging (ft.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mil (ga.) | Lateral Stud Pressure (psf) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | | 45 | | 50 | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 16 | 362S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 4 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 7 | 5 | 6 | 5 | 6 | 4 | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 7 | 6 | 6 | 5 | 5 |
| | 362S200 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 6 | 5 | 5 | 4 | 4 | — | 4 | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 6 | 4 | 5 | 4 | 5 | — | 4 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 4 |
| | 362S250 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 6 | 4 | 5 | — | 4 | — | 4 | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 5 | 4 | 5 | 4 | 4 | — | — | — | — |
| | 600S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 5 | 7 | 4 | 6 | 4 | 5 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | 4 | 7 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 8 |
| | 600S200 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | 4 | 7 | — | 6 | — | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 6 |
| | 600S250 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 5 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 6 | — | 5 | — | 4 |
| | 800S162 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | 4 | 8 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 | 5 | 8 |
| | 800S200 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | — | 8 | — | 7 | — | 7 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 5 | 8 | 4 | 8 | 4 | 7 |
| | 800S250 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 4 | 8 | 4 | 8 | — | 7 | — | 6 | — | 6 | — | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | — | 7 | — | 6 | — | 5 |
| 24 | 362S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 5 | 4 | 4 | — | 4 | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 7 | 5 | 6 | 4 | 5 | — | 4 | — | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 6 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | — | — |
| | 362S200 | 33 (20) | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 5 | 4 | 4 | — | — | — | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 6 | 4 | 5 | — | 4 | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 7 | 5 | 5 | 4 | 4 | — | 4 | — | — | — | — | — | — |
| | 362S250 | 43 (18) | 8 | 8 | 8 | 8 | 6 | 7 | 4 | 5 | — | 4 | — | — | — | — | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 7 | 7 | 5 | 5 | 4 | 4 | — | — | — | — | — | — | — | — | — | — |
| | 600S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 8 | 4 | 7 | — | 6 | — | 5 | — | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 5 | 7 | 4 | 6 | — | 6 | — | 5 |
| | 600S200 | 33 (20) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 7 | 4 | 5 | — | 4 | — | 4 | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 5 | — | 4 | — | 4 |
| | 600S250 | 43 (18) | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 6 | — | 5 | — | 4 | — | 4 | — | — | — | — |
| | 800S162 | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 8 | 4 | 8 | — | 7 | — | 7 | — | 6 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | 4 | 7 | — | 6 |
| | 800S200 | 43 (18) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | — | 7 | — | 6 | — | 5 | — | 5 | — | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 8 | — | 7 | — | 6 | — | 5 | — | 5 |
| | 800S250 | 43 (18) | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 8 | — | 7 | — | 6 | — | 5 | — | 4 | — | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 | — | 4 | — | 4 | — | — |

1. See General Notes on pp. 14–16.
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 and later, wind pressures are at strength level and must be multiplied by 0.6 for ASD load combinations.
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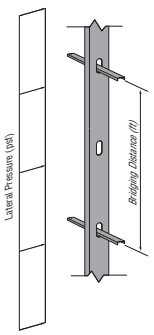
# **SUBH** Design Tables



## MSUBH — Maximum Vertical Spacing for Rows of U-Channel Bridging (ft.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mil (ga.) | Lateral Stud Pressure (psf) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | | 45 | | 50 | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 16 | 362S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 7 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 362S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 | 5 | 7 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 7 | 8 | 6 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 |
| | 362S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 7 | 4 | 6 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 5 | 6 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 7 | 5 | 6 |
| | 600S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 600S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 7 | 8 | 6 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 600S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 7 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 |
| | 800S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 800S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 800S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 |
| | 1000S162 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1000S200 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1000S250 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1200S162 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1200S200 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1200S250 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |

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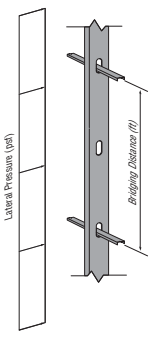

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# SUBH Design Tables

## MSUBH — Maximum Vertical Spacing for Rows of U-Channel Bridging (ft.) (cont.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mil (ga.) | Lateral Stud Pressure (psf) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | | 45 | | 50 | |
| | | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 24 | 362S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 7 | 4 | 6 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 | 5 | 7 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 |
| | 362S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | 4 | 5 | — | 5 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | 4 | 5 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 5 | 6 | 4 | 5 |
| | 362S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 4 | — | 4 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | 4 | 5 | — | 5 | — | 4 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 7 | 5 | 6 | 4 | 5 | 4 | 5 | — | 4 |
| | 600S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 |
| | 600S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 7 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 7 |
| | 600S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 4 | 7 | 4 | 6 | — | 5 | — | 5 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 6 | 4 | 6 | — | 5 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 5 | 7 | 4 | 6 | 4 | 5 |
| | 800S162 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 6 | 8 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 |
| | 800S200 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 8 | 4 | 7 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 | 5 | 7 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 8 |
| | 800S250 | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 5 | 8 | 5 | 8 | 4 | 7 | — | 6 | — | 5 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 8 | 5 | 8 | 5 | 7 | 4 | 6 | 4 | 6 |
| | | 97 (12) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 6 | 8 | 5 | 7 | 4 | 7 | 4 | 6 |
| | 1000S162 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1000S200 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 |
| | 1000S250 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 6 | — | 5 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 6 | — | 5 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 6 | — | 5 |
| | 1200S162 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1200S200 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 |
| | 1200S250 | 54 (16) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 6 | — | 6 |
| | | 68 (14) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 6 | — | 6 |
| | | 97 (12) | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 8 | — | 7 | — | 7 | — | 6 |

1. See General Notes on pp. 14–16.
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 and later, 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 MSUBH does not offer a solution.



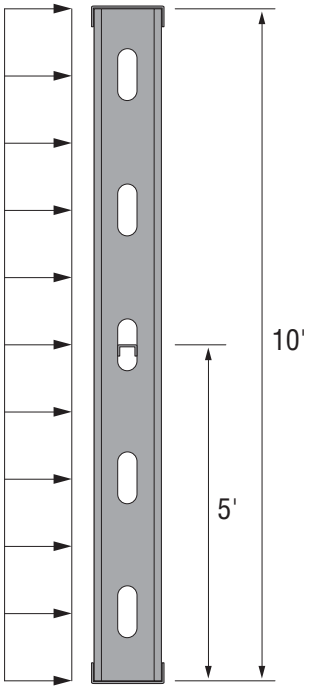



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# Example #1: Curtain-Wall Stud

## Given

- 2015 IBC (ASCE 7-10 and AISI S100-2012)
- 600S162–43 (33 ksi) studs at 24" o.c.
- 10'-tall studs with mid-point bracing (5' o.c.)
- Wind design pressure = 41 psf




## Select Connector Using Design Table (p. 121)

ASD wind pressure:

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

**Note:** 2015 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' 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 p. 119 (see Example #2).

# Example #2: Exterior Bearing-Wall Stud

## Given

- 2015 IBC (ASCE 7-10 and AISI S100-2012)
- 600S162–54 (50 ksi) studs at 24" o.c., 10' tall
  Mid-point bracing (5' o.c.)
  Required axial stud strength, $P_{ra}$ = 2,200 lb.
  Distance from shear center to mid-plane of web, m = 0.663" (2013 AISI Manual, Table I-2)
- Wind design pressure = 34 psf

## Axially-Loaded Stud Design

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

$P_{br,1} = 0.01P_{ra}$ = (0.01)(2,200 lb.) = 22 lb.

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

$\beta_{rb} = \{2[4 - (2/n)]/Lb\}\Omega P_{ra}$ = {2[4 – (2/1)]/60 in.}(2)(2,200) = 294 lb./in.

From Allowable Loads table (p. 119) for 6"-deep 54-mil stud:

➡ Select SUBH3.25 with Min. fasteners
Allowable brace strength = 275 lb. > 22 lb. **OK**
Brace stiffness = 1,130 lb./in. > 294 lb./in. **OK**

## Laterally-Loaded Stud Design

Design load tributary to a single connector:

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

**Note:** 2015 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 lb.) = 33.8 lb.

Torsional moment:

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

From Allowable Loads table (p. 119) for 6"-deep 54-mil stud:

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

## Combined-Loading Check

($P_{br,1}$/Allowable brace strength) + ($M_z$/Allowable torsional moment) = (22 lb./275 lb.) + (203 in.-lb./350 in.-lb.) = 0.66 < 1.0 **OK**

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# **SBR / DBR** Spacer Bracers



***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.***

Simpson Strong-Tie introduces the SBR and DBR spacer bracers for cold-formed steel construction. These spacer bracers reduce the installed cost of cold-formed steel stud walls by enabling faster stud layout while minimizing the need for bridging clips.

The DBR is used for interior walls to eliminate stud bow and allow for quicker drywall attachment, while the SBR is designed for structural exterior walls. Both products provide bracing along the length of the stud, and for head-of-wall slip conditions. The SBR and DBR also come with prepunched slots that eliminate the need to use bridging clips with on-module studs.

The SBR and DBR spacer bracers come with bracing load data based on assembly testing, thus mitigating risk for designers and maximizing confidence in design specs. In fact, the SBR and DBR are the only spacer bracers on the market with tabulated design values based on assembly tests.

**Features:**

- SBR and DBR have patent-pending precision-engineered prepunched slots strategically located to enable 12", 16" and 24" on-center stud spacing and can be used to space the studs without having to mark the top track for layout
- The SBR will accommodate 3⅝" and 6" studs in thicknesses of 33 mil (20 ga.) thru 68 mil (14 ga.)
- The DBR will accommodate 2½", 3⅝" and 6" studs in thicknesses of 15 mil (25 ga. EQ) through 33 mil (20 ga.)
- Prepunched holes in the SBR provide rapid screw installation when spacer-bracer splices are needed for axial load-bearing studs
- In off-layout or end-of run conditions, the hat-section profiles enable clip attachments to the stud with Simpson Strong-Tie® LSSC or RCA connectors

**Installation:**

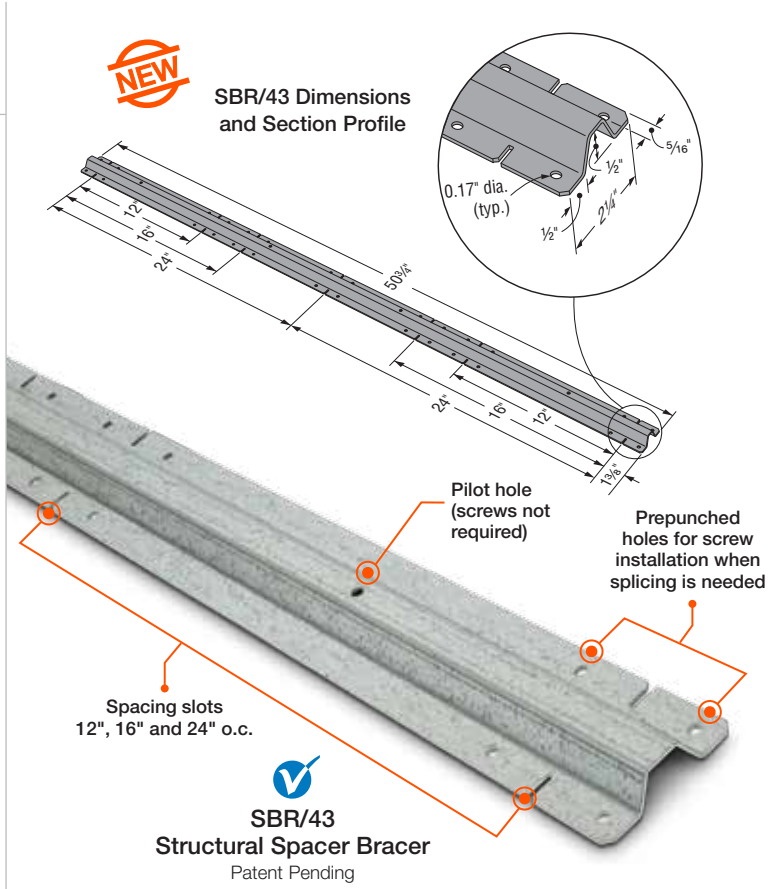
- Spacer bracers are fed through the stud knockout at a 90° angle until studs align with spacer-bracer slots. With the slots engaging the stud web, the spacer-bracer is then rotated back to the flat position so that the slotted flanges are on the bottom.
- For off-layout or end-of-run studs where a spacer-bracer slot does not engage a stud, manually snip the spacer-bracer flanges with a ½"-deep slot and secure the spacer bracer to the stud with Simpson Strong-Tie LSSC or RCA connectors. Use all specified fasteners.
- Wear gloves while handling and installing spacer bracers.

**Material:** SBR/43 — 43 mil (40 ksi); DBR/30 — 27 mil (33 ksi)

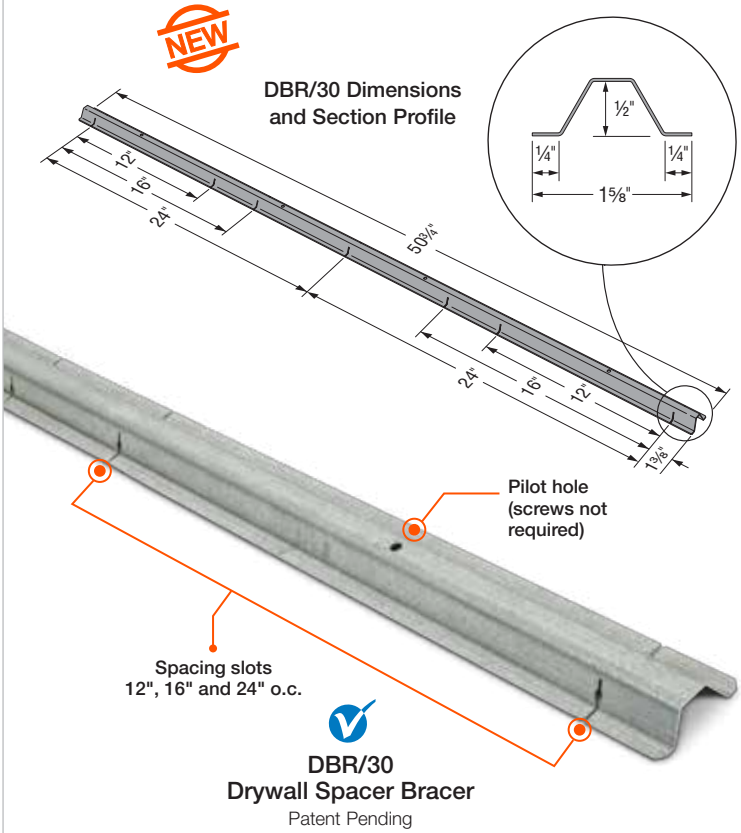
**Finish:** Galvanized (G90)

**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**
SBR/43-R20 (Box of 20)
DBR/30-R20 (Box of 20)




**SBR/43**
**Structural Spacer Bracer**
Patent Pending




**DBR/30**
**Drywall Spacer Bracer**
Patent Pending

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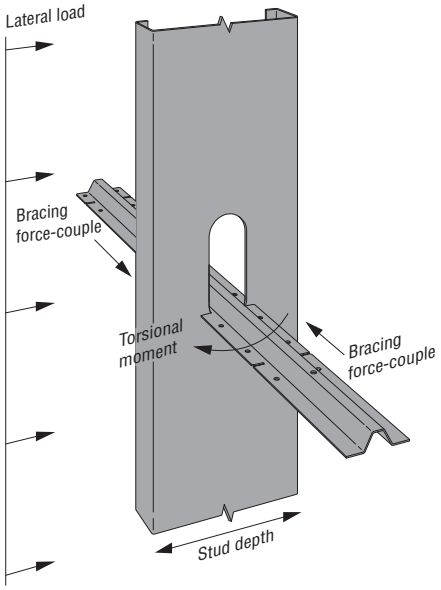
# **SBR / DBR** Spacer Bracers



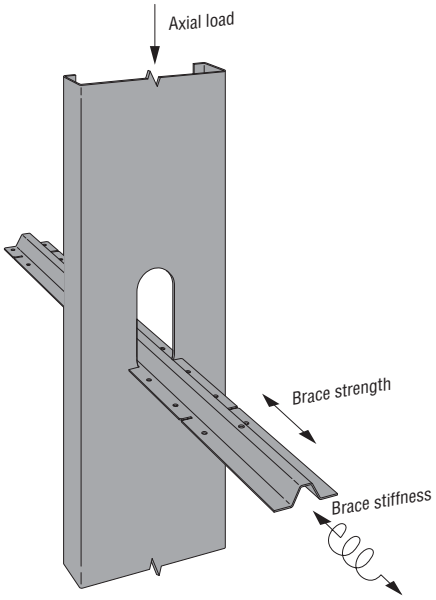
## SBR and DBR Spacer Bracer — Connection Strength and Stiffness

| Model No. | Stud Depth (in.) | Stud Thickness mil (ga.) | Allowable Torsional Moment (in./lb.) | Allowable Brace Strength (lb.) | Brace Stiffness (lb./in.) | Code Ref. |
|---|---|---|---|---|---|---|
| SBR/43 | 3⅝ | 33 (20) | 235 | 390 | 845 | 170 |
| | | 43 (18) | 310 | 435 | 1,390 | |
| | | 54 (16) | 400 | 435 | 1,390 | |
| | | 68 (14) | 400 | 435 | 1,390 | |
| | 6 | 33 (20) | 215 | 160 | 495 | |
| | | 43 (18) | 310 | 330 | 765 | |
| | | 54 (16) | 365 | 450 | 840 | |
| | | 68 (14) | 365 | 450 | 840 | |
| DBR/30 | 2½ | 15 (25 EQ) | 55 | — | — | |
| | | 18 (25) | 55 | — | — | |
| | | 19 (20 EQ) | 60 | — | — | |
| | | 30 (20 DW) | 85 | — | — | |
| | | 33 (20 STR) | 90 | — | — | |
| | 6 | 15 (25 EQ) | 55 | — | — | |
| | | 18 (25) | 55 | — | — | |
| | | 19 (20 EQ) | 60 | — | — | |
| | | 30 (20 DW) | 85 | — | — | |
| | | 33 (20 STR) | 90 | — | — | |

1. Allowable loads are for use when utilizing the traditional Allowable Stress Design methodology. For LRFD loads multiply the ASD tabulated values by 1.6.
2. Tabulated 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 S100-2012.
3. Tabulated Brace Stiffness values apply to both ASD and LRFD designs.
4. Allowable loads consider bridging connection only. It is the responsibility of the Designer to verify the strength and serviceability of the framing members.
5. EQ — equivalent, DW — drywall, STR — structural.




**Laterally Loaded C-Stud with SBR Spacer Bracer**
*(DBR spacer bracer similar)*




**Axially Loaded C-Stud with SBR Spacer Bracer**

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# **SBR / DBR** Spacer Bracers



## SBR and DBR Gross Properties

| Model No. | Design Thickness (in.) | $F_y$ (ksi) | Area[2] (in.) | $I_x$[4] (in.) | $S_x$[3] (in.) | $R_x$ (in.) | $I_y$[4] (in.) | $S_y$[3] (in.) | $R_y$ (in.) | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | $Jx1{,}000$[4] (in.) | $C_w$[6] (in.) | $Y_o$ (in.) | m (in.) | $R_o$ (in.) | β |
| SBR/43 | 0.0468 | 40 | 0.126 | 0.0047 | 0.1458 | 0.1936 | 0.0436 | 0.0400 | 0.5891 | 0.0916 | 5.56E-04 | 0.283 | 0.017 | 0.681 | 0.828 |
| DBR/30 | 0.0289 | 33 | 0.060 | 0.0023 | 0.0082 | 0.1936 | 0.0109 | 0.0141 | 0.4259 | 0.0167 | 7.05E-05 | 0.346 | 0.087 | 0.582 | 0.647 |

## SBR and DBR Net Properties

| Model No. | Area[2] (in.) | $I_x$[4] (in.) | $S_x$[3] (in.) | $R_x$ (in.) | $I_y$[4] (in.) | $S_y$[3] (in.) | $R_y$ (in.) | Torsional Properties | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $Jx1{,}000$[4] (in.) | $C_w$[6] (in.) | $Y_o$ (in.) | m (in.) | $R_o$ (in.) | β |
| SBR/43 | 0.085 | 0.0028 | 0.0097 | 0.1816 | 0.0120 | 0.0184 | 0.3765 | 0.0617 | 3.43E-05 | 0.355 | 0.141 | 0.548 | 0.581 |
| DBR/30 | 0.022 | 0.0001 | 0.0004 | 0.0479 | 0.0008 | 0.0027 | 0.1944 | 0.0061 | 1.09E-06 | 0.086 | 0.051 | 0.218 | 0.844 |

## SBR and DBR Allowable Member Strengths

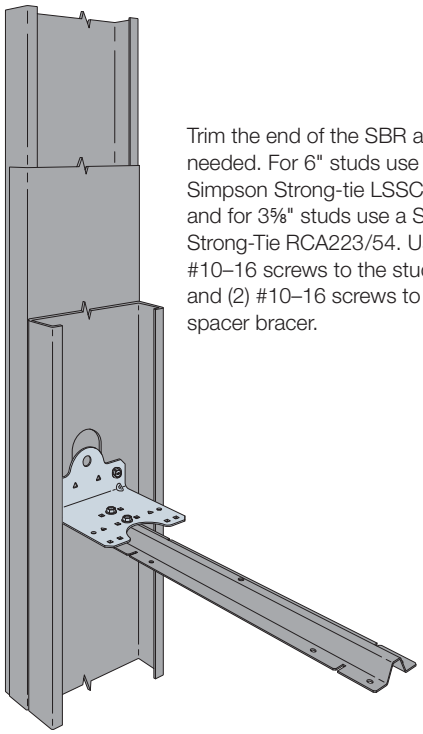
| Model No. | $M_a$ ($F_y$) (in.-lb.) | $M_a$ (12" o.c.) (in.-lb.) | $M_a$ (16" o.c.) (in.-lb.) | Ma (24" o.c.) (in.-lb.) | $P_a$ (12" o.c.) (lb.) | $P_a$ (16" o.c.) (lb.) | $P_a$ (24" o.c.) (lb.) |
|---|---|---|---|---|---|---|---|
| SBR/43 | 369 | 369 | 369 | 360 | 945 | 904 | 618 |
| DBR/30 | 44 | 40 | 38 | 32 | — | — | — |

1. Net section properties are based a section that excludes all material that is interrupted by the slots.
2. Member strengths are based on DSM Analysis (non-prequalified section, Ω = 2.0).
3. $C_b$ = 1.67 has been applied to $M_a$ to account for a triangular moment diagram with zero end moment.

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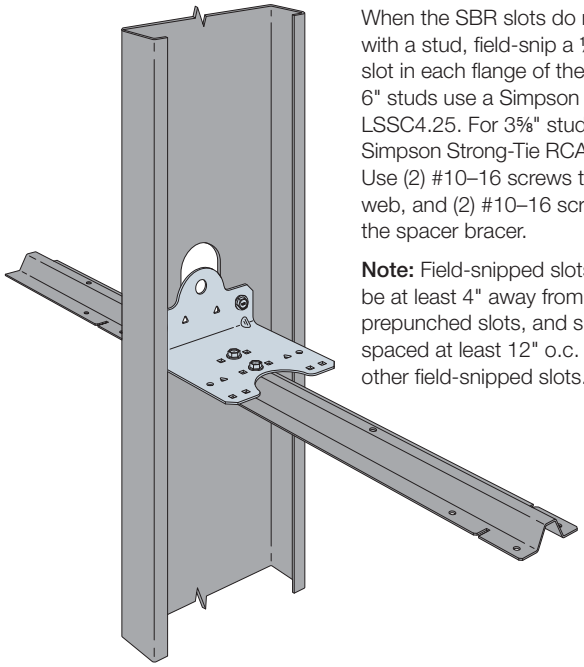
# **SBR / DBR** Spacer Bracers





Trim the end of the SBR as needed. For 6" studs use a Simpson Strong-tie LSSC4.25 and for 3⅝" studs use a Simpson Strong-Tie RCA223/54. Use (2) #10–16 screws to the stud web, and (2) #10–16 screws to the spacer bracer.

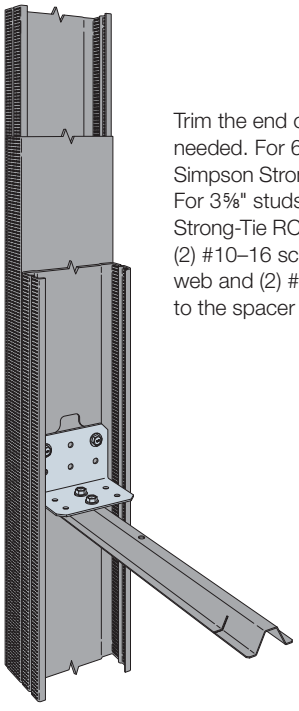
**SBR End-of-Run for 6" Studs with LSSC4.25**
*(3⅝" studs with RCA 223/54 similar)*



When the SBR slots do not line-up with a stud, field-snip a ½"-deep slot in each flange of the SBR. For 6" studs use a Simpson Strong-Tie LSSC4.25. For 3⅝" studs use a Simpson Strong-Tie RCA223/54. Use (2) #10–16 screws to the stud web, and (2) #10–16 screws to the spacer bracer.

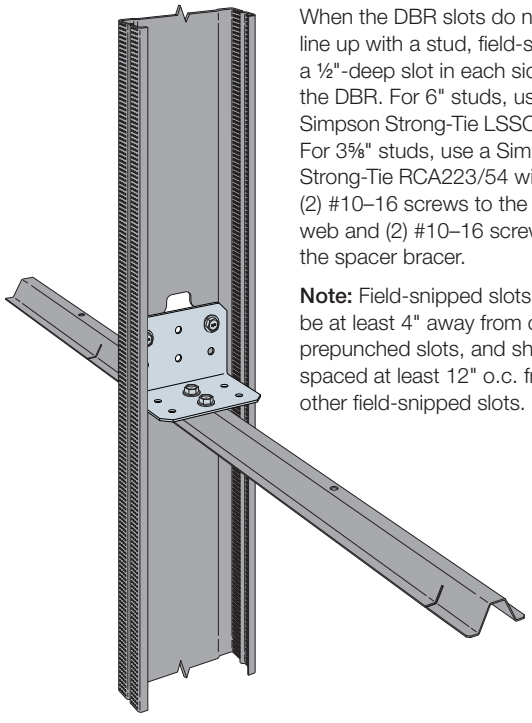
**Note:** Field-snipped slots shall be at least 4" away from other prepunched slots, and shall be spaced at least 12" o.c. from other field-snipped slots.

**SBR Off-Module for 6" Studs with LSSC4.25**
*(3⅝" studs with RCA 223/54 similar)*



Trim the end of the DBR as needed. For 6" studs use a Simpson Strong-Tie LSSC4.25. For 3⅝" studs use a Simpson Strong-Tie RCA223/54. Use (2) #10–16 screws to the stud web and (2) #10–16 screws to the spacer bracer.

**DBR End-of-Run for 3⅝" Studs with RCA223/54**
*(6" studs with LSSC4.25 similar)*



When the DBR slots do not line up with a stud, field-snip a ½"-deep slot in each side of the DBR. For 6" studs, use a Simpson Strong-Tie LSSC4.25. For 3⅝" studs, use a Simpson Strong-Tie RCA223/54 with (2) #10–16 screws to the stud web and (2) #10–16 screws to the spacer bracer.

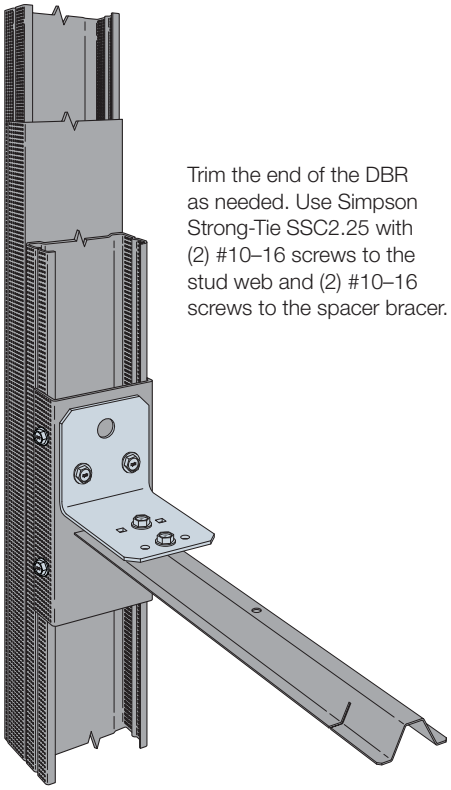
**Note:** Field-snipped slots shall be at least 4" away from other prepunched slots, and shall be spaced at least 12" o.c. from other field-snipped slots.

**DBR Off-Module for 3⅝" Studs with RCA223/54**
*(6" studs with LSSC4.25 similar)*

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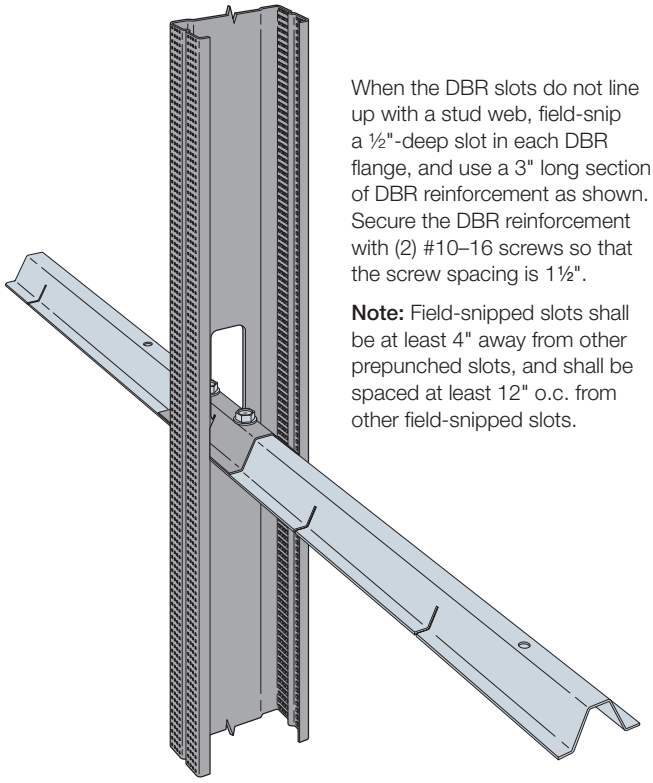
# **SBR / DBR** Spacer Bracers





Trim the end of the DBR as needed. Use Simpson Strong-Tie SSC2.25 with (2) #10–16 screws to the stud web and (2) #10–16 screws to the spacer bracer.

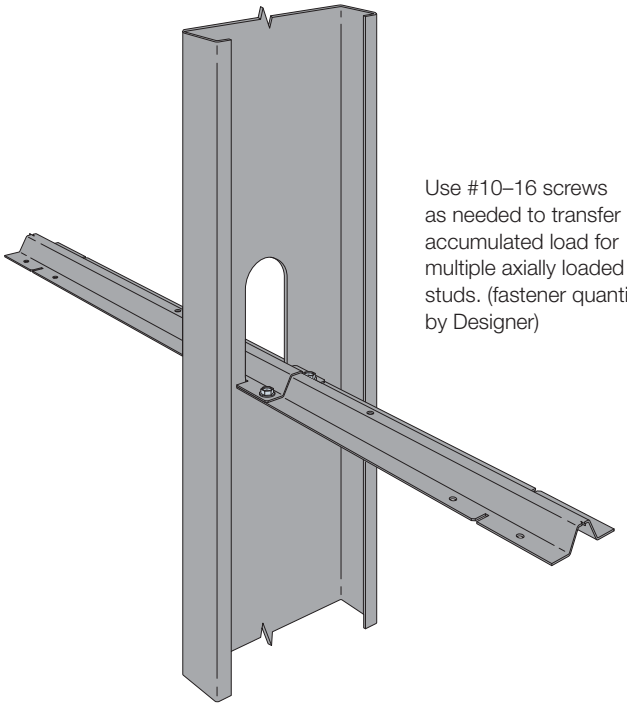
**DBR End-of-Run for 2.5" Studs with SSC2.25**



When the DBR slots do not line up with a stud web, field-snip a ½"-deep slot in each DBR flange, and use a 3" long section of DBR reinforcement as shown. Secure the DBR reinforcement with (2) #10–16 screws so that the screw spacing is 1½".

**Note:** Field-snipped slots shall be at least 4" away from other prepunched slots, and shall be spaced at least 12" o.c. from other field-snipped slots.

**DBR Off-Module for 2½" Studs with DBR Reinforcement**
*(DBR and SBR with 3⅝" studs and 6" studs similar)*



Use #10–16 screws as needed to transfer accumulated load for multiple axially loaded studs. (fastener quantity by Designer)

**Typical SBR Splice for Axially Loaded Studs**

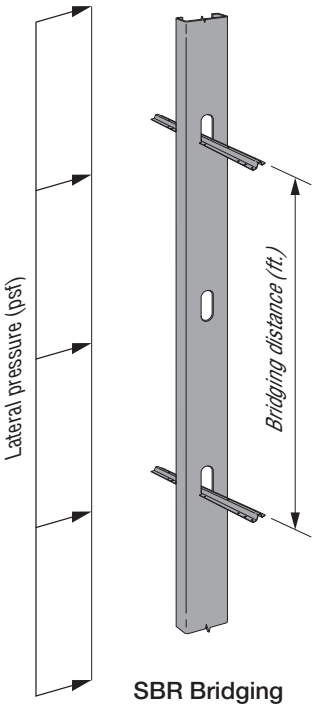
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# **SBR / DBR** Spacer Bracers



## SBR/43 Maximum Bridging Distance (ft.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mil (ga.) | Lateral Stud Pressure (psf) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| 12 | 362S162 | 33 (20) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 5 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 6 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 |
| | 362S200 | 33 (20) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 6 | 5 | 5 | 4 | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 6 | 5 | 4 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 6 | 5 | 4 |
| | 600S162 | 33 (20) | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 6 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 |
| | 600S200 | 33 (20) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 5 | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 6 | 5 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 6 | 5 |
| 16 | 362S162 | 33 (20) | 8 | 8 | 8 | 7 | 5 | 4 | 4 | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 5 | 4 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 6 | 6 | 5 | 4 |
| | 362S200 | 33 (20) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | | 68 (14) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | 600S162 | 33 (20) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 5 | 4 |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 6 | 5 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 6 | 6 | 5 |
| | 600S200 | 33 (20) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 8 | 6 | 5 | 4 | 4 | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 8 | 6 | 5 | 5 | 4 | 4 |
| | | 68 (14) | 8 | 8 | 8 | 8 | 8 | 6 | 5 | 5 | 4 | 4 |
| 24 | 362S162 | 33 (20) | 8 | 8 | 6 | 4 | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 6 | 5 | 4 | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 68 (14) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | 362S200 | 33 (20) | 8 | 7 | 5 | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 6 | 5 | 4 | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | | 68 (14) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | 600S162 | 33 (20) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 8 | 7 | 6 | 5 | 4 | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | | 68 (14) | 8 | 8 | 8 | 8 | 7 | 6 | 5 | 4 | 4 | — |
| | 600S200 | 33 (20) | 8 | 7 | 5 | — | — | — | — | — | — | — |
| | | 43 (18) | 8 | 8 | 7 | 5 | 4 | — | — | — | — | — |
| | | 54 (16) | 8 | 8 | 8 | 6 | 5 | 4 | — | — | — | — |
| | | 68 (14) | 8 | 8 | 8 | 6 | 5 | 4 | — | — | — | — |




**SBR Bridging Distance**
*(DBR similar)*

1. Tabulated solutions are for ASD lateral pressure. Contact Simpson Strong-Tie for LRFD solutions.
2. Lateral pressures shall be determined based on the load combinations of the applicable building code. For designs in accordance with the 2009 IBC and earlier, wind pressures are at the working stress level and may be used directly. For designs in accordance with the 2012 and 2015 IBC, wind pressures are at the strength level and must be multiplied by 0.6 for ASD load combinations.
3. Tabulated values are based on the minimum of the tested connection strength and the calculated SBR/DBR member strength. Studs must be checked separately for unbraced length.

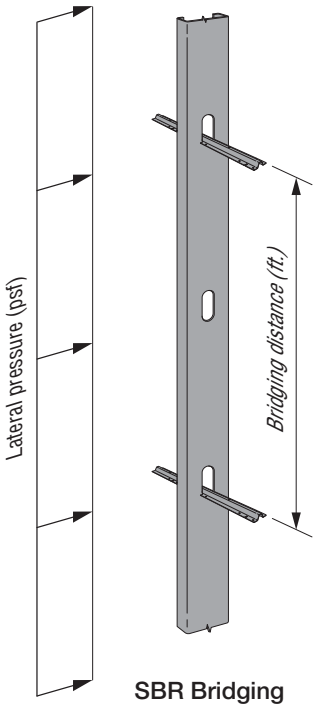
C-CF-2017 © 2017 SIMPSON STRONG-TIE COMPANY INC.

# SBR / DBR Spacer Bracers



## DBR/30 Maximum Bridging Distance (ft.)

| Stud Spacing (in.) | Stud Section | Stud Thickness mils (ga.) | Lateral Stud Pressure (psf) | |
|---|---|---|---|---|
| | | | 5 | 10 |
| 12 | 362S125 | 15 (25 EQ) | 8 | 5 |
| | | 18 (25) | 8 | 5 |
| | | 19 (20 EQ) | 8 | 5 |
| | | 30 (20 DW) | 8 | 5 |
| | | 33 (20 STR) | 8 | 5 |
| | 600S125 | 15 (25 EQ) | 8 | 6 |
| | | 18 (25) | 8 | 6 |
| | | 19 (20 EQ) | 8 | 6 |
| | | 30 (20 DW) | 8 | 6 |
| | | 33 (20 STR) | 8 | 6 |
| 16 | 362S125 | 15 (25 EQ) | 7 | — |
| | | 18 (25) | 7 | — |
| | | 19 (20 EQ) | 7 | — |
| | | 30 (20 DW) | 7 | — |
| | | 33 (20 STR) | 7 | — |
| | 600S125 | 15 (25 EQ) | 8 | 4 |
| | | 18 (25) | 8 | 4 |
| | | 19 (20 EQ) | 8 | 4 |
| | | 30 (20 DW) | 8 | 4 |
| | | 33 (20 STR) | 8 | 4 |
| 24 | 362S125 | 15 (25 EQ) | 4 | — |
| | | 18 (25) | 4 | — |
| | | 19 (20 EQ) | 4 | — |
| | | 30 (20 DW) | 4 | — |
| | | 33 (20 STR) | 4 | — |
| | 600S125 | 15 (25 EQ) | 4 | — |
| | | 18 (25) | 4 | — |
| | | 19 (20 EQ) | 4 | — |
| | | 30 (20 DW) | 5 | — |
| | | 33 (20 STR) | 5 | — |




**SBR Bridging Distance**
*(DBR similar)*

1. Tabulated solutions are for ASD lateral pressure. Contact Simpson Strong-Tie for LRFD solutions.
2. Lateral pressures shall be determined based on the load combinations of the applicable building code. For designs in accordance with the 2009 IBC and earlier, wind pressures are at the working stress level and may be used directly. For designs in accordance with the 2012 and 2015 IBC, wind pressures are at the strength level and must be multiplied by 0.6 for ASD load combinations.
3. Tabulated values are based on the minimum of the tested connection strength and the calculated SBR/DBR member strength. Studs must be checked separately for unbraced length.

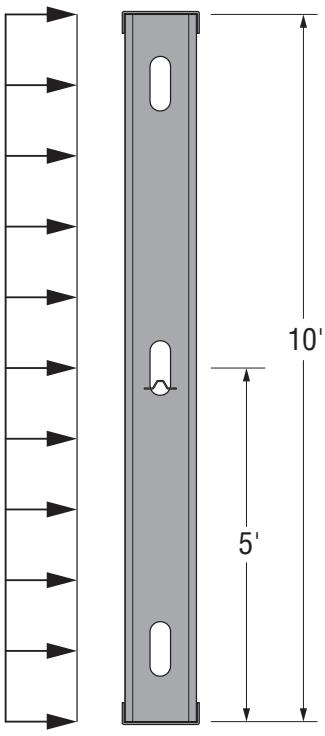
C-CF-2017 ©2017 SIMPSON STRONG-TIE COMPANY INC.

# **SBR** Spacer Bracer



## Given

- 2015 IBC (ASCE 7-10 and AISI S100-2012)
- 600S162-54 (50 ksi) studs at 24" o.c., 10'-stud height
  - – Mid-point bracing (5' o.c.)
  - – Distance from shear center to mid-plane of web, m = 0.663". (2013 AISI Manual, Table I-2)
- Wind design pressure = 34 psf
- $P_{ra}$ = Required ASD axial load = 3,000 lb.




## Axially Loaded Stud

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

$P_{rb} = 0.01P_{ra} = (0.01)(3{,}000 \text{ lb.}) = 30 \text{ lb.}$

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

$\beta_{rb} = (2[4-(2/n)]/L_b)(\Omega P_{ra}) = (2[4-(⅔)]/60)(2)(3{,}000) = 400 \text{ lb./in.}$

Check connection strength and stiffness from Strength and Stiffness table (page 4) for the SBR/43 for 6"-deep, 54-mil studs

- ➢ Allowable brace strength = 450 lb. > 30 lb. **OK**
- ➢ Allowable brace stiffness = 840 lb./in. > 400 lb./in. **OK**

Check member strength from Allowable Strengths table (page 4) for the SBR/43 for 24" o.c.

- ➢ $P_a$ (24" o.c.) = Allowable member strength = 618 lb. > 30 lb. **OK**

**Note:** Member stiffness and the effects of accumulated load for multiple axially loaded studs have not been accounted for in the above calculations. Reference CFSEI Tech Note W400-16 for additional guidance on these topics.

## Laterally Loaded Stud

ASD Design load tributary to brace:

$W = (0.6)(34 \text{ psf})(2 \text{ ft.})(5 \text{ ft.}) = 204 \text{ lb.}$

**Note:** 2015 IBC load combinations for ASD include a factor of 0.6

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

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

Torsional moment

$M_z = P_{L1}d = -P_{L2}d = (33.8)(6) = 202.8 \text{ in.-lb.}$

Moment applied to bridging member

$M_m = 0.64M_z = (0.64)(202.8) = 129.8 \text{ in.-lb.}$

**Note:** The 0.64 factor is from an analysis of a five-span continuous beam that is loaded with equal support moments (Reference AISI Design Guide D110-07, pp. 2–9, Figure 2-6)

Check connection strength from Strength and Stiffness table (p. 126) for the SBR/43 for 6"-deep, 54-mil studs

- ➢ Allowable torsional moment = 365 in.-lb. > 202.8 in.-lb. **OK**

Check member strength from Allowable Strengths table (p. 126) for the SBR/43 for 24" o.c.

- ➢ $M_a$ (24" o.c.) = Allowable moment = 360 in.-lb. > 129.8 in.-lb. **OK**

## Combined-Loading Check of Connection

($P_{br}$/Allowable brace strength) + ($M_z$/Allowable torsional moment) ≤ 1.0

(30 lb./450 lb.) + (202.8 in.-lb./365 in.-lb.) = 0.62 < 1.0 **OK**

## Combined-Loading Check of Bridging Member

Reference AISI Eqs. C5.2.1-1, C5.2.1-2, or Eq. C52.1-3 as applicable. For this condition, Eq. C5.2.1-3 applies.

$$\frac{\Omega_c P}{P_n} + \frac{\Omega_b M}{M_n} \leq 1.0$$

$$P_n = 2P_a \qquad M_n = 2M_a$$

$$\frac{1.8\ (30)}{2\ (618)} + \frac{1.67\ (129.8)}{2\ (360)} = 0.34 < 1.0 \textbf{ OK}$$

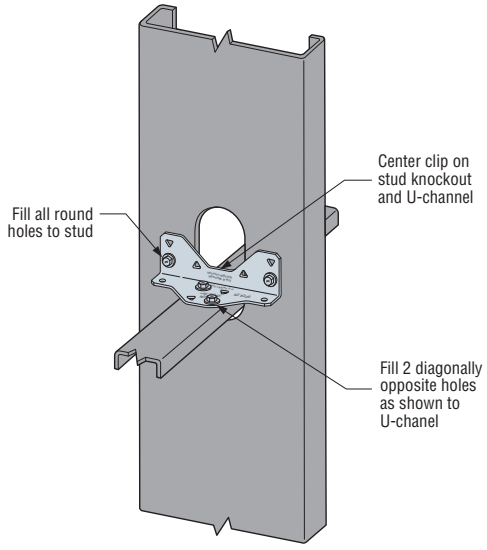
**Note:** The allowable strengths given in the Allowable Strengths table (p. 126) have been converted to nominal strengths by multiplying by Ω = 2.0.

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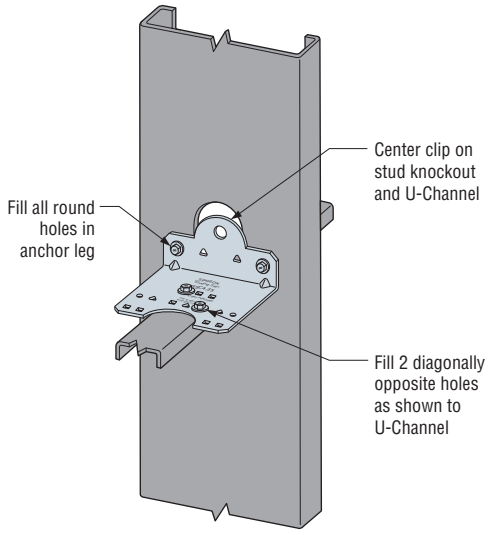
## SFC/SSC Connectors – U-Channel Bridging Allowable Loads

| 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 | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Stud | Bridging | Allowable Torsional Moment[2] (in.-lb.) | Allowable Brace Strength[2,3] (lb.) | Brace Stiffness[4] (lb./in.) | |
| SFC4.25 | 54 (16) | 4¼ | 6 | 33 (20) | (2) #10 | (2) #10 | 275 | 125 | 860 | IP2 |
| | | | | 43 (18) | (2) #10 | (2) #10 | 510 | 190 | 1,220 | |
| | | | | 54 (16) | (2) #10 | (2) #10 | 645 | 280 | 2,045 | |
| LSSC4 | 54 (16) | 4¼ | 6 | 54 (16) | (2) #10 | (2) #10 | 1,085 | 180 | 165 | |
| SSC4.25 | 68 (14) | 4¼ | 6 | 54 (16) | (2) #10 | (2) #10 | 655 | 280 | 2,045 | |
| | | | | 68 (14) | (2) #10 | (2) #10 | 805 | 335 | 2,305 | |
| | | | | 97 (12) | (2) #10 | (2) #10 | 920 | 660 | 4,230 | |
| LSSC6.25 | 54 (16) | 6¼ | 8, 10, 12 | 54 (16) | (2) #10 | (2) #10 | 1,085 | 180 | 685 | |

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 pp. 138 through 171 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 one- or two-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.***






**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:** See p. 11 for Code 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. - lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | Mil | Gauge[3] | Fy (ksi) | | | | |
| DBC2.5 | 3⅝ | 15 | 25 EQ. | 50 | Min. | (1) #8 | 65 | 170 |
| | | 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 (one screw total); Max. fastener quantity and tabulated values — fill round and triangle holes (two screws total).
3. EQ — equivalent, DW — drywall, STR — structural.

# Design Example

### Given

- 600S125–18 (33 ksi) studs at 24" o.c., 10' 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 lb.

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

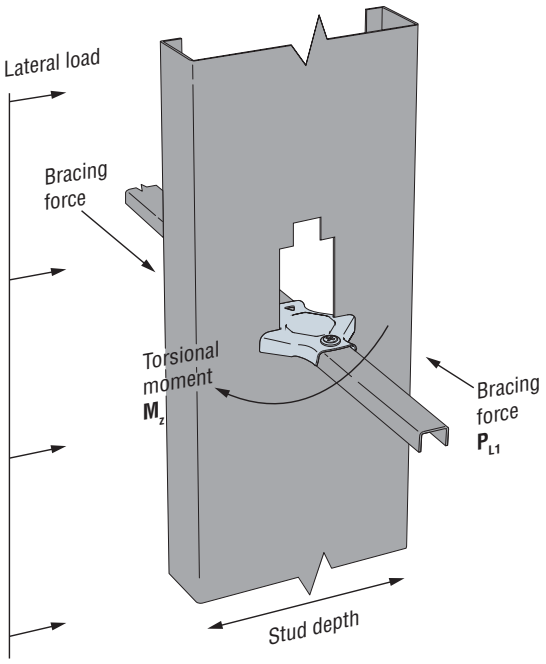
$P_{L1} = -P_{L2} = 1.5(m/d)W = (1.5)(0.408 \text{ in.}/6 \text{ in.})(50 \text{ lb.}) = 5.1 \text{ lb.}$

Torsional moment:

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

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

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

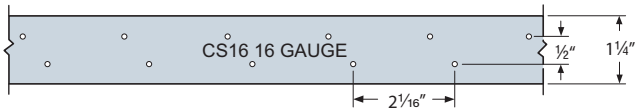
**Materials:** See table.

**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 p. 11 for Code Reference Key Chart




**CS16 Hole Pattern**
*(all other CS straps similar)*

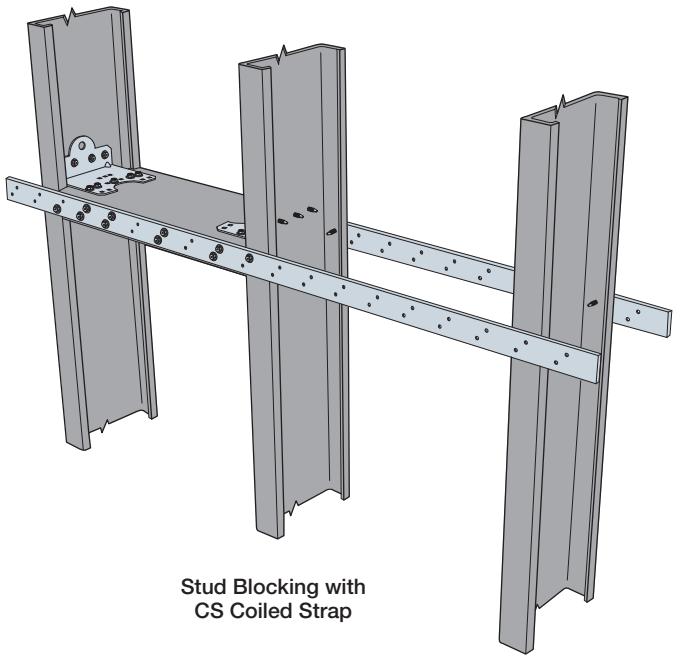
| Model No. | Total Length (ft.) | Connector Material Thickness mil (ga.) | Width (in.) | Fasteners (At Blocking)[4] Framing Thickness mil (ga.) 33 (20) | 43 (18) | 54 (16) | Allowable Tension Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| CS16 | 150 | 54 (16) | 1¼ | (9) #10 | (6) #10 | (4) #10 | 1,550 | IP1, L2, FL |
| CS18 | 200 | 43 (18) | 1¼ | (7) #10 | (5) #10 | (3) #10 | 1,235 | |
| 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



**Stud Blocking with CS Coiled Strap**

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# **LTB** Bridging

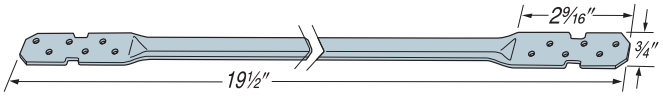
LTB bridging connectors are a cost-effective solution for bracing between non-load-bearing wall studs when compared with field fabricated blocking and clip angles.

**Material:** 27 mil (22 ga.)

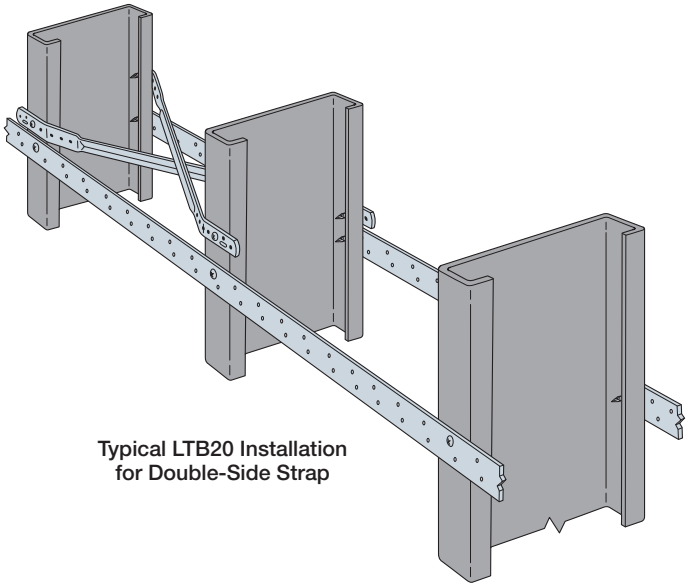
**Finish:** Galvanized (G90)

**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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# Fasteners and Quik Drive®



# In the Fastener Marketplace, Simpson Strong-Tie Stands Apart from the Rest.

Quality and reliability are our top priorities. 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.











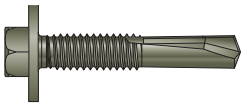
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# Applications: Fastening to Metal



## Screws

Strong-Drive®
XL **LARGE-HEAD METAL** Screw



5⁄16" hex head, Quik Guard® coating, p. 149

Strong-Drive®
XM **MEDIUM-HEAD METAL** Screw



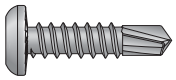
5⁄16" hex head, Quik Guard® coating, p. 147

Strong-Drive® XE **EXTERIOR STRUCTURAL METAL** Screw



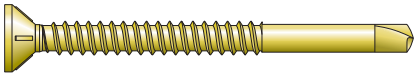
5⁄16" hex head, Quik Guard® coating, p. 141

Strong-Drive®
FPHSD **FRAMING-TO-CFS** Screw



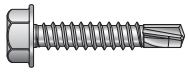
Flat-pan head, clear zinc coating, p. 143

Strong-Drive®
PPSD **SHEATHING-TO-CFS** Screw



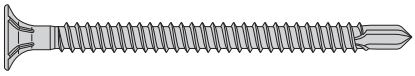
Subfloor to CFS screw Quik Guard® and yellow zinc coating, p. 152

Strong-Drive®
**SELF-DRILLING X METAL** Screw



5⁄16" hex head, Quik Guard® and clear zinc coating, p. 145

Self-Drilling
Fiber-Cement Screw



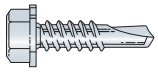
Type 410 stainless steel

Strong-Drive®
TB **WOOD-TO-STEEL** Screw



#4 drill point, black phosphate, mechanically galvanized coating, p. 156

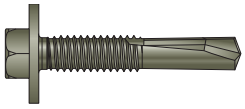
Self-Drilling
E Metal Screw



#3 drill point, clear zinc coating, p. 142

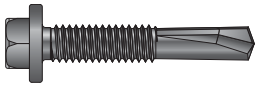
## Collated Screws for the Quik Drive® System

Strong-Drive®
XL **LARGE-HEAD METAL** Screw



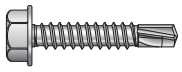
5⁄16" hex head, Quik Guard® coating, p. 149

Strong-Drive®
XM **MEDIUM-HEAD METAL** Screw



5⁄16" hex head, Quik Guard® coating, p. 147

Strong-Drive®
**SELF-DRILLING X METAL** Screw



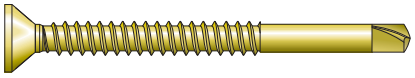
5⁄16" hex head, Quik Guard® and clear zinc coating, p. 145

Strong-Drive®
TB **WOOD-TO-STEEL** Screw



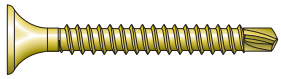
#4 drill point, black phosphate, yellow zinc, mechanically galvanized coating, p. 156

Strong-Drive®
PPSD **SHEATHING-TO-CFS** Screw



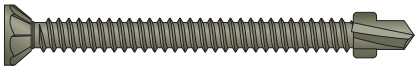
#3 drill point, Quik Guard®, yellow zinc coating, p. 152

DWFSD Drywall-to-CFS Screw



Drywall to steel, #2 point, yellow zinc coating (54, 43 mil / 16, 18 ga.), p. 155

CBSDQ Sheathing-to-CFS Screw



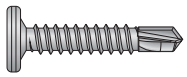
Sheathing to steel, #2 drill point, Quik Guard® coating, p. 150

DWF Drywall-to-CFS Screw



Drywall to steel, gray phosphate coating (33, 27, 18 mil / 20, 22, 25 ga.), p. 155

PCSD Standing-Seam Roofing Panel Clip Screw



#3 drill point , clear zinc or Quik Guard® coating and Type 410 stainless steel, p. 154

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# Strong-Drive® XE EXTERIOR STRUCTURAL METAL Screw

SIMPSON Strong-Tie®

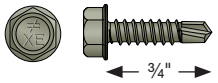
## Common Applications:

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

## 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 | 1,000 | XEQ34B1016M |

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

| Screw Size | Nominal Dia. d (in.) | Washer Dia. $d_w$ (in.) | Load Description | Shear (lb.) | | | | | | Pullover (lb.) | | | | | | Pullout (lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 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) |
| #10 x ¾" | 0.19 | 0.4 | Allowable strength (ASD) | 182 | 235 | 365 | 465 | 465 | 465 | 330 | 425 | 605 | 785 | 785 | 785 | 64 | 95 | 128 | 226 | 306 | 501 |
| | | | Design strength (LRFD) | 292 | 375 | 585 | 695 | 695 | 695 | 525 | 675 | 970 | 1,175 | 1,175 | 1,175 | 103 | 152 | 205 | 361 | 490 | 801 |
| | | | Nominal strength | 423 | 535 | 830 | 1,290 | 1,290 | 1,290 | 805 | 1,035 | 1,485 | 2,065 | 2,065 | 2,065 | 167 | 234 | 348 | 555 | 750 | 1,225 |

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 mil (18 ga.) and thinner, and a minimum yield strength, $F_y$ = 50 ksi and tensile strength, $F_u$ = 65 ksi for 54 mil (16 ga.) and thicker.
3. Screws shall extend through the connection with a minimum of three exposed threads per AISI General Provisions Standard Section D1.3.

## Screw Strength (lb.)

| Screw Size | Nominal Strength | | Design Strength (LRFD) $\phi = 0.5$ | | Allowable Strength (ASD) $\Omega = 3.0$ | |
|---|---|---|---|---|---|---|
| | $P_{ss}$ | $P_{ts}$ | $\phi P_{ss}$ | $\phi P_{ts}$ | $P_{ss}/\Omega$ | $P_{ts}/\Omega$ |
| #10 x ¾" | 1,390 | 2,350 | 695 | 1,175 | 465 | 785 |

$P_{ss}$ – Shear strength.
$P_{ts}$ – Tensile strength.



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# **Self-Drilling E** Metal Screw



### Common Application:

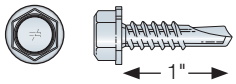
Cold-formed steel framing or connectors to cold-formed steel.

### 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 | 2,500 | E1B1414B |

## Screw Strength

| Screw Size | Model No. | Nominal Strength (lb.) | | Design Strength (LRFD) (lb.) $\phi = 0.5$ | | Allowable Strength (ASD) (lb.) $\Omega = 3.0$ | |
|---|---|---|---|---|---|---|---|
| | | $P_{ss}$ | $P_{ts}$ | $\phi P_{ss}$ | $\phi P_{ts}$ | $P_{ss}/\Omega$ | $P_{ts}/\Omega$ |
| #14 x 1" | E1B1414 | 3,130 | 5,395 | 1,565 | 2,700 | 1,045 | 1,800 |

## Cold-Formed Steel Member Connection Loads

| Screw Size | Model No. | Nominal Dia. (in.) | Washer Dia. (in.) | Load Description | Shear (lb.) Steel Thickness: mil (ga.) | | | | | Pullover (lb.) Steel Thickness: mil (ga.) | | | | | Pullout (lb.) 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 | 1,045 | 390 | 505 | 920 | 1,160 | 1,655 | 105 | 140 | 250 | 320 | 455 |
| | | | | LRFD | 300 | 445 | 905 | 1,280 | 1,565 | 585 | 760 | 1,380 | 1,740 | 2,480 | 160 | 210 | 380 | 480 | 680 |
| | | | | Nominal strength | 600 | 890 | 1,810 | 2,555 | 3,130 | 1,170 | 1,520 | 2,760 | 3,475 | 4,960 | 320 | 415 | 755 | 955 | 1,360 |

1. Screws shall extend through the connection with a minimum of three exposed threads per AISI S200 General Provisions Standard Section D1.3.
2. Tabulated loads are based on calculations per AISI S100 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 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. For other pertinent information, please refer to the Important Information and General Notes on pp. 14–16 of this catalog.

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# Strong-Drive® FPHSD FRAMING-TO-CFS Screw



## Common Applications:

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

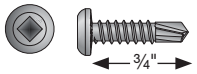
## Features:

- 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.

**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 | 5,000 | FPHSD34B1016-5K |
| #12 | ¾ | 14 | 0.365 | #3 | 147 | FPHSD34B1214 | 5,000 | FPHSD34B1214-5K |

Refer to *Fastening Systems* catalog C-F-2017 for collated fastener information.

## Cold-Formed Steel Member Connection Loads

| Model No. | Size | Nominal Dia. (in.) | Load Description | Shear (lb.) | | | | | | Pullover (lb.) | | | | | | Pullout (lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 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 | 76 | 95 | 156 | 240 | 340 | 505 |
| | | | LRFD load | 280 | 375 | 605 | 855 | 855 | 855 | 445 | 585 | 775 | 1,110 | 1,110 | 1,110 | 123 | 151 | 250 | 380 | 545 | 805 |
| | | | Nominal strength | 395 | 535 | 860 | 1,305 | 1,305 | 1,305 | 685 | 895 | 1,190 | 1,705 | 2,215 | 2,215 | 190 | 230 | 385 | 585 | 840 | 1,235 |
| FPHSD34S1214 | #12–14 x ¾" | 0.216 | ASD load | 205 | 260 | 410 | 610 | 610 | 610 | 240 | 330 | 430 | 630 | 840 | 1,125 | 76 | 95 | 159 | 240 | 345 | 530 |
| | | | LRFD load | 330 | 420 | 650 | 975 | 975 | 975 | 390 | 530 | 685 | 1,005 | 1,340 | 1,690 | 123 | 151 | 255 | 385 | 550 | 855 |
| | | | Nominal strength | 485 | 610 | 930 | 1,385 | 1,385 | 1,385 | 595 | 815 | 1,050 | 1,540 | 2,060 | 2,065 | 190 | 230 | 390 | 590 | 845 | 1,295 |

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 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 Section A2.4.
4. Screw diameters per AISI S200 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 General Provisions Standard Section D1.3.
6. The allowable load (ASD) values shown are not permitted to be increased for short-duration loads such as wind or earthquake loads.
7. The lower of the Pullover and Pullout allowable loads should be used for tension design.
8. 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 FRAMING-TO-CFS Screw



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

| Assembly Description | Max. Aspect Ratio (h/w) | Fastener Spacing at Panel Edges[2] (in.) | | | | Designation Thickness[5] of Stud, Track and Blocking[7] (mil) |
|---|---|---|---|---|---|---|
| | | 6 | 4 | 3 | 2 | |
| 0.018" sheet steel, one side | 2:1 | 485 (W)<br>390 (S) | — | — | — | 33 (min.) |
| 0.027" sheet steel, one side | 4:1 | — | 1,000 | 1,085 | 1,170 | 43 (min.) |
| | 2:1[3] | 647 | 710 | 778 | 845 | 33 (min.) |
| 0.018" sheet steel, both sides | 2:1 | 970 (W)<br>780 (S) | — | — | — | 33 (min.) |
| 0.027" sheet steel, both sides | 4:1 | — | 2,000 | 2,170 | 2,340 | 43 (min.) |
| | 2:1[3] | 1,294 | 1,420 | 1,556 | 1,690 | 33 (min.) |

1. Nominal strength shall be multiplied by the resistance factor ($\phi$ = 0.6, LRFD Seismic, $\phi$ = 0.65, LRFD Wind) to determine design strength or divided by the safety factor ($\Omega$ = 2.5, ASD Seismic, $\Omega$ = 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 Type H steel for members with a designation thickness of 33 and 43 mil.
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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# Strong-Drive® SELF-DRILLING X METAL Screw





## 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:

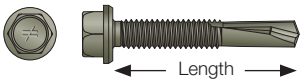
- 5⁄16" hex head
- Drill point
- Hex washer head
- This screw is also available collated for the Quik Drive® system

**Codes/Standards:** ICC-ES ESR-3006, City of LA RR 25670, RR25917 and RR26009, ASTM C1513 compliant, FM Approval #3045651 and #3050714, SDI DDM03, Appendix VII; SDI DDM04; 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.**

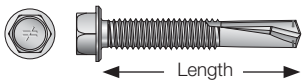
Refer to *Fastening Systems* catalog C-F-2017 for collated fastener information.

## 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 | 4,000 | XQ1B1016-4K | 2, 3 |
| 12 | 1 | 14 | #3 | 0.110 – 0.210 | Quik Guard | 3,500 | XQ1B1214-3.5K | 2, 3 |
| 12 | 1¼ | 24 | #5 | 0.125 – 0.500 | Quik Guard | 2,500 | XQ114B1224-2.5K | 1, 3 |
| 12 | 1½ | 24 | #5 | 0.125 – 0.500 | Quik Guard | 2,000 | 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 | 5,000 | XU34B1016-5K | 2, 3 |
| 10 | ¾ | 16 | #3 | 0.110 – 0.175 | Clear Zinc | 5,000 | X34B1016-5K | 2, 3 |
| 10 | 1 | 16 | #3 | 0.110 – 0.175 | Clear Zinc | 4,000 | X1B1016-4K | 2, 3 |
| 12 | 1 | 14 | #3 | 0.110 – 0.210 | Clear Zinc | 3,500 | X1B1214-3.5K | 2, 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 (lb.) | Tension (lb.) |
| | | | | | $P_{ss}$ | $P_{ts}$ |
| Self-Drilling X Metal Screw | #12 x 1¼" | XQ114S1224, XQ114B1224-2.5K, X114S1224 | 0.216 | 0.415 | 3,110 | 4,985 |
| Self-Drilling X Metal Screw | #12 x 1½" | XQ112S1224, XQ112B1224-2K | 0.216 | 0.415 | | |
| Self-Drilling X Metal Screw | #10 x ¾" | X34B1016-5K | 0.190 | 0.415 | 1,625 | — |
| Self-Drilling X Metal Screw | #10 x 1" | X1S1016, XQ1S1016, X1B1016-4K, XQ1B1016-4K | 0.190 | 0.415 | 1,625 | — |
| Self-Drilling X Metal Screw (undersized drillpoint) | #10 x ¾" | XU34B1016-5K | 0.190 | 0.475 | 1,735 | — |

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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# Strong-Drive® SELF-DRILLING X METAL Screw



## Cold-Formed Steel Connection Loads

| Model No. | Nominal Dia. (in.)[8] | Load Description | Shear (lb.) | | | | | | | | Pullover (lb.) | | | | | | Pullout (lb.) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Steel Thickness: mil (ga.) | | | | | | | | Steel Thickness: mil (ga.) | | | | | | Steel Thickness: mil (ga.) | | | | | | | | |
| | | | 27 (22) | 33 (20) | 43 (18) | 54 (16) | 68 (14) | 97 (12) | 1/8"[12] | 1/4"[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) | 3/16" | 1/4" | 1/2"[12] |
| X34B1016-5K<br>XQ1S1016<br>X1S1016<br>(#10–16 x 1") | 0.190 | ASD | 175 | 235 | 360 | 540 | 540 | 540 | — | — | 330 | 400 | 475 | 645 | 925 | 975 | 71 | 87 | 129 | 200 | 270 | 445 | — | — | — |
| | | LRFD | 280 | 375 | 570 | 810 | 810 | 810 | — | — | 525 | 640 | 755 | 1,035 | 1,475 | 1,465 | 114 | 139 | 205 | 320 | 430 | 715 | — | — | — |
| | | Nominal strength | 400 | 535 | 815 | 1,290 | 1,290 | 1,290 | — | — | 805 | 990 | 1,160 | 1,585 | 2,260 | 2,695 | 174 | 215 | 315 | 490 | 660 | 1,095 | — | — | — |
| XQ1S1214<br>X1S1214<br>(#12–14 x 1") | 0.216 | ASD | 176 | 235 | 385 | 595 | 840 | 840 | — | — | 295 | 375 | 525 | 785 | 1,045 | 1,210 | 74 | 96 | 147 | 215 | 325 | 500 | — | — | — |
| | | LRFD | 280 | 375 | 610 | 950 | 1,265 | 1,265 | — | — | 470 | 600 | 835 | 1,255 | 1,675 | 1,930 | 117 | 154 | 235 | 340 | 520 | 795 | — | — | — |
| | | Nominal strength | 400 | 535 | 870 | 1,350 | 2,135 | 2,135 | — | — | 720 | 920 | 1,285 | 1,925 | 2,565 | 2,965 | 180 | 235 | 360 | 520 | 800 | 1,220 | — | — | — |
| XQ78S1224<br>(#12–24 x 7/8")<br>XQ112S1224<br>(#12–24 x 1½") | 0.216 | ASD | 140 | 230 | 350 | 640 | 740 | 935 | 935 | 935 | 265 | 290 | 400 | 720 | 790 | 1,390 | 78 | 80 | 115 | 200 | 260 | 460 | 730 | 1,375 | 1,420 |
| | | LRFD | 210 | 365 | 560 | 1,025 | 1,175 | 1,355 | 1,355 | 1,355 | 395 | 440 | 640 | 1,155 | 1,260 | 2,160 | 117 | 125 | 185 | 320 | 415 | 735 | 1,170 | 2,135 | 2,160 |
| | | Nominal strength | 420 | 550 | 920 | 1,455 | 1,675 | 2,675 | 2,675 | 2,675 | 795 | 875 | 985 | 1,770 | 1,930 | 3,400 | 235 | 205 | 280 | 505 | 640 | 1,130 | 1,990 | 3,370 | 4,260 |

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 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.
3. The safety factor $\Omega$ and resistance factor $\phi$ used to determine the ASD and LRFD strength 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 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 Section A2.4.
7. Screw diameters per AISI S200 General Provisions Commentary Table D1-1.
8. Minimum required screw length is the lesser of 3/4" or the minimum length required for the screw to extend through the steel connection a minimum of 3 exposed threads per AISI General Provisions Standard Section D1.3.
9. Screw head or washer diameter, $d_W$ 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 Pullover and Pullout 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® XM MEDIUM-HEAD METAL Screw

## Common Applications:

Steel decking to structural members involving wide or narrow valley; nestable or interlocking steel decking

Strong-Drive® metal screws are load-tested and code-listed, allowing you to get the maximum load values for installation. Comparison testing shows Strong-Drive® XM Medium-Head Metal screws are stronger than many alternative fastener types in 33 ksi and 50 ksi steel decking.

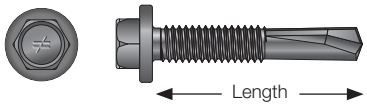
## Features:

- 5⁄16" hex drive
- ½"-diameter hex washer head is ideal for narrow-channel steel decking
- Available only in 1¼" length with #5 drill point
- Available in Quik Guard® coating
- Available in bulk for hand-drive installation and collated for the Quik Drive® system

**Codes/Standards:** IAPMO UES ER-326, FM Approval 3050714, State of Florida FL16937, City of Los Angeles RR26009, SDI DDM04

U.S. Patent Pending

**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

| Size | Length (in.) | Hex Head Size (in.) | Washer Dia. (in.) | Threads per Inch | Point Size | Suitable Material Thickness (in.) | Bulk | | Collated | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Carton Qty. | Model No. | Carton Qty. | Model No. | PROSDX150 |
| #12 | 1¼ | 5⁄16 | 0.483 | 24 | #5 | 0.125 – 0.500 | 2,000 | XMQ114B1224-2K | 1,500 | XMQ114S1224 | ✓ |



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# Strong-Drive® XL LARGE-HEAD METAL Screw



## High-Performance Screw Alternative to Welds and Pins

Strong-Drive® metal screws are load-tested and code-listed, allowing you to get the maximum load values for installation. Strong-Drive® XL Large-Head Metal screws are the perfect choice when high shear or uplift resistance is required. Strong-Drive® XM Medium-Head Metal screws, with their ½" washer head, are designed for narrow flutes commonly found on interlocking deck profiles. In high-strength decks ($F_y$ = 50 ksi), these screws are excellent 1-for-1 replacements for pins. The Self-Drilling X Metal screw is your go-to screw for lighter-duty support fastening and stitching applications. These screws are available in bulk or collated for Quik Drive® steel-decking systems.

**Simpson Strong-Tie provides a full offering of code-listed fasteners for your next steel-decking job.**

DDM03 APPENDIX VII, IX DDM04 Approved

IAPMO UES ER-326

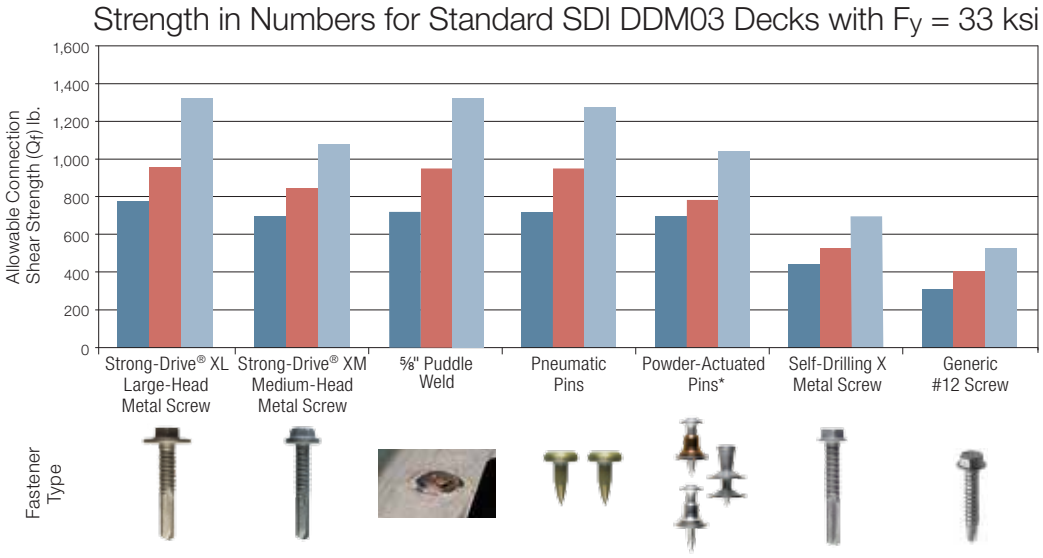
FM APPROVAL #3050714, #3045651

City of L.A. RR26009

State of Florida FL16937

## Strength in Numbers

Comparison testing shows that Strong-Drive XL Large-Head Metal screws and Strong-Drive XM Medium-Head Metal screws are stronger than many alternative fastener types in 33 ksi and 50 ksi steel decking.




## Steel Deck Diaphragm Calculator



### Steel Deck Design Made Easier

The Steel Deck Diaphragm Calculator web app offers optimized steel deck design solutions based on fastener and labor costs for a given shear and uplift. It can provide calculations for any solution generated. Generate diaphragm tables for various roof and floor decks using Simpson Strong-Tie® fasteners. The app can also generate a submittal package that includes fastener information, code reports, Factory Mutual reports, Appendix VII of DDM03, coating information and tools for installation. The app is accessible from any web browser and does not require downloading or installing special software. Users can:

- Design for multiple zones and develop solutions in either ASD or LRFD
- Modify deck properties from the standard properties listed in SDI DDM03 and DDM04
- Generate multiple cost- and labor-optimized solutions with calculations included
- Generate tables in Nominal, ASD Wind, LRFD Wind, ASD Seismic or LRFD Seismic
- Design for loads using the new Strong-Drive® XL Large-Head Metal screw (included in the optimization calculator)
- Design for additional structural patterns not covered in SDI literature
- Access proprietary deck tables with the new Strong-Drive® XM Medium-Head Metal screw

strongtie.com/diaphragmcalc

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# Strong-Drive® XL LARGE-HEAD METAL Screw



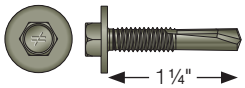
## Common Applications:

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.

## Features:

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

**Codes/Standards:** IAPMO UES ER-326, FM Approval #3050714, SDI DDM03 Appendix IX; SDI DDM04, 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 | 2,000 | XLQ114B1224-2K |

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

Refer to *Fastening Systems* catalog C-F-2017 for collated fastener information.

## Cold-Formed Steel Connection Loads

| Model No. | Size | Nominal Dia. (in.) | Washer Dia. (in.) | Load Description | Shear (lb.) | | | | | | Pullover (lb.) | | | | | | Pullout (lb.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 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 | 1,015 | 1,035 | 1,035 | 1,035 | 525 | 690 | 990 | 1,220 | 1,220 | 1,220 | 575 |
| | | | | LRFD | 970 | 1,160 | 1,555 | 1,555 | 1,555 | 1,555 | 840 | 1,100 | 1,585 | 1,950 | 1,950 | 1,950 | 860 |
| | | | | Nominal strength | 1,400 | 1,670 | 2,340 | 3,110 | 3,110 | 3,110 | 1,295 | 1,705 | 2,430 | 2,995 | 2,995 | 2,995 | 1,720 |

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 Section A2.4.
7. Screw diameters are per AISI S200 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 three exposed threads per 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



## Common Applications:

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

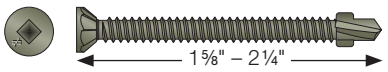
## Features:

- 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, 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 | 1,500 | 0.322 | CBSDQ158S | ✓ | ✓ | ✓ |
| 2¼ | #10 | 16 | #2 | 1,000 | 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 pp. 18–21 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] (lb./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 | 1,065[3] | — | — | — |
| 7/16" rated sheathing (OSB), one side | 2:1 | 910[3] | 1,410 | 1,735 | 1,910 |
| 7/16" rated sheathing (OSB), one side oriented perpendicular to framing | 2:1 | 1,020 | — | — | — |
| 7/16" rated sheathing (OSB), one side | 2:1[5] | — | 1,025 | 1,425 | 1,825 |

1. Nominal strength shall be multiplied by the resistance factor ($\phi$ = 0.65) to determine the design strength or divided by the safety factor ($\Omega$ = 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 mil.

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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] (lb./ft.)

| Assemble Description | Maximum Aspect Ratio (h/w) | Fastener Spacing at Panel Edges[2] (in.) | | | | Designation Thickness[5,6] of Stud, track and Blocking (mil) | 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 | 1,330 | 1,775 | 2,190 | 43 or 54 | 8 |
| | | | | | | 68 | 10 |
| 7/16" rated sheathing (OSB), one side | 2:1[3] | 700 | 915 | — | — | 33 | 8 |
| | 2:1[3] | 825 | 1,235 | 1,545 | 2,060 | 43 or 54 | 8 |
| | 2:1 | 940 | 1,410 | 1,760 | 2,350 | 54 | 8 |
| | 2:1 | 1,232 | 1,848 | 2,310 | 3,080 | 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 Type H steel for members with a designation thickness of 33 and 43 mil, and A1003 Structural Grade 50 Type H steel for members with a designation thickness equal to greater than 54 mil.
7. For wood structural panel sheathed shear walls, tabulated $R_n$ 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



## Common Application:

- Subfloor/sheathing to cold-formed steel. (#8 — maximum thickness: 54 mil / 16 ga.; #10 and #12 — maximum thickness: 97 mil / 12 ga.)
- Shearwall applications (see load tables on pp. 150 and 151)

## Features:

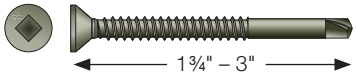
- Flat head with nibs for easier countersinking
- #3 square drive (replacement bit BIT3SU-2 for Quik Guard® and BIT3S-2 for yellow-zinc coating)
- Fine threads
- Pilot point
- Head diameter meets AISI S-213 Lateral Standard
- This screw is also available collated for the Quik Drive® system

**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.**

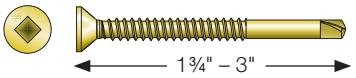
Refer to *Fastening Systems* catalog C-F-2017 for collated fastener information.

## 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 | 4,000 | PPSDQ11516B-4K |
| #10 | 1¾ | 0.333 | #3 | 16 | 4,000 | PPSDQ134B1016-4K |
| #12 | 1¾ | 0.333 | #3 | 16 | 4,000 | PPSDQ134B1214-4K* |
| #10 | 3 | 0.333 | #3 | 16 | 2,000 | PPSDQ3B1016-2K |
| #12 | 3 | 0.333 | #3 | 16 | 2,000 | 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 | 4,000 | PPSD11516B-4K |
| #10 | 1¾ | 0.333 | #3 | 16 | 4,000 | PPSD134B1016-4K |
| #12 | 1¾ | 0.333 | #3 | 16 | 4,000 | PPSD134B1214-4K* |
| #10 | 3 | 0.333 | #3 | 16 | 2,000 | PPSD3B1016-2K |
| #12 | 3 | 0.333 | #3 | 16 | 2,000 | PPSD3B1214-2K* |

* Has underhead nibs.

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# Strong-Drive® PPSD SHEATHING-TO-CFS Screw



## PPSD — Pullout Loads — Steel Connections

| Model No. | Screw Size | Load Description | Pullout Load (lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Steel Thickness: mil (ga.) | | | | | |
| | | | 27 (22) | 33 (20) | 43 (18) | 54 (16) | 68 (14) | 97 (12) |
| PPSD11516S0818<br>PPSDQ11516S0818 | #8 | ASD | 63 | 87 | 119 | 183 | — | — |
| | | LRFD | 100 | 139 | 190 | 295 | — | — |
| | | Nominal strength | 154 | 215 | 290 | 450 | — | — |
| PPSD134S1016<br>PPSDQ134S1016 | #10 | ASD | 80 | 128 | 194 | 315 | 425 | 480 |
| | | LRFD | 128 | 205 | 310 | 500 | 680 | 765 |
| | | Nominal strength | 225 | 325 | 480 | 765 | 1,045 | 1,205 |
| PPSD3S1016<br>PPSDQ3S1016 | #10 | ASD | 80 | 128 | 194 | 315 | 425 | 480 |
| | | LRFD | 128 | 205 | 310 | 500 | 680 | 765 |
| | | Nominal strength | 225 | 325 | 480 | 765 | 1,045 | 1,205 |

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 mil (16 ga.) to 97 mil (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 Load (lb.) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Minimum Nominal Panel Thickness (in.) | | | | | |
| | | | Plywood | | | OSB | | |
| | | | 15/32 | 19/32 | 23/32 | 15/32 | 19/32 | 23/32 |
| PPSD11516S0818<br>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<br>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<br>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 2015, Appendix N using $K_f$ = 3.32, $\phi$ = 0.65, and $\lambda$ =1.0.

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# **PCSD** Standing-Seam Roofing Panel Clip Screw



## Common Applications:

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

## Features:

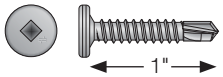
- Pancake head
- #2 square drive (replacement bit BIT2SU-2 for Quik Guard®; BIT2S-2 for Type 410 stainless steel and clear-zinc coating)
- Type 410 stainless steel is coated for additional corrosion protection
- This screw is also available collated for the Quik Drive® system

**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.**

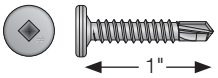
Refer to *Fastening Systems* catalog C-F-2017 for collated fastener information.

## Type 410 Stainless Steel



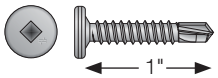

| Size | Length (in.) | Thread per Inch | Drill Point Size | Head Diameter (in.) | Carton Quantity | Model No. |
|---|---|---|---|---|---|---|
| #10 | 1 | 16 | #3 | 0.405 | 5,000 | SSPCSD1B1016-5K |

## 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 | 5,000 | PCSDQ1B1016-5K |
| #12 | 1 | 14 | #3 | 0.405 | 4,000 | 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 | 5,000 | PCSD1B1016-5K |
| #12 | 1 | 14 | #3 | 0.405 | 4,000 | PCSD1B1214-4K |

## Cold-Formed Steel (CFS) Member Connection Loads

| Model | Model No. | Size | Nominal Dia.[7] (in.) | Load Description | Shear (lb.) | | | | | | Pullover (lb.) | | | | | | Pullout (lb.) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 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 | 1,475 | 1,645 | 1,690 | 420 | 735 | 1,220 | | | | 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 | 1,640 | 1,890 | 2,290 | 520 | 780 | 1,245 | | | | 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 Section E4.
3. The safety factor is based on AISI S100 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 Section A2.4.
7. Screw diameters per AISI S200 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 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 Pullover and Pullout 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:

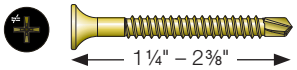
Drywall to cold-formed steel. (Recommended max. steel thicknesses: 54 and 43 mil / 16 and 18 ga.)

### 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

## Yellow-Zinc Coating




| Length (in.) | Shank Size | Threads per Inch | Drill Point Size | Box Quantity | Model No. |
|---|---|---|---|---|---|
| 1¼ | #6 | 20 | #2 | 2,500 | DWFSD114PS |
| 1⅝ | #6 | 20 | #2 | 2,500 | DWFSD158PS |
| 1⅞ | #6 | 20 | #2 | 2,000 | DWFSD178PS |
| 2⅜ | #8 | 20 | #2 | 1,500 | DWFSD238PS |

# **DWF** Drywall-to-CFS Screw

### Common Applications:

Drywall to cold-formed steel. (Recommended thicknesses: 33, 27 and 18 mil; 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. |
|---|---|---|---|
| 1¼ | #6 | 2,500 | DWF114PS |
| 1⅝ | #6 | 2,500 | DWF158PS |



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# Strong-Drive® TB WOOD-TO-STEEL Screw



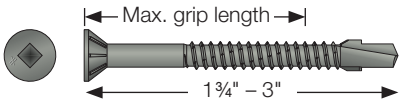
## Common Applications:

Wood to hot-rolled or heavy-gauge cold-formed steel (Maximum recommended thicknesses: 5⁄16")

## Features:

- Flat head with nibs for easy countersinking
- #3 square drive (driver bit in each box; replacement bit model BIT3S; use BIT3SU for Mechanically Galvanized – N2000®)
- #4 drill point with wings
- This screw is also available collated in straight collation for the Quik Drive® system; see p. 171 for details

**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.**




## Mechanically Galvanized — N2000

| Length (in.) | Maximum Grip Length (in.) | Shank Size | Head Diameter (in.) | Threads per Inch | Carton Quantity | Model No. |
|---|---|---|---|---|---|---|
| 2⅜" | 1.65 | #12 | 0.39 | 14 | 1,500 | TBG1260R1500 |




## Black Phosphate Coating

| Length (in.) | Maximum Grip Length (in.) | Shank Size | Head Diameter (in.) | Threads per Inch | Carton Quantity | Model No. |
|---|---|---|---|---|---|---|
| 1¾" | 1.06 | #12 | 0.39 | 14 | 2,000 | TBP1245R2000 |
| 1¾" | 1.06 | #12 | 0.39 | 14 | 50 | TBP1245R50 |
| 2⅜" | 1.65 | #14 | 0.46 | 14 | 1,000 | TBP1460R1000 |
| 2⅜" | 1.65 | #14 | 0.46 | 14 | 50 | TBP1460R50 |
| 3" | 2.24 | #14 | 0.46 | 14 | 1,000 | TBP1475R1000 |
| 3" | 2.24 | #14 | 0.46 | 14 | 50 | TBP1475R50 |

* Grip length includes side member, steel thickness, air gap (if any) and allowance for three threads protuding through the steel.

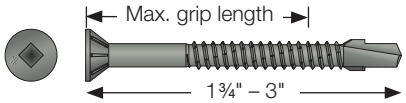
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# Strong-Drive® TB WOOD-TO-STEEL Screw



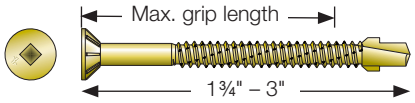


## Mechanically Galvanized — N2000®



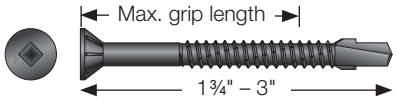

| Length in. (mm) | Max. Grip Length (in.)* | Shank Size | Threads Per Inch | Carton Quantity | Model No. | PRO HSD60 | PRO HSD75 |
|---|---|---|---|---|---|---|---|
| 1¾ (45) | 1.055 | #12 | 14 | 1,000 | TBG1245S | ✓ | |
| 2⅜ (60) | 1.645 | #12 | 14 | 1,000 | TBG1260S | ✓ | ✓ |
| 1¾ (45) | 1.055 | #14 | 14 | 1,000 | TBG1445S | ✓ | |
| 2⅜ (60) | 1.645 | #14 | 14 | 750 | TBG1460S | ✓ | ✓ |
| 3 (75) | 2.236 | #14 | 14 | 750 | TBG1475S | | ✓ |

## Yellow Zinc Coating




| Length in. (mm) | Max. Grip Length (in.)* | Shank Size | Threads Per Inch | Carton Quantity | Model No. | PRO HSD60 | PRO HSD75 |
|---|---|---|---|---|---|---|---|
| 1½ (40) | 0.826 | #14 | 14 | 1,000 | TB1440S | ✓ | |
| 1¾ (45) | 1.055 | #14 | 14 | 1,000 | TB1445S | ✓ | |
| 2⅜ (60) | 1.645 | #14 | 14 | 750 | TB1460S | ✓ | ✓ |
| 3 (75) | 2.236 | #14 | 14 | 750 | TB1475S | | ✓ |

## Black Phosphate Coating




| Length in. (mm) | Max. Grip Length (in.)* | Shank Size | Threads Per Inch | Carton Quantity | Model No. | PRO HSD60 | PRO HSD75 |
|---|---|---|---|---|---|---|---|
| 1¾ (45) | 1.055 | #12 | 14 | 1,000 | TBP1245S | ✓ | |
| 2⅜ (60) | 1.645 | #12 | 14 | 1,000 | TBP1260S | ✓ | ✓ |
| 2⅜ (60) | 1.645 | #14 | 14 | 750 | TBP1460S | ✓ | ✓ |
| 3 (75) | 2.236 | #14 | 14 | 750 | TBP1475S | | ✓ |

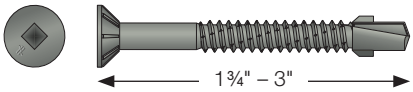
* Grip length includes side member, steel thickness, air gaps (if any) and allowance for three threads protruding through the steel.

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# Strong-Drive® TB WOOD-TO-STEEL Screw

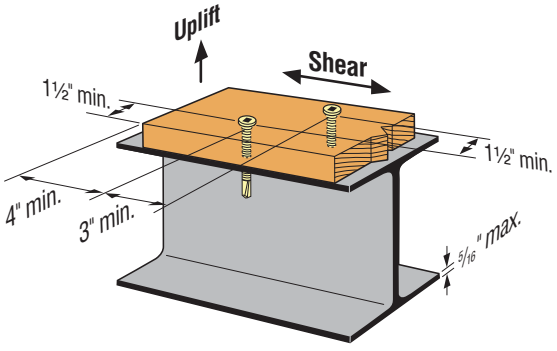


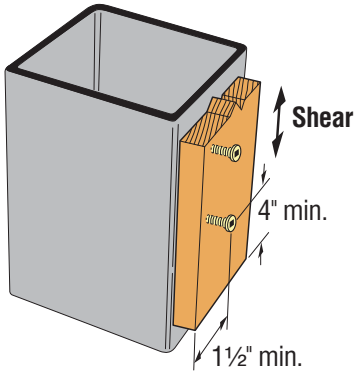
## TB — Allowable Loads — DF and SP Lumber Attachment to Steel (Steel Members 16 ga. – 5⁄16" Thick)




| Model No. | Length in. (mm) | Nominal Wood Thickness (in.) | Steel Thickness mil (ga.) | DF/SP Allowable Load (lb.) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Uplift | | Shear | |
| | | | | $C_D$ = 1.0 | $C_D$ = 1.6 | $C_D$ = 1.0 | $C_D$ = 1.6 |
| TB1460S | 2⅜ (60) | 2x | 54 (16) | 195 | 195 | 210 | 335 |
| | | | 68 (14) | 225 | 225 | 210 | 335 |
| | | | 97–312 (12 – 5⁄16") | 245 | 390 | 215 | 345 |
| TB1475S | 3 (75) | | 54 (16) | 195 | 195 | 210 | 335 |
| | | | 68 (14) | 225 | 225 | 210 | 335 |
| | | | 97–312 (12 – 5⁄16") | 245 | 390 | 215 | 345 |

1. For use with structural steel members up to 5⁄16" thick or cold-formed steel members 54 mil (16 ga.) or thicker.
2. Standard product available in a black phosphate, yellow zinc or N2000 coating for additional corrosion protection *(TBG1460S or TBG1475S).*
3. For use with 2x (1 ½") DF/SP only.
4. For use with QD HSD60 or HSD75 tool.
5. Use increased allowable loads ($C_D$ = 1.6) only when resisting wind or seismic forces.




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# 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)



**PROSDX150 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



**PROHSD60 Wood-to-Steel Attachment**

Applications: Truck beds and trailer flooring to steel, wood nailer to structural steel



**PROHSD75 Wood-to-Steel Attachment**

Applications: Truck beds and trailer flooring to steel, wood nailer to structural steel



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# **Quik Drive® Applications:** Drywall





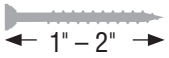



Quik Drive® auto-feed screw driving systems are ideal for fastening drywall. They provide a fast, efficient solution with a precision countersink adjustment that produces consistent dimples.

## PRO200 System



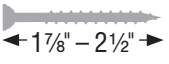

- Compact body for reduced weight and easy handling
- Smooth nose will not mar drywall surface
- Slim profile allows driving in corners




## PRO250DW Attachment




- Compact body for reduced weight and easy handling
- Smooth nose will not mar drywall surface
- Slim profile allows driving in corners

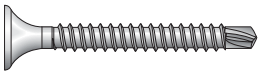



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# Quik Drive® Applications: Drywall



## Collated Screws for the Quik Drive® System

| Fastener Model | PRO200 | PRO250DW |
|---|---|---|
| DWF Drywall-to-CFS Screw  Drywall to steel, gray phosphate coating (33, 27, 18 mil / 20, 22, 25 ga.) | 1¼", 1⅝" | N/A |
| DWFSD Drywall-to-CFS Screw  Drywall to steel, #2 point, yellow zinc coating (54, 43 mil / 16, 18 ga.) | 1¼", 1⅝", 1⅞" | 1⅞", 2⅜" |
| DWFSD Drywall-to-CFS Screw  Drywall to steel, #2 point, Quik Guard® coating (54, 43 mil / 16, 18 ga.) | 1¼" | 1¼" |

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# **Quik Drive® Applications:** Underlayment/Backerboard








Quik Drive® auto-feed screw driving systems are ideal for underlayment. The variety of screws solves challenges such as driving over radiant heat panels and the extension enables stand-up-and-drive installation.

## PROCGB Combo System



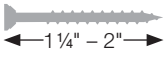

- Slim profile allows driving in corners
- Drives fasteners that meet ANSI standards
- Compact body for reduced weight and easy handling
- Includes both PROLDH Attachment and PRO200S Attachment for added versatility




## PROLDH System




- Slim profile allows driving in corners
- Compact body for reduced weight and easy handling




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# PRO200S System




- Slim profile allows driving in corners
- Compact body for reduced weight and easy handling




## Collated Screws for the Quik Drive® System

| Fastener Model | PROCGB | PROLDH | PRO200S |
|---|---|---|---|
| DWF Drywall-to-CFS Screw  Gypsum panel to steel, gray phosphate coating | 1¼", 1⅝" | — | 1¼", 1⅝" |
| DWFSD Drywall-to-CFS Screw  Gypsum panel to steel, yellow zinc or Quik Guard® coating | 1¼", 1⅝" | — | 1¼", 1⅝" |



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# **Quik Drive® Applications:** Steel Decking/Stitching







The Quik Drive® PROSDX150 auto-feed screw driving system is the right choice for steel decking because it provides an efficient fastening solution that is safer and easier than welding or P.A.T.

## PROSDX150 System




- Features an extended nosepiece for easy access to valley
- Stand-up driving increases comfort and productivity
- One system for fastening steel decking to structural members and steel stitching
- No special inspection or certification required as with welding or P.A.T. fastening

## BSD200 System



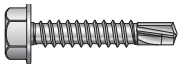

- Innovative Precision Placement™ nosepiece allows for easy location of the standing seam metal roofing clip holes
- Stand-up driving increases comfort and productivity
- Patented belt collation enables auto-feed fastening of screws
- Depth control prevents over driving

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# **Quik Drive® Applications:** Steel Decking/Stitching



## Collated Screws for the Quik Drive® System

| Fastener Model | PROSDX150 | BSD200 |
|---|---|---|
| Strong-Drive® **SELF-DRILLING X METAL** Screw  Quik Guard® coating, 5/16" hex head | 1", 1¼", 1½" | — |
| Strong-Drive® **SELF-DRILLING X METAL** Screw  Clear zinc coating, 5/16" hex head | ¾", 1", 1¼" | — |
| Strong-Drive® **XL LARGE-HEAD METAL** Screw  Quik Guard® coating, 5/16" hex head | — | 1¼" |
| Strong-Drive® **XM MEDIUM-HEAD METAL** Screw  Quik Guard® coating, 5/16" hex head | 1¼" | — |

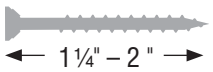


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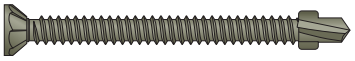
# PROLDH System




- Slim profile allows driving in corners
- Drives fasteners that meet ANSI standards
- Compact body for reduced weight and easy handling

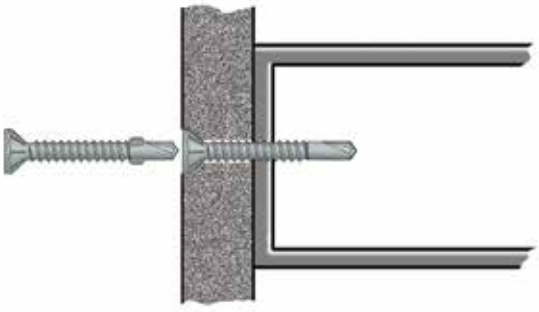



## Collated Screws for the Quik Drive® System

| Fastener Model | PRO200S | PROCGB | PROLDH | PRO250 |
|---|---|---|---|---|
| CBSDQ Sheathing Screw*<br>  <br>Self-drilling screw* #2 drill point, Quik Guard® coating | 1⅝" | 1⅝" | — | 2¼" |

*** #2 Drill Point with Wings**

Wings cut a path, protecting the integrity of the threads and break away before penetrating the steel.





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# **Quik Drive® Applications:** Standing-Seam Metal



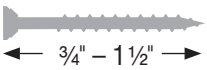


The Quik Drive® PROPP150 auto-feed screw driving system is ideal for standing-seam metal roofing. The Precision Placement™ nosepiece cuts installation time and the collated fasteners eliminate handling of individual screws.

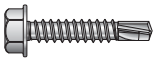
## PROPP150 System



- Innovative Precision Placement nosepiece allows for easy location of the hole in the clip
- Hands-free screw advancement speeds installation
- Collated fastener strips reduce waste and prevent damage to roof panels
- Suitable for panel clips up to 2½" tall
- Also ideal for fastening panel flanges for snap-and-seam metal roofing and installing trim and drip edge




### Collated Screws for the Quik Drive® System

| Fastener Model | PROPP150 |
|---|---|
| PC Standing-Seam-Roofing Panel Clip Screw  Type 17 point, Type 410 stainless steel, Quik Guard® and clear zinc coating | 1", 1½" |
| PCSD Standing-Seam-Roofing Panel Clip Screw  #3 drill point, Type 410 stainless steel, Quik Guard® and clear zinc coating | 1" |
| Strong-Drive® **SELF-DRILLING X METAL** Screw  5⁄16" hex head, Quik Guard® and clear zinc coating | 1" |



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# **Quik Drive® Applications:** Steel Framing/Stitching





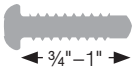


Quik Drive® auto-feed screw driving systems save time when fastening cold-formed steel framing. The collated fastening strips eliminate the handling of individual screws and the attachments hold the screw in place while it drills through the material.

## PROPH Attachment



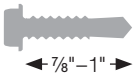

- Compact body for reduced weight and easy handling
- Slim profile allows driving in corners
- Long-lasting reliability for targeted applications




## PROHX516 Attachment




- Engineered to drive screws for steel fastening
- Precise depth adjustment prevents over and under driving
- Long-lasting reliability for targeted applications

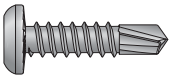
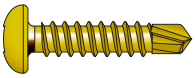
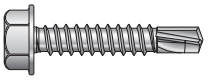



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# **Quik Drive® Applications:** Steel Framing/Stitching



## Collated Screws for the Quik Drive® System

| Fastener Model | PROPH | PROHX516 |
|---|---|---|
| Strong-Drive® FPHSD **FRAMING-TO-CFS** Screw  Flat pan head, #3 drill point, clear zinc coating | ¾" | — |
| Strong-Drive® PHSD **FRAMING-TO-CFS** Screw  Pan head, #2 drill point, yellow zinc coating | ¾" | — |
| Strong-Drive® **SELF-DRILLING X METAL** Screw  5⁄16" hex head, clear zinc coating | — | ⅞"–1" |



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# **Quik Drive® Applications:** Nailers/Ledgers-to-Steel





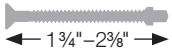



Quik Drive® PROHSD auto-feed fastening systems are ideal for wood-to-steel fastening. They hold the screw in place while drilling and our self-drilling screws eliminate the need for pre-drilling.

## PROHSD60 System



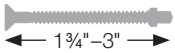

- Specifically engineered for fastening wood-to-steel
- Expanded depth settings for various material thickness
- Broad nose increases stability and protects surfaces




## PROHSD75 System




- Specifically engineered for fastening wood-to-steel
- Expanded depth settings for various material thickness
- Broad nose increases stability and protects surfaces

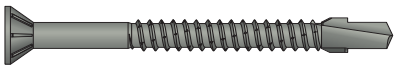
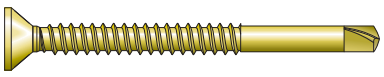



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# **Quik Drive® Applications:** Nailers/Ledgers-to-Steel



## Collated Screws for the Quik Drive® System

| Fastener Model | PROHSD60 | PROHSD75 |
|---|---|---|
| Strong-Drive®<br>TB **WOOD-TO-STEEL** Screw<br>  <br>Black phosphate coating | 1¾", 2⅜"<br>(45, 60 mm) | 2⅜", 3"<br>(60, 75 mm) |
| Strong-Drive®<br>TB **WOOD-TO-STEEL** Screw<br>  <br>Yellow zinc coating | 1¾", 2⅜"<br>(45, 60 mm) | 2⅜", 3"<br>(60, 75 mm) |
| Strong-Drive®<br>TB **WOOD-TO-STEEL** Screw<br>  <br>N2000® galvanized coating | 1¾", 2⅜"<br>(45, 60 mm) | 2⅜", 3"<br>(60, 75 mm) |
| Strong-Drive®<br>PPSD **SHEATHING-TO-CFS** Screw<br>  <br>Quik Guard® coating | #12 x 1¾" | #12 x 1¾", #12 x 3" |
| Strong-Drive®<br>PPSD **SHEATHING-TO-CFS** Screw<br>  <br>Yellow zinc coating | #12 x 1¾" | #12 x 1¾", #12 x 3" |



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# Concrete Connectors



# **AnchorMate®** Anchor Bolt Holders

The reusable AnchorMate® anchor bolt holder is 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 setup and teardown. It also protects the threads from wet concrete and simplifies trowel finishing.

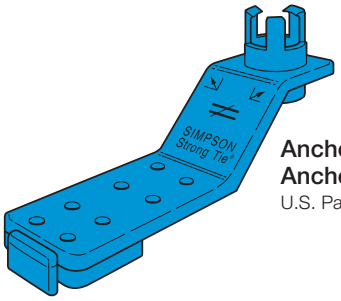
**Features:**

- 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.

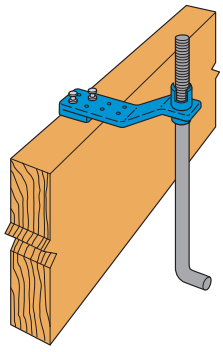
**Material:** Nylon

**Codes:** See p. 11 for Code Reference Key Chart

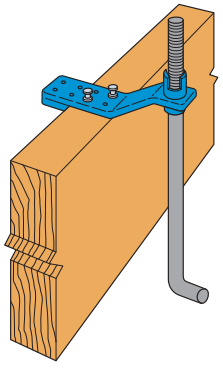
| Model No. | Diameter (in.) | Color | Code Ref. |
|---|---|---|---|
| AM½ | ½ | Yellow | 180 |
| AM⅝ | ⅝ | Blue | |
| AM¾ | ¾ | Red | |
| AM⅞ | ⅞ | Green | |
| AM1 | 1 | Black | |




**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.

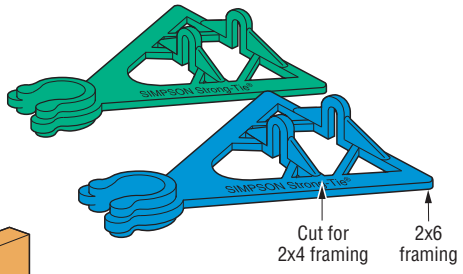
**Features:**

- 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

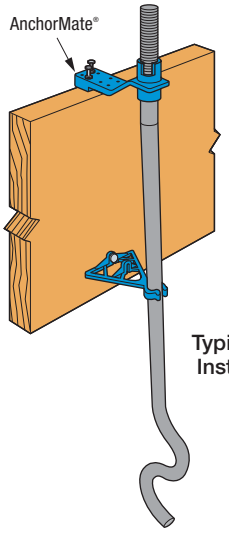
**Material:** Engineered Composite Plastic

**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Diameter (in.) | Color | Code Ref. |
|---|---|---|---|
| ABS⅝ | ⅝ | Blue | 180 |
| ABS⅞ | ⅞ | Green | |




**ABS**
**Anchor Bolt Stabilizer**




**Typical ABS Installation**



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# **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.

**Features:**

- The StrapMate is reusable
- Works with STHD, LSTHD

**Material:** Engineered Composite Plastic

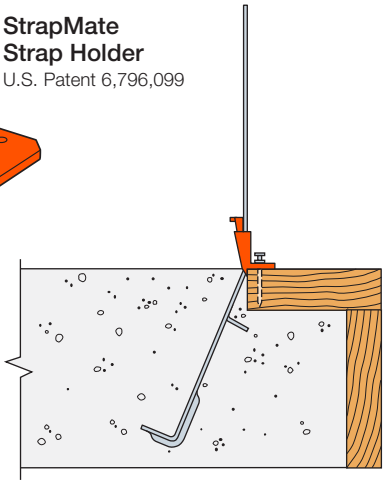
- Designed to fit ¾" plywood forms up to 1¾" LVL forms and larger
- The strap is positioned off the front edge of the form board

**Codes:** See p. 11 for Code 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:**

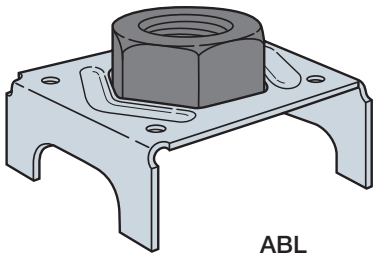
- Designed for optimum concrete flow.
- Installed with nails or screws.
- Meets code requirement for 1" stand off. Also available with 1½" standoff. Order ABLXX-1.5.
- PAB anchors are not designed for use with the ABL. Contact Simpson Strong-Tie for pre-assembled anchor solutions to be used with ABL.

**Material:** Nut — Heavy hex; Chair — Steel

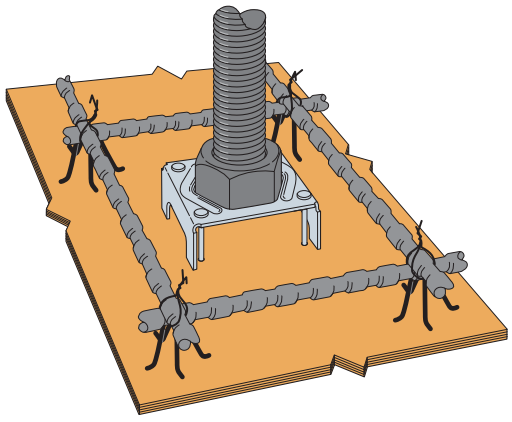
**Finish:** Nut — None or Electro-galvanized; Chair — G90; ABL-OST — HDG

**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Anchor Bolt Diameter (in.) | Code Ref. |
|---|---|---|
| ABL4-1 | ½ | 180 |
| ABL5-1 | ⅝ | |
| ABL6-1 | ¾ | |
| ABL7-1 | ⅞ | |
| ABL8-1 | 1 | |
| ABL9-1 | 1⅛ | |
| ABL10-1 | 1¼ | |



**ABL**
U.S. Patents 8,621,816 and 8,381,482



**Typical ABL Installation**



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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.

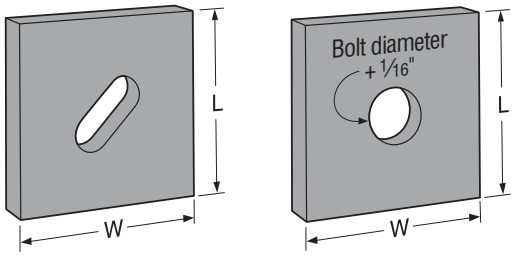
**Material:** See table

**Finish:** LBP, LBPS and BP⅝S — Galvanized;
BP⅞-2 and 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 pp. 18–21 for Corrosion Information.

**Installation:**

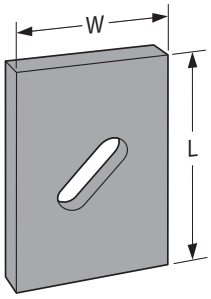
- See General Notes on pp. 14–16.
- BP/BPS — For shearwall applications, position edge of plate washer within ½" of sheathed edge of track-bottom plate.

**Codes:** See p. 11 for Code Reference Key Chart

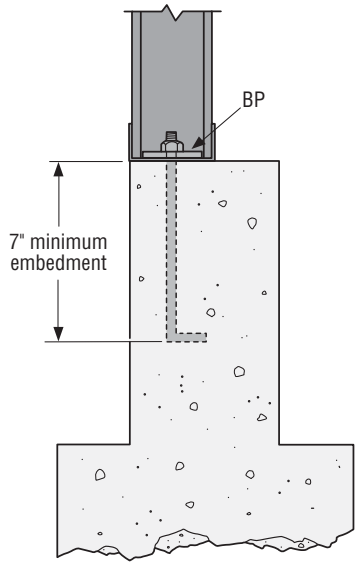



**BPS**
*(LBPS similar)*

**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 | I1, FL |
| ■ | ½ | LBP½ | 9/64" | 2 | 2 | 190 |
| ■ | | LBPS½ | 9/64" | 3 | 3 | |
| ■ | | BPS½-3 | 3 ga. | 3 | 3 | |
| ■ | | BPS½-6 | 3 ga. | 3 | 4½ | |
| ■ | | BP½ | 3/16" | 2 | 2 | |
| ■ | | BP½-3 | 3 ga. | 3 | 3 | I1, FL |
| ■ | ⅝ | LBP⅝ | 9/64" | 2 | 2 | 190 |
| ■ | | LBPS⅝ | 9/64" | 3 | 3 | |
| ■ | | BPS⅝-3 | 3 ga. | 3 | 3 | |
| ■ | | BPS⅝-6 | 3 ga. | 3 | 4½ | |
| ■ | | BP⅝-2 | 3/16" | 2 | 2 | I1, FL |
| ■ | | BP⅝ | ¼" | 2½ | 2½ | 180 |
| ■ | | BP⅝-3 | 3 ga. | 3 | 3 | I1, FL |
| ■ | ¾ | BP¾ | 5/16" | 2¾ | 2¾ | |
| ■ | | BP¾-3 | 3 ga. | 3 | 3 | |
| ■ | | BPS¾-3 | 3 ga. | 3 | 3 | 190 |
| ■ | | BPS¾-6 | 3 ga. | 3 | 4½ | |
| | ⅞ | BP⅞-2 | ⅜" | 1 15/16 | 2¼ | 190 |
| ■ | | BP⅞ | 5/16" | 3 | 3 | |
| ■ | 1 | BP1 | ⅜" | 3½ | 3½ | |

■ 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 2015 IRC and 2015 SPDWS.



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# **CNW** Coupler Nuts



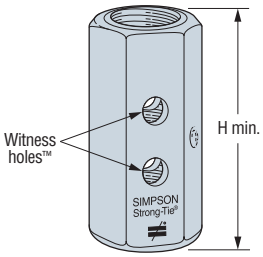
Simpson Strong-Tie® coupler nuts are a tested and load-rated method to join threaded rod and anchor bolts. "Witness" holes in the nut provide a means to verify when rods are properly installed. The positive stop feature helps ensure even threading into each end of the nut. CNWs meet and exceed the specified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

**Finish:** Zinc Plated

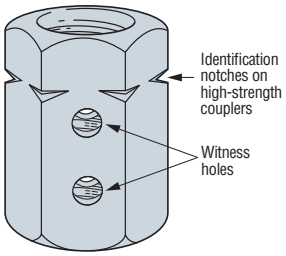
**Installation:**

- Tighten the two rods until each all-thread rod is visible in the witness hole. Any portion of the thread visible in the witness is a correct installation.
- Standard CNW for use with 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.
- Some OST couplers are typically oversized on one end of the coupler nut only and will be marked with an "O" on the oversized side. Couplers may be oversized on both ends. Contact Simpson Strong-Tie.

**Codes:** See p. 11 for Code Reference Key Chart

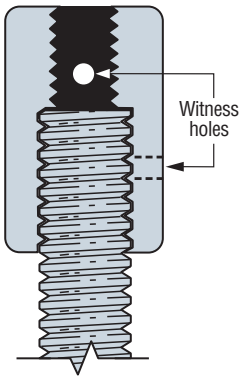



**CNW**
**Allows Fast Visual Check for Correct All Thread Rod Installation**



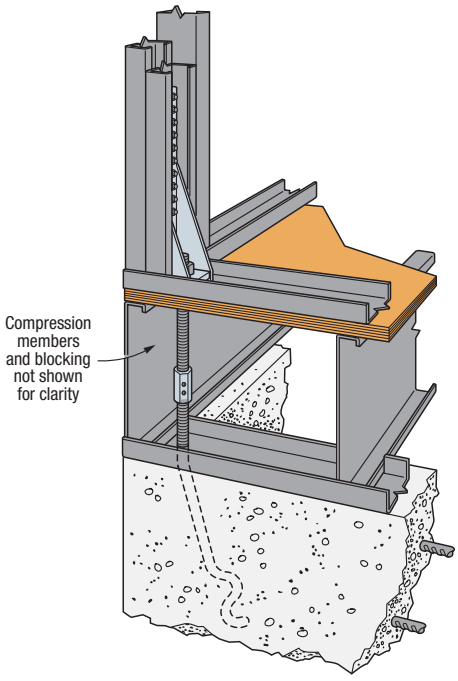

**HSCNW**
**High-Strength Coupler Nut**

**CNW**
**Transition Coupler Nut**




| Model No. | Rod Diameter (in.) | H Min. (in.) | Allowable Tension Capacity (lb.) (100) | Code Ref. |
|---|---|---|---|---|
| CNW½ | 0.500 | 1½ | 4,265 | I1, FL |
| CNW⅝ | 0.625 | 1⅞ | 6,675 | |
| CNW¾ | 0.750 | 2¼ | 9,610 | |
| CNW⅞ | 0.875 | 2½ | 13,080 | 170 |
| CNW1 | 1.000 | 2¾ | 17,080 | |
| CNW1¼ | 1.250 | 3 | 26,690 | |
| HSCNW¾ | 0.750 | 2¼ | 19,880 | |
| HSCNW1 | 1.000 | 2¾ | 35,345 | |
| **Transition Couplers** | | | | |
| CNW⅝ -½ | 0.625 to 0.500 | 1½ | 4,265 | I1, FL |
| CNW¾ -⅝ | 0.750 to 0.625 | 1¾ | 6,675 | |
| CNW⅞ -⅝ | 0.875 to 0.625 | 2 | 6,675 | 170 |
| CNW1-⅞ | 1.000 to 0.875 | 2¼ | 13,080 | |

1. Allowable loads shown are based on AISC 14th Edition A36 and A449 (HS) threaded rod capacities.




**Typical CNW Rim Joist Installation**

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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.

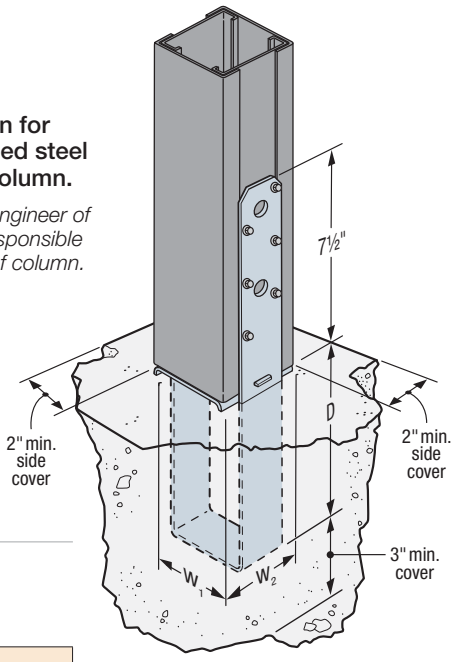
**Installation:**

- 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 p. 11 for Code 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 (in.) | Dimensions (in.) | | | Column Fasteners[7] | Allowable Load (lb.) | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Wind and SDC A&B | | SDC C–F | | |
| | | $W_1$ | $W_2$ | D | | Non-Cracked Uplift | Cracked Uplift | Non-Cracked Uplift | Cracked Uplift | |
| LCB44 | 3.5 x 3.5 | 3⅜ | 3½ | 6½ | (12) #10 | 1,170 | 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, $f'_c$ = 2,500 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



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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, 2012 and 2015 IBC® and IRC® and have been tested to meet the requirements of ICC-ES acceptance criteria AC-398 for cracked and uncracked concrete.

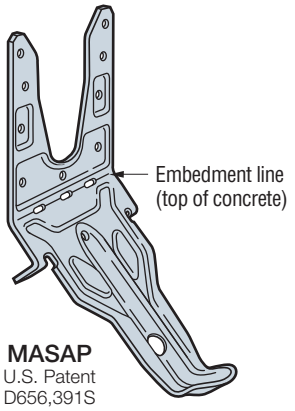
**Material:** 16 gauge

**Finish:** Galvanized, all available in ZMAX® coating.
See Corrosion Information, pp. 18–21.

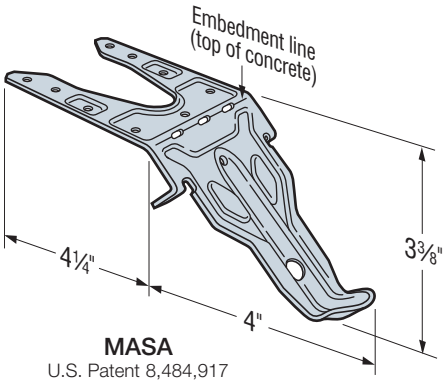
**Installation:**

- Use all specified fasteners; see General Notes
- **MASA/MASAP**
  - Concrete shall have a minimum $f'_C$ = 2,500 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 p. 11 for Code Reference Key Chart




**MASAP**
U.S. Patent
D656,391S




**MASA**
U.S. Patent 8,484,917

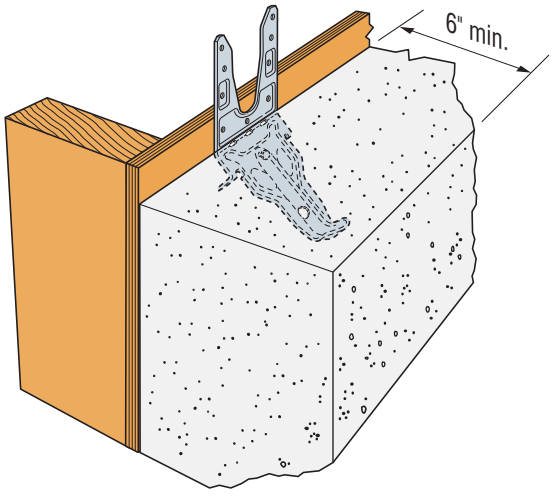
## Allowable Loads for MASA/MASAP Cast-in-Place Mudsill Anchor on CFS Track

| Model No. | Fasteners[8] | | Allowable Load (lb.)[1,2,3,4,5] 43 mil (18 ga.) CFS | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Standard Installation | | | | | | |
| | | | Wind and SDC A&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, FL |
| | | | 675 | 1,205 | 895 | 565 | 1,010 | 750 | |
| | | | Cracked | | | | | | |
| | | | 510 | 1,205 | 655 | 425 | 1,010 | 550 | |

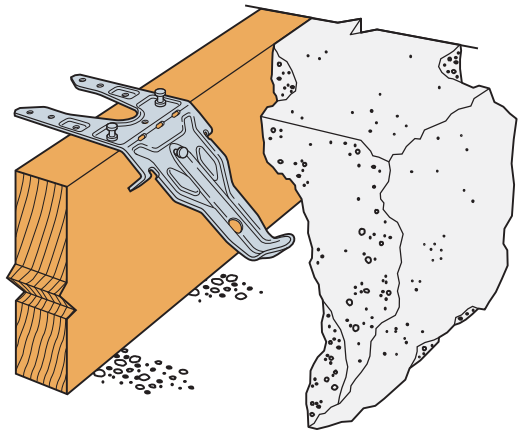
1. Allowable loads are governed by tests and may not be increased ($C_D$ = 1.0).
2. The tabulated allowable (ASD) loads may be multiplied by 1.6 for designs for wind and in SDC A&B, and by 1.4 for designs in SDC C through F to obtain the LRFD loads.
3. Minimum concrete compression strength, $f'_C$ is 2,500 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, 2012 and 2015 IBC, detached one- and two-family dwellings in SDC C may use the "Wind and SDC A&B" allowable loads.
7. Parallel-to-Track loads for One-Leg-Up Installation: SDC A–C = 1,025 lb., SDC C–F = 860 lb.
8. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

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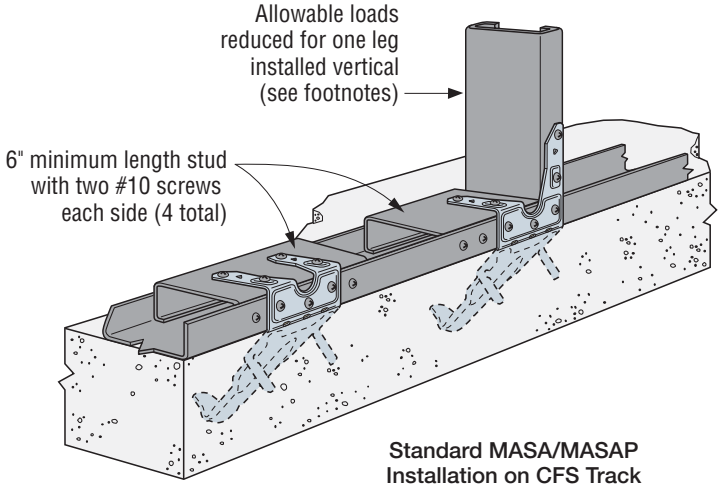
# **MASA/MASAP** Mudsill Anchors




Standard MASAP
Installation in Concrete



Standard MASA
Installation in Concrete




Standard MASA/MASAP
Installation on CFS Track



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# Anchors



# 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

**AD** Anchor Designer™ for ACI 318, ETAG and CSA

**SIMPSON Strong-Tie ACE** Adhesive Cartridge Estimator

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



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# **SET-XP®** High-Strength Epoxy Adhesive

SET-XP® epoxy anchoring adhesive is a high-strength formula for anchoring and doweling in cracked and uncracked concrete and masonry applications. It is a two-part system with the resin and hardener being simultaneously dispensed and mixed through the mixing nozzle. When properly mixed, adhesive will be a uniform teal color for easy post-installation identification.

**Features:**

- 1:1 two-component, high-solids, epoxy-based anchoring adhesive formula
- Passed the demanding ICC-ES AC308 adverse-condition tests pertaining to elevated temperatures and long-term sustained loads
- Code listed under the IBC/IRC for cracked and uncracked concrete per ICC-ES ESR-2508
- Code listed under the IBC/IRC for masonry per IAPMO UES ER-265
- Suitable for use under static and seismic loading conditions in cracked and uncracked concrete and masonry
- Cure times: 24 hours at 70°F, 72 hours at 50°F
- Easy hole-cleaning — no power-brushing required
- Suitable for use in dry or water-saturated concrete
- For best results, store between 45°F and 90°F
- Available in 8.5 oz., 22 oz. and 56 oz. cartridges for application versatility
- Manufactured in the USA using global materials

**Applications:**

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

**Codes**: ICC-ES ESR-2508 (concrete); IAPMO UES ER-265 (masonry); City of L.A. RR25744 (concrete), RR25965 (masonry); Florida FL-17449.2 (concrete), FL-16230.3 (masonry); AASHTO M-235 and ASTM C881 (Type I and IV, Grade 3, Class C); NSF/ANSI Standard 61 (216 in.$^2$/1,000 gal.)

**Installation and Application Instructions:**

- Surfaces to receive epoxy must be clean.
- Base material temperature must be 50°F or above at the time of installation. For best results, material should be between 70°F and 80°F at time of application.
- To warm cold material, store cartridges in a warm, uniformly heated area or storage container. Do not immerse cartridges in water to facilitate warming.
- Mixed material in nozzle can harden in 30 minutes at temperatures of 70°F and above.

**Suggested Specifications:**

See **strongtie.com** for more information.




**SET-XP® Adhesive**



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# SET-XP® High-Strength Epoxy Adhesive

## Test Criteria

Anchors installed with SET-XP® adhesive have been tested in accordance with ICC-ES ***Acceptance Criteria for Post-Installed Adhesive Anchors in Masonry Elements (AC58) and Adhesive Anchors in Concrete Elements (AC308).***

| Property | Test Method | Result* |
|---|---|---|
| Consistency | ASTM C881 | Passed, non-sag |
| Glass transition temperature | ASTM E1356 | 155°F |
| Bond strength (moist cure) | ASTM C882 | 3,742 psi at 2 days |
| Water absorption | ASTM D570 | 0.10% |
| Compressive yield strength | ASTM D695 | 14,830 psi |
| Compressive modulus | ASTM D695 | 644,000 psi |
| Shore D Durometer | ASTM D2240 | 84 |
| Gel time | ASTM C881 | 49 minutes |
| Volatile Organic Compound (VOC) | — | 3 g/L |

*Material and curing conditions: 73 ± 2°F, unless otherwise noted.

## SET-XP® Cartridge System

| Model No. | Capacity (ounces) | Cartridge Type | Carton Quantity | Dispensing Tool(s) | Mixing Nozzle |
|---|---|---|---|---|---|
| SET-XP10[4] | 8.5 | Single | 12 | CDT10S | EMN22i |
| SET-XP22-N[5] | 22 | Side-by-side | 10 | EDT22S, EDTA22P, EDTA22CKT | |
| SET-XP56 | 56 | Side-by-side | 6 | EDTA56P | |

1. Cartridge estimation guidelines are available at **strongtie.com/apps**.
2. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available at **strongtie.com**.
3. Use only Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair SET-XP adhesive performance.
4. Two EMN22i mixing nozzles and two nozzle extensions are supplied with each cartridge.
5. One EMN22i mixing nozzle and one nozzle extension are provided with each cartridge.

## 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 Epoxy Adhesive

## SET-XP® — Tension Loads for Threaded Rod in Normal-Weight Concrete

| Anchor Dia. (in.) | Drill Bit (in.) | Emb. Depth (in.) | Tension Load[6,13] (lb.) | | | | | | | | | | Tension Loads[10] $F_u$ = 58 ksi Steel (lb.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | 1,460 | 1,670 | 1¾ | 1,080 | 1,445 | 755 | 865 | 6,175 | 4,265 |
| | | 7 | 8 | 4,700 | 6,175[9] | 3,290 | 3,705 | 1¾ | 2,305 | 3,075 | 1,615 | 1,845 | | |
| | | 10 | 8 | 6,175[9] | 6,175[9] | 4,325 | 3,705 | 1¾ | 3,295 | 4,395 | 2,305 | 2,635 | | |
| ⅝ | ¾ | 5 | 8 | 3,555 | 4,740 | 2,490 | 2,845 | 1¾ | 1,665 | 2,220 | 1,165 | 1,330 | 9,830 | 6,675 |
| | | 8½ | 8 | 6,040 | 8,055 | 4,230 | 4,835 | 1¾ | 2,830 | 3,770 | 1,980 | 2,260 | | |
| | | 12 | 9 | 8,235 | 9,830[9] | 5,765 | 5,900 | 1¾ | 4,005 | 5,340 | 2,805 | 3,205 | | |
| ¾ | ⅞ | 6 | 9 | 4,415 | 5,885 | 3,090 | 3,530 | 1¾ | 2,030 | 2,705 | 1,420 | 1,625 | 14,530 | 9,615 |
| | | 10½ | 12 | 7,985 | 10,650 | 5,590 | 6,390 | 1¾ | 3,595 | 4,795 | 2,515 | 2,875 | | |
| | | 15 | 15 | 11,410 | 14,530[9] | 7,985 | 8,720 | 1¾ | 5,135 | 6,845 | 3,595 | 4,105 | | |
| ⅞ | 1 | 8 | 10 | 5,045 | 8,410 | 3,530 | 5,045 | 1¾ | 2,270 | 3,780 | 1,590 | 2,270 | 20,095 | 13,070 |
| | | 12 | 12 | 7,855 | 13,090 | 5,500 | 7,855 | 1¾ | 3,450 | 5,750 | 2,415 | 3,450 | | |
| | | 17½ | 14 | 11,455 | 19,095 | 8,020 | 11,455 | 1¾ | 5,035 | 8,390 | 3,525 | 5,035 | | |
| 1 | 1⅛ | 8 | 12 | 6,690 | 9,695 | 4,685 | 5,815 | 1¾ | 2,895 | 4,190 | 2,025 | 2,515 | 26,360 | 17,075 |
| | | 14 | 18 | 11,705 | 16,965 | 8,195 | 10,180 | 1¾ | 5,060 | 7,335 | 3,540 | 4,400 | | |
| | | 20 | 23 | 16,720 | 24,235 | 11,705 | 14,540 | 1¾ | 7,230 | 10,480 | 5,060 | 6,290 | | |

Note: Reference p. 185 for footnotes.



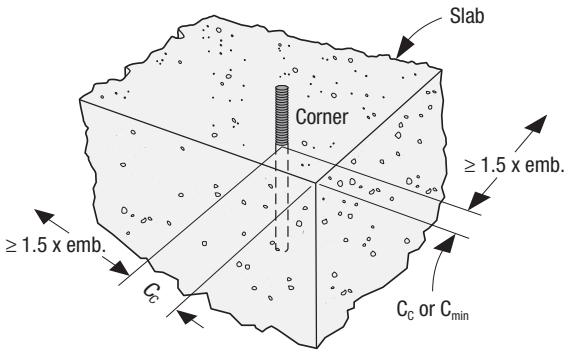
C-CF-2017 © 2017 SIMPSON STRONG-TIE COMPANY INC.

# SET-XP® High-Strength Epoxy Adhesive

## SET-XP® — 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 Load[6] (lb./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" | 1,825 | 1,825 | 1,280 | 1,095 | 895 | 1,320 | 2,485 |
| | | | | | | 1'– 0" | 1,215 | 1,215 | 850 | 730 | 595 | 880 | 1,655 |
| | | | | | | 1'– 4" | 910 | 910 | 635 | 545 | 445 | 660 | 1,240 |
| | | | | | | 2' – 0" | 610 | 610 | 425 | 365 | 300 | 440 | 830 |
| | | | | | | 2' – 8" | 455 | 455 | 320 | 275 | 225 | 330 | 620 |
| | | | | | | 4' – 0" | 305 | 305 | 215 | 185 | 150 | 220 | 415 |
| | | | | | | 6' – 0" | 205 | 205 | 145 | 125 | 100 | 145 | 275 |
| ⅝ | ¾ | 1¾ | 5 | 5 | 8½ | 0' – 8" | 2,035 | 2,035 | 1,425 | 1,220 | 960 | 1,490 | 2,995 |
| | | | | | | 1'– 0" | 1,355 | 1,355 | 950 | 815 | 640 | 995 | 2,000 |
| | | | | | | 1'– 4" | 1,015 | 1,015 | 710 | 610 | 480 | 745 | 1,500 |
| | | | | | | 2' – 0" | 680 | 680 | 475 | 410 | 320 | 495 | 1,000 |
| | | | | | | 2' – 8" | 510 | 510 | 355 | 305 | 240 | 375 | 750 |
| | | | | | | 4' – 0" | 340 | 340 | 240 | 205 | 160 | 250 | 500 |
| | | | | | | 6' – 0" | 225 | 225 | 160 | 135 | 105 | 165 | 335 |
| ¾ | ⅞ | 1¾ | 5 | 6 | 10 | 0' – 8" | 2,190 | 2,190 | 1,535 | 1,315 | 965 | 1,600 | 3,320 |
| | | | | | | 1'– 0" | 1,460 | 1,460 | 1,020 | 875 | 640 | 1,065 | 2,215 |
| | | | | | | 1'– 4" | 1,095 | 1,095 | 765 | 655 | 480 | 800 | 1,660 |
| | | | | | | 2' – 0" | 730 | 730 | 510 | 440 | 320 | 535 | 1,110 |
| | | | | | | 2' – 8" | 550 | 550 | 385 | 330 | 240 | 400 | 830 |
| | | | | | | 4' – 0" | 365 | 365 | 255 | 220 | 160 | 265 | 555 |
| | | | | | | 6' – 0" | 245 | 245 | 170 | 145 | 105 | 180 | 370 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 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, $m_f = 0.75$, $\Omega = 2.5$. 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 **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 318-14 Chapter 17. 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 318-14 Sections 17.2.3.4.3 and 17.2.3.5.3, where applicable.






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# AT-XP® High-Strength Acrylic Adhesive

Formulated for high-strength anchorage of threaded rod and rebar into cracked and uncracked concrete and masonry under a wide range of conditions, AT-XP® adhesive dispenses easily in cold or warm environments and in below-freezing temperatures with no need to warm the cartridge. When mixed properly, this low-odor formula is a dark teal color for easy post-installation identification.

**Features:**

- Passed the demanding ICC-ES AC308 adverse-condition tests pertaining to reduced and elevated temperatures and long-term sustained loads
- Code listed under the IBC/IRC for cracked and uncracked concrete per IAPMO UES ER-263 and City of L.A. RR25960
- Code listed under the IBC/IRC for masonry per IAPMO UES ER-281 and City of L.A. RR25966
- 10:1 two-component high-strength, acrylic-based anchoring adhesive
- Suitable for use under static and seismic loading conditions in cracked and uncracked concrete as well as masonry
- Easy hole-cleaning procedure — no power-brushing required
- Suitable for use in dry or water-saturated concrete
- For best results, store between 14°F and 80°F
- Cures in substrate temperatures as low as 14°F (–10°C) in 24 hours or less
- Available in 9.4 oz., 12.5 oz. and 30 oz. cartridges for application versatility
- Volatile Orgainic Compound (VOC) — 30 g/L
- Manufactured in the USA using global materials

**Applications:**

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

**Codes**: IAPMO UES ER-263 (concrete); IAPMO UES ER-281 (masonry); City of L.A. RR25960 (concrete), RR25966 (masonry); FL-16230.1; NSF/ANSI Standard 61 (43.2 in.$^2$/1,000 gal.)

**Installation and Application Instructions:**

- Surfaces to receive adhesive must be clean.
- Base material temperature must be 14°F or above at the time of installation. For best results, material should be 14–80°F at time of application.
- To warm cold material, store cartridges in a warm, uniformly heated area or storage container. Do not immerse cartridges in water to facilitate warming.
- Mixed material in nozzle can harden in 3–4 minutes at temperatures of 70°F and above.

**Suggested Specifications**

See **strongtie.com** for more information.




**AT-XP® Adhesive**



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# AT-XP® High-Strength Acrylic Adhesive

## AT-XP® Adhesive Cartridge System

| Model No. | Capacity ounces (cubic in.) | Cartridge Type | Carton Qty. | Dispensing Tool | Mixing Nozzle |
|---|---|---|---|---|---|
| AT-XP10 | 9.4 (16.9) | Coaxial | 6 | CDT10S | AMN19Q |
| AT-XP13 | 12.5 (22.5) | Side-by-side | 10 | ADT813S | |
| AT-XP30 | 30 (54) | Side-by-side | 5 | ADT30S ADTA30P or ADTA30CKT | |

1. Cartridge estimation guidelines are available at **strongtie.com/apps**.
2. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available at **strongtie.com**.
3. Use only Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair AT-XP adhesive performance.
4. One AMN19Q mixing nozzle and one nozzle extension are supplied with each cartridge.

## 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.

## AT-XP® — Tension Loads for Threaded Rod In Normal-Weight Concrete

| Anchor Dia. (in.) | Drill Bit (in.) | Emb. Depth (in.) | Tension Load[6,13] (lb.) | | | | | | | | | | Tension Load[10] $F_u$ = 58 ksi Steel (lb.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | 1,875 | 2,525 | 1¾ | 1,365 | 2,140 | 955 | 1,285 | 6,175 | 4,265 |
| | | 7 | 8 | 4,715 | 6,175[9] | 3,300 | 3,705 | 1¾ | 2,395 | 3,760 | 1,675 | 2,255 | | |
| | | 10 | 8 | 6,175[9] | 6,175[9] | 4,325 | 3,705 | 1¾ | 3,425 | 5,370 | 2,400 | 3,220 | | |
| ⅝ | ¾ | 5 | 8 | 3,985 | 6,175 | 2,790 | 3,705 | 1¾ | 1,870 | 2,930 | 1,310 | 1,760 | 9,830 | 6,675 |
| | | 8½ | 8 | 6,040 | 8,055 | 4,230 | 4,835 | 1¾ | 3,185 | 4,695 | 2,230 | 2,815 | | |
| | | 12 | 9 | 8,235 | 9,830[9] | 5,765 | 5,900 | 1¾ | 4,495 | 6,890 | 3,145 | 4,135 | | |
| ¾ | ⅞ | 6 | 9 | 5,180 | 8,120 | 3,625 | 4,870 | 1¾ | 2,420 | 3,680 | 1,695 | 2,210 | 14,530 | 9,615 |
| | | 10½ | 12 | 9,740 | 13,545 | 6,820 | 8,125 | 1¾ | 4,355 | 6,745 | 3,050 | 4,045 | | |
| | | 15 | 15 | 13,915 | 14,530[9] | 9,740 | 8,720 | 1¾ | 6,220 | 9,755 | 4,355 | 5,855 | | |
| ⅞ | 1 | 8 | 10 | 4,550 | 9,980 | 3,185 | 5,990 | 1¾ | 2,130 | 4,810 | 1,490 | 2,885 | 20,095 | 13,070 |
| | | 12 | 12 | 7,735 | 14,355 | 5,415 | 8,615 | 1¾ | 3,350 | 7,565 | 2,345 | 4,540 | | |
| | | 17½ | 14 | 11,275 | 20,095[9] | 7,890 | 12,055 | 1¾ | 4,885 | 11,035 | 3,420 | 6,620 | | |
| 1 | 1⅛ | 8 | 12 | 6,850 | 10,750 | 4,795 | 6,450 | 1¾ | 2,960 | 4,640 | 2,070 | 2,785 | 26,360 | 17,075 |
| | | 14 | 18 | 12,335 | 19,350 | 8,635 | 11,610 | 1¾ | 5,235 | 8,215 | 3,665 | 4,930 | | |
| | | 20 | 23 | 17,625 | 26,360[9] | 12,340 | 15,815 | 1¾ | 7,480 | 11,735 | 5,235 | 7,040 | | |

Note: Reference p. 188 for footnotes.



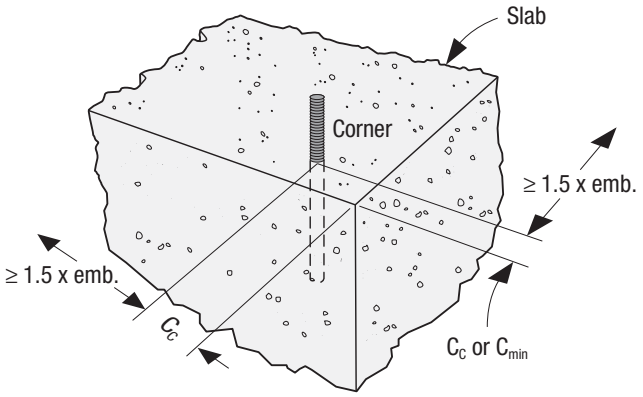
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# AT-XP® High-Strength Acrylic Adhesive

## AT-XP® — 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 Load[6] (lb./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" | 1,825 | 1,825 | 1,280 | 1,095 | 895 | 1,320 | 2,485 |
| | | | | | | 1'– 0" | 1,215 | 1,215 | 850 | 730 | 595 | 880 | 1,655 |
| | | | | | | 1'– 4" | 910 | 910 | 635 | 545 | 445 | 660 | 1,240 |
| | | | | | | 2' – 0" | 610 | 610 | 425 | 365 | 300 | 440 | 830 |
| | | | | | | 2' – 8" | 455 | 455 | 320 | 275 | 225 | 330 | 620 |
| | | | | | | 4' – 0" | 305 | 305 | 215 | 185 | 150 | 220 | 415 |
| | | | | | | 6' – 0" | 205 | 205 | 145 | 125 | 100 | 145 | 275 |
| ⅝ | ¾ | 1¾ | 5 | 5 | 8½ | 0' – 8" | 2,035 | 2,035 | 1,425 | 1,220 | 960 | 1,490 | 2,995 |
| | | | | | | 1'– 0" | 1,355 | 1,355 | 950 | 815 | 640 | 995 | 2,000 |
| | | | | | | 1'– 4" | 1,015 | 1,015 | 710 | 610 | 480 | 745 | 1,500 |
| | | | | | | 2' – 0" | 680 | 680 | 475 | 410 | 320 | 495 | 1,000 |
| | | | | | | 2' – 8" | 510 | 510 | 355 | 305 | 240 | 375 | 750 |
| | | | | | | 4' – 0" | 340 | 340 | 240 | 205 | 160 | 250 | 500 |
| | | | | | | 6' – 0" | 225 | 225 | 160 | 135 | 105 | 165 | 335 |
| ¾ | ⅞ | 1¾ | 5 | 6 | 10 | 0' – 8" | 2,190 | 2,190 | 1,535 | 1,315 | 965 | 1,600 | 3,320 |
| | | | | | | 1'– 0" | 1,460 | 1,460 | 1,020 | 875 | 640 | 1,065 | 2,215 |
| | | | | | | 1'– 4" | 1,095 | 1,095 | 765 | 655 | 480 | 800 | 1,660 |
| | | | | | | 2' – 0" | 730 | 730 | 510 | 440 | 320 | 535 | 1,110 |
| | | | | | | 2' – 8" | 550 | 550 | 385 | 330 | 240 | 400 | 830 |
| | | | | | | 4' – 0" | 365 | 365 | 255 | 220 | 160 | 265 | 555 |
| | | | | | | 6' – 0" | 245 | 245 | 170 | 145 | 105 | 180 | 370 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Load values based on the following: minimum concrete strength of 2,500 psi, dry hole, maximum short-term temperature of 180°F, maximum long-term temperature of 110°F, and continuous special inspection. Reference IAPMO UES ER-263 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, $m_f = 0.75$, $\Omega = 2.5$. Reference General Notes for CFS properties. To convert from ASD to LRFD, multiply value by 1.5.
6. Governing 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 **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 318-14 Chapter 17. 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 318-14 Section 17.2.3.5.3, where applicable.






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# **Titen HD®** Heavy-Duty Screw Anchor

The original high-strength screw anchor for use in cracked and uncracked concrete, as well as uncracked masonry. The Titen HD offers low installation torque and outstanding performance. Designed and tested in dry, interior, non-corrosive environments or temporary outdoor applications, the Titen HD demonstrates industry-leading performance even in seismic conditions.

**Features:**

- 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
- Qualified for static and seismic loading conditions
- Thread design undercuts to efficiently transfer the load to the base material
- Standard fractional sizes
- Specialized heat-treating process creates tip hardness for better cutting without compromising the ductility
- No special drill bit required — designed to install using standard-sized ANSI tolerance drill bits
- Testing shows the Titen HD installs in concrete with 50% less torque than competitor anchors
- Hex-washer head requires no separate washer and provides a clean installed appearance
- Removable — ideal for temporary anchoring (e.g., formwork, bracing) or applications where fixtures may need to be moved (reuse of the anchor to achieve listed load values is not recommended)

**Codes:** ICC-ES ESR-2713 (concrete); ICC-ES ESR-1056 (masonry); City of L.A. RR25741 (concrete), RR25560 (masonry); Florida FL-15730.6; FM 3017082, 3035761 and 3043442; Multiple DOT listings

**Material:** Carbon steel

**Coating:** Zinc plated or mechanically galvanized

**Installation:**

Holes in metal fixtures to be mounted should match the diameter specified in the table on p. 192.

Use a Titen HD screw anchor one time only — installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

Do not use impact wrenches to install into hollow CMU.

**Caution:** Oversized holes in base material will reduce or eliminate the mechanical interlock of the threads with the base material and reduce the anchor's load capacity.

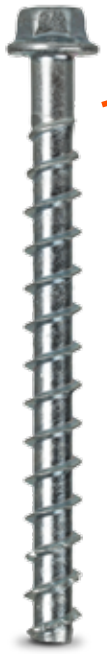
- Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus minimum hole depth overall (see table below right) to allow the thread tapping dust to settle, and blow it clean using compressed air. (Overhead installations need not be blown clean.) Alternatively, drill the hole deep enough to accommodate embedment depth and the 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.

Cracked Concrete CODE LISTED



**Titen HD Screw Anchor**
U.S. Patents 5,674,035 and 6,623,228

NEW



**¼" Titen HD Screw Anchor**
U.S. Patents 5,674,035 and 6,623,228



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



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# Titen HD® Heavy-Duty Screw Anchor

## Titen HD® Anchor Product Data — Zinc Plated

| Size (in.) | Model No. | Drill Bit Diameter (in.) | Wrench Size (in.) | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| ¼ x 1⅞ | THDB25178H | ¼ | ⅜ | 100 | 500 |
| ¼ x 2¾ | THDB25234H | ¼ | ⅜ | 50 | 250 |
| ¼ x 3 | THDB25300H | ¼ | ⅜ | 50 | 250 |
| ¼ x 3½ | THDB25312H | ¼ | ⅜ | 50 | 250 |
| ¼ x 4 | THDB25400H | ¼ | ⅜ | 50 | 250 |
| ⅜ x 1¾ | THD37134H* | ⅜ | 9⁄16 | 50 | 250 |
| ⅜ x 2½ | THD37212H* | ⅜ | 9⁄16 | 50 | 200 |
| ⅜ x 3 | THD37300H | ⅜ | 9⁄16 | 50 | 200 |
| ⅜ x 4 | THD37400H | ⅜ | 9⁄16 | 50 | 200 |
| ⅜ x 5 | THD37500H | ⅜ | 9⁄16 | 50 | 100 |
| ⅜ x 6 | THD37600H | ⅜ | 9⁄16 | 50 | 100 |
| ½ x 3 | THD50300H | ½ | ¾ | 25 | 100 |
| ½ x 4 | THD50400H | ½ | ¾ | 20 | 80 |
| ½ x 5 | THD50500H | ½ | ¾ | 20 | 80 |
| ½ x 6 | THD50600H | ½ | ¾ | 20 | 80 |
| ½ x 6½ | THD50612H | ½ | ¾ | 20 | 40 |
| ½ x 8 | THD50800H | ½ | ¾ | 5 | 25 |
| ½ x 12 | THD501200H | ½ | ¾ | 5 | 25 |
| ½ x 13 | THD501300H | ½ | ¾ | 5 | 25 |
| ½ x 14 | THD501400H | ½ | ¾ | 5 | 25 |
| ½ x 15 | THD501500H | ½ | ¾ | 5 | 25 |
| ⅝ x 4 | THDB62400H | ⅝ | 15⁄16 | 10 | 40 |
| ⅝ x 5 | THDB62500H | ⅝ | 15⁄16 | 10 | 40 |
| ⅝ x 6 | THDB62600H | ⅝ | 15⁄16 | 10 | 40 |
| ⅝ x 6½ | THDB62612H | ⅝ | 15⁄16 | 10 | 40 |
| ⅝ x 8 | THDB62800H | ⅝ | 15⁄16 | 10 | 20 |
| ¾ x 4 | THD75400H | ¾ | 1⅛ | 10 | 40 |
| ¾ x 5 | THD75500H | ¾ | 1⅛ | 5 | 20 |
| ¾ x 6 | THDT75600H | ¾ | 1⅛ | 5 | 20 |
| ¾ x 7 | THD75700H | ¾ | 1⅛ | 5 | 10 |
| ¾ x 8½ | THD75812H | ¾ | 1⅛ | 5 | 10 |
| ¾ x 10 | THD75100H | ¾ | 1⅛ | 5 | 10 |

*These models do not meet minimum embedment depth requirements for strength design and require maximum installation torque of 25 ft.–lb. using a torque wrench, driver drill or cordless ¼" impact driver with a maximum permitted torque rating of 100 ft.–lb.

## Titen HD® Anchor Product Data — Mechanically Galvanized

| Size (in.) | Model No. | Drill Bit Diameter (in.) | Wrench Size (in.) | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| ⅜ x 5 | THD37500HMG | ⅜ | 9⁄16 | 50 | 100 |
| ⅜ x 6 | THD37600HMG | | | 50 | 100 |
| ½ x 5 | THD50500HMG | ½ | ¾ | 20 | 80 |
| ½ x 6 | THD50600HMG | | | 20 | 80 |
| ½ x 6½ | THD50612HMG | | | 20 | 40 |
| ½ x 8 | THD50800HMG | | | 20 | 40 |
| ¾ x 8½ | THD75812HMG | ¾ | 1⅛ | 5 | 10 |
| ¾ x 10 | THD75100HMG | | | 5 | 10 |
| ⅜ x 4 | THD37300HMG | ⅜ | 9⁄16 | 50 | 200 |
| ⅜ x 4 | THD37400HMG | | | 50 | 200 |
| ½ x 4 | THD50400HMG | ½ | ¾ | 20 | 80 |
| ¾ x 6 | THDT75600HMG | ¾ | 1⅛ | 5 | 20 |

Mechanical galvanizing meets ASTM B695, Class 65, Type 1.
Intended for some pressure-treated wood sill plate applications.
Not for use in other corrosive or outdoor environments. See pp. 18-21 or visit **strongtie.com/info** for more corrosion information.



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# **Titen HD®** Heavy-Duty Screw Anchor

## Titen HD® Installation Information and Additional Data[1]

| Characteristic | Symbol | Units | Nominal Anchor Diameter, $d_a$ (in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ¼[4] | | ⅜ | | ½ | | ⅝[4] | | ¾ | |
| **Installation Information** | | | | | | | | | | | | |
| Drill Bit Diameter | $d_{bit}$ | in. | ¼ | | ⅜ | | ½ | | ⅝ | | ¾ | |
| Baseplate Clearance Hole Diameter | $d_c$ | in. | ⅜ | | ½ | | ⅝ | | ¾ | | ⅞ | |
| Maximum Installation Torque | $T_{inst,max}$ | ft.-lbf | 24[2] | | 50[2] | | 65[2] | | 100[2] | | 150[2] | |
| Maximum Impact Wrench Torque Rating | $T_{impact,max}$ | ft.-lbf | 125[3] | | 150[3] | | 340[3] | | 340[3] | | 385[3] | |
| Minimum Hole Depth | $h_{hole}$ | in. | 1¾ | 2⅝ | 2¾ | 3½ | 3¾ | 4½ | 4½ | 6 | 6 | 6¾ |
| Nominal Embedment Depth | $h_{nom}$ | in. | 1⅝ | 2½ | 2½ | 3¼ | 3¼ | 4 | 4 | 5½ | 5½ | 6¼ |
| Critical Edge Distance | $c_{ac}$ | in. | 3 | 6 | 2 11/16 | 3⅝ | 3 9/16 | 4½ | 4½ | 6⅜ | 6⅜ | 7 5/16 |
| Minimum Edge Distance | $c_{min}$ | in. | 1½ | | 1¾ | | | | | | | |
| Minimum Spacing | $s_{min}$ | in. | 3 | | | | | | | | | |
| Minimum Concrete Thickness | $h_{min}$ | in. | 3¼ | 3½ | 4 | 5 | 5 | 6¼ | 6 | 8½ | 8¾ | 10 |
| **Additional Data** | | | | | | | | | | | | |
| Anchor Category | Category | — | 1 | | | | | | | | | |
| Yield Strength | $f_{ya}$ | psi | 100,000 | | 97,000 | | | | | | | |
| Tensile Strength | $f_{uta}$ | psi | 125,000 | | 110,000 | | | | | | | |
| Minimum Tensile & Shear Stress Area | $A_{se}$ | in² | 0.042 | | 0.099 | | 0.183 | | 0.276 | | 0.414 | |
| Axial Stiffness in Service Load Range – Uncracked Concrete | $\beta_{uncr}$ | lb./in. | 202,000 | | 715,000 | | | | | | | |
| Axial Stiffness in Service Load Range – Cracked Concrete | $\beta_{cr}$ | lb./in. | 173,000 | | 345,000 | | | | | | | |

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17.
2. $T_{inst,max}$ is the maximum permitted installation torque for the embedment depth range covered by this table using a torque wrench.
3. $T_{impact,max}$ is the maximum permitted torque rating for impact wrenches for the embedment depth range covered by this table.
4. Data for ¼" anchor is only valid for THDB25 series. Data for the ⅝" anchor is valid only for the THDB62 series.



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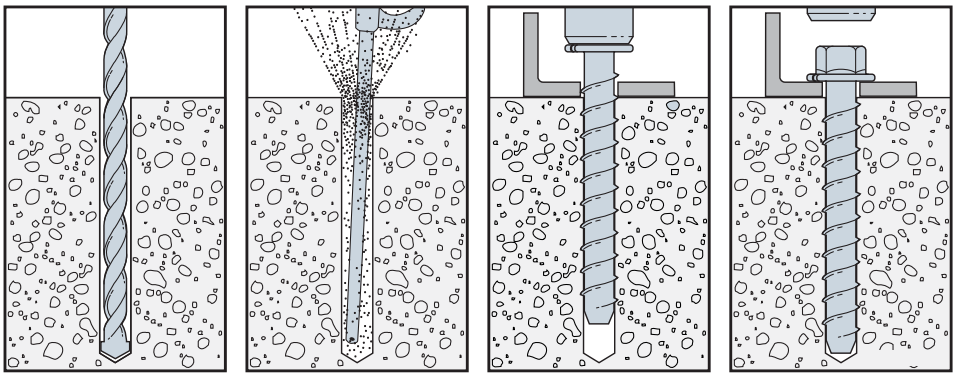
# Titen HD® Heavy-Duty Screw Anchor

## Additional Installation Information — Hole Dimensions

| Titen HD® Diameter (in.) | Wrench Size (in.) | Recommended Fixture Hole Size in Steel (in.) | Min. Hole Depth Overdrill in Concrete (in.) |
|---|---|---|---|
| ¼ | ⅜ | ⅜ to 7⁄16 | ⅛ |
| ⅜ | 9⁄16 | ½ to 9⁄16 | ¼ |
| ½ | ¾ | ⅝ to 11⁄16 | ½ |
| ⅝ | 15⁄16 | ¾ to 13⁄16 | ½ |
| ¾ | 1 ⅛ | ⅞ to 15⁄16 | ½ |

**Note:** Recommended fixture hole dimensions apply to structural steel greater than ¼" thick only and do not apply to CFS in 97 mil (12 ga.) and thinner. Standard 1⁄16" oversized holes may be used into CFS fixtures and tracks.

## Installation Sequence



## Titen HD — Tension Loads Attaching Cold-Formed Steel To Normal-Weight Concrete (lb.)[6]

| Anchor Size (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 1½ | 3 | 1⅝ | 3¼ | 6 | 470 | 630 | 330 | 375 | 390 | 505 | 920 | 1,160 |
| | | 1¾ | 3 | 1⅝ | 3¼ | 6 | 530 | 705 | 370 | 425 | | | | |
| | | 3 | 3 | 1⅝ | 3¼ | 6 | 540 | 715 | 375 | 430 | | | | |
| ¼ x 2¾ | | 1½ | 3 | 2½ | 3½ | 6 | 725 | 965 | 510 | 580 | | | | |
| | | 1¾ | 3 | 2½ | 3½ | 6 | 790 | 1,050 | 555 | 630 | | | | |
| | | 3 | 3 | 2½ | 3½ | 6 | 930 | 1,240 | 650 | 745 | | | | |
| ⅜ x 3 | ⅜ | 1¾ | 3 | 2½ | 4 | 6 | 600 | 800 | 420 | 480 | 585 | 760 | 1,380 | 1,740 |
| ½ x 4 | ½ | 1¾ | 4 | 3¼ | 5 | 8 | 940 | 1,255 | 660 | 755 | 585 | 760 | 1,380 | 1,740 |
| | | 3 | 4 | 3¼ | 5 | 8 | 1,320 | 1,760 | 925 | 1,055 | | | | |
| | | 4 | 4 | 3¼ | 5 | 8 | 1,490 | 1,985 | 1,045 | 1,190 | | | | |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. 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) tension pullover values are based on AISI S-100, Eq. E4.4.2-1, $d_w$ = 0.50" (¼" THD), $d_w$ = 0.75" (⅜" and ½" THD) and Ω = 3.0. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5. Tension values do not account for weak axis bending in the sill member.
6. Governing load is the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design includes SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.4.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.



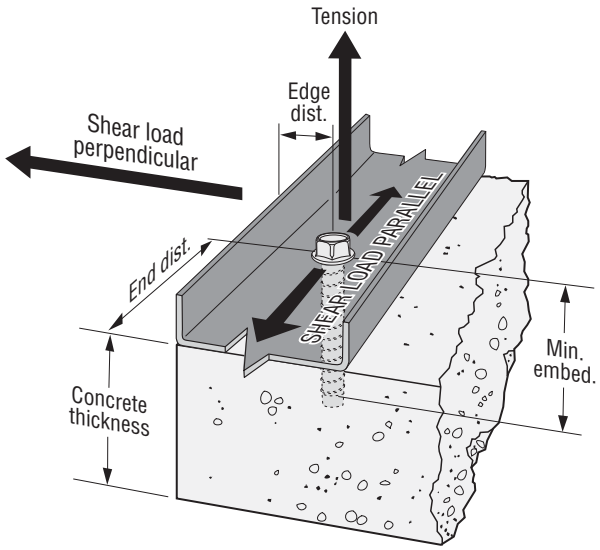
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# **Titen HD®** Heavy-Duty Screw Anchor

## Titen HD — Shear Loads Perpendicular to Edge in Normal-Weight Concrete (lb.)[6]

| Anchor Size (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 1½ | 3 | 1⅝ | 3¼ | 6 | 305 | 305 | 215 | 185 | 350 | 455 | 830 | 1,045 |
| | | 1¾ | 3 | 1⅝ | 3¼ | 6 | 385 | 385 | 270 | 230 | | | | |
| | | 3 | 3 | 1⅝ | 3¼ | 9 | 555 | 555 | 390 | 335 | | | | |
| ¼ x 2¾ | | 1½ | 3 | 2½ | 3½ | 6 | 340 | 340 | 235 | 205 | | | | |
| | | 1¾ | 3 | 2½ | 3½ | 6 | 425 | 425 | 300 | 255 | | | | |
| | | 3 | 3 | 2½ | 3½ | 9 | 635 | 635 | 445 | 380 | | | | |
| ⅜ x 3 | ⅜ | 1¾ | 7 | 2½ | 4 | 5¼ | 475 | 475 | 335 | 285 | 510 | 685 | 1,240 | 1,565 |
| | | 3 | 7 | 2½ | 4 | 9 | 1,000 | 1,000 | 700 | 600 | | | | |
| ½ x 4 | ½ | 1¾ | 8 | 3¼ | 5 | 5¼ | 545 | 545 | 380 | 325 | 595 | 880 | 1,655 | 2,085 |
| | | 3 | 8 | 3¼ | 5 | 9 | 1,225 | 1,225 | 860 | 735 | | | | |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Shear load is applied perpendicular 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 conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design includes SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.




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

U.S. Patent 5,674,035



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# **Titen HD®** Heavy-Duty Screw Anchor

SIMPSON Strong-Tie®

## Titen HD — Shear Loads Parallel to Edge in Normal-Weight Concrete (lb./ft.)[6]

| Anchor Size (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 1½ | 3 | 1⅝ | 3¼ | 0' – 6" | 790 | 790 | 550 | 470 | 700 | 910 | 1,660 | 2,090 |
| | | | | | | 0' – 8" | 595 | 595 | 415 | 355 | 525 | 685 | 1,245 | 1,570 |
| | | | | | | 1'– 0" | 395 | 395 | 275 | 235 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 295 | 295 | 205 | 175 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 200 | 200 | 140 | 120 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 150 | 150 | 105 | 90 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 100 | 100 | 70 | 60 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 65 | 65 | 45 | 40 | 60 | 75 | 140 | 175 |
| ¼ x 1⅞ | ¼ | 1¾ | 3 | 1⅝ | 3¼ | 0' – 6" | 840 | 840 | 590 | 500 | 700 | 910 | 1,660 | 2,090 |
| | | | | | | 0' – 8" | 630 | 630 | 445 | 375 | 525 | 685 | 1,245 | 1,570 |
| | | | | | | 1'– 0" | 420 | 420 | 295 | 250 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 315 | 315 | 220 | 190 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 210 | 210 | 150 | 125 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 160 | 160 | 110 | 95 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 105 | 105 | 75 | 65 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 70 | 70 | 50 | 40 | 60 | 75 | 140 | 175 |
| ¼ x 1⅞ | ¼ | 3 | 3 | 1⅝ | 3¼ | 0' – 9" | 740 | 740 | 520 | 445 | 465 | 605 | 1,105 | 1,395 |
| | | | | | | 1'– 0" | 555 | 555 | 390 | 335 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 415 | 415 | 295 | 250 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 280 | 280 | 195 | 170 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 210 | 210 | 145 | 125 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 140 | 140 | 100 | 85 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 95 | 95 | 65 | 55 | 60 | 75 | 140 | 175 |
| ¼ x 2¾ | ¼ | 1½ | 3 | 2½ | 3½ | 0' – 6" | 900 | 900 | 630 | 540 | 700 | 910 | 1,660 | 2,090 |
| | | | | | | 0' – 8" | 675 | 675 | 475 | 405 | 525 | 685 | 1,245 | 1,570 |
| | | | | | | 1'– 0" | 450 | 450 | 315 | 270 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 340 | 340 | 235 | 205 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 225 | 225 | 160 | 135 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 170 | 170 | 120 | 100 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 115 | 115 | 80 | 70 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 75 | 75 | 55 | 45 | 60 | 75 | 140 | 175 |
| ¼ x 2¾ | ¼ | 1¾ | 3 | 2½ | 3½ | 0' – 6" | 960 | 960 | 670 | 580 | 700 | 910 | 1,660 | 2,090 |
| | | | | | | 0' – 8" | 720 | 720 | 505 | 435 | 525 | 685 | 1,245 | 1,570 |
| | | | | | | 1'– 0" | 480 | 480 | 335 | 290 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 360 | 360 | 250 | 220 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 240 | 240 | 170 | 145 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 180 | 180 | 125 | 110 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 120 | 120 | 85 | 75 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 80 | 80 | 55 | 50 | 60 | 75 | 140 | 175 |
| ¼ x 2¾ | ¼ | 3 | 3 | 2½ | 3½ | 0' – 9" | 845 | 845 | 595 | 505 | 465 | 605 | 1,105 | 1,395 |
| | | | | | | 1'– 0" | 635 | 635 | 445 | 380 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'– 4" | 475 | 475 | 335 | 285 | 265 | 340 | 625 | 785 |
| | | | | | | 2' – 0" | 320 | 320 | 225 | 190 | 175 | 230 | 415 | 525 |
| | | | | | | 2' – 8" | 240 | 240 | 165 | 145 | 130 | 170 | 310 | 390 |
| | | | | | | 4' – 0" | 160 | 160 | 110 | 95 | 90 | 115 | 210 | 260 |
| | | | | | | 6' – 0" | 105 | 105 | 75 | 65 | 60 | 75 | 140 | 175 |

See footnotes on p. 195.



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# **Titen HD®** Heavy-Duty Screw Anchor

## Titen HD — Shear Loads Parallel to Edge in Normal-Weight Concrete (lb./ft.)[6] (cont.)

| Anchor Size (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (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 | 995 | 855 | 765 | 1,030 | 1,860 | 2,350 |
| | | | | | | 1'– 0" | 950 | 950 | 665 | 570 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'– 4" | 715 | 715 | 500 | 430 | 385 | 515 | 930 | 1,175 |
| | | | | | | 2' – 0" | 475 | 475 | 335 | 285 | 255 | 340 | 620 | 780 |
| | | | | | | 2' – 8" | 355 | 355 | 250 | 215 | 190 | 255 | 465 | 585 |
| | | | | | | 4' – 0" | 240 | 240 | 170 | 145 | 130 | 170 | 310 | 390 |
| | | | | | | 6' – 0" | 160 | 160 | 110 | 95 | 85 | 115 | 205 | 260 |
| ½ x 4 | ½ | 1¾ | 8 | 3¼ | 5 | 0' – 8" | 1,645 | 1,645 | 1,150 | 985 | 895 | 1,320 | 2,485 | 3,130 |
| | | | | | | 1'– 0" | 1,095 | 1,095 | 765 | 655 | 595 | 880 | 1,655 | 2,085 |
| | | | | | | 1'– 4" | 820 | 820 | 575 | 490 | 445 | 660 | 1,240 | 1,565 |
| | | | | | | 2' – 0" | 550 | 550 | 385 | 330 | 300 | 440 | 830 | 1,045 |
| | | | | | | 2' – 8" | 410 | 410 | 285 | 245 | 220 | 330 | 620 | 780 |
| | | | | | | 4' – 0" | 275 | 275 | 195 | 165 | 150 | 220 | 415 | 520 |
| | | | | | | 6' – 0" | 185 | 185 | 130 | 110 | 100 | 145 | 275 | 350 |
| ⅜ x 3 | ⅜ | 3 | 7 | 2½ | 4 | 0' – 8" | 1,770 | 1,770 | 1,240 | 1,060 | 765 | 1,030 | 1,860 | 2,350 |
| | | | | | | 1'– 0" | 1,180 | 1,180 | 825 | 710 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'– 4" | 885 | 885 | 620 | 530 | 385 | 515 | 930 | 1,175 |
| | | | | | | 2' – 0" | 590 | 590 | 415 | 355 | 255 | 340 | 620 | 780 |
| | | | | | | 2' – 8" | 445 | 445 | 310 | 265 | 190 | 255 | 465 | 585 |
| | | | | | | 4' – 0" | 295 | 295 | 205 | 175 | 130 | 170 | 310 | 390 |
| | | | | | | 6' – 0" | 195 | 195 | 135 | 115 | 85 | 115 | 205 | 260 |
| ½ x 4 | ½ | 3 | 8 | 3¼ | 5 | 0' – 8" | 2,505 | 2,505 | 1,755 | 1,505 | 895 | 1,320 | 2,485 | 3,130 |
| | | | | | | 1'– 0" | 1,670 | 1,670 | 1,170 | 1,000 | 595 | 880 | 1,655 | 2,085 |
| | | | | | | 1'– 4" | 1,255 | 1,255 | 880 | 755 | 445 | 660 | 1,240 | 1,565 |
| | | | | | | 2' – 0" | 835 | 835 | 585 | 500 | 300 | 440 | 830 | 1,045 |
| | | | | | | 2' – 8" | 625 | 625 | 440 | 375 | 220 | 330 | 620 | 780 |
| | | | | | | 4' – 0" | 420 | 420 | 295 | 250 | 150 | 220 | 415 | 520 |
| | | | | | | 6' – 0" | 280 | 280 | 195 | 170 | 100 | 145 | 275 | 350 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 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 **strongtie.com**.
8. Wind design includes SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.



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# **Titen HD®** Heavy-Duty Screw Anchor

## Titen HD — Tension Loads Attaching Cold-Formed Steel to Top of Normal-Weight Concrete over Metal Deck (lb.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 3½ | 3¾ | 1⅝ | 2½ | 3½ | 580 | 775 | 405 | 545 | 390 | 505 | 920 | 1,160 |
| ⅜ x 3 | ⅜ | 3 | 7¼ | 2½ | 3¼ | 3 | 660 | 880 | 460 | 615 | 585 | 760 | 1,380 | 1,740 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 psi. Reference ICC-ES ESR-2713 for further information.
5. Cold-formed steel (CFS) tension pullover values are based on AISI S-100, Eq. E4.4.2-1, $d_w$ = 0.50" (¼" THD), $d_w$ = 0.75" (⅜" THD) and Ω = 3.0. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5. Tension values do not account for weak axis bending in the sill member.
6. Governing load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.4.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-2713.

## Titen HD — Shear Loads Perpendicular to Edge in Top of Normal-Weight Concrete over Metal Deck (lb.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 3½ | 3¾ | 1⅝ | 2½ | 3½ | 450 | 450 | 315 | 315 | 350 | 455 | 830 | 1,045 |
| ⅜ x 3 | ⅜ | 3 | 7¼ | 2½ | 3¼ | 3 | 660 | 660 | 460 | 460 | 510 | 685 | 1,240 | 1,565 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 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, Ω = 2.5. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5.
6. Governing load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-2713.



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# **Titen HD®** Heavy-Duty Screw Anchor

## Titen HD — Shear Loads Parallel to Edge in Top of Normal-Weight Concrete over Metal Deck (lb./ft.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ¼ x 1⅞ | ¼ | 3½ | 3¾ | 1⅝ | 2½ | 1'–0" | 635 | 635 | 445 | 445 | 350 | 455 | 830 | 1,045 |
| | | | | | | 1'–4" | 475 | 475 | 335 | 335 | 265 | 340 | 625 | 785 |
| ⅜ x 3 | ⅜ | 3 | 7¼ | 2½ | 3¼ | 0'–9" | 1,590 | 1,590 | 1,115 | 1,115 | 680 | 915 | 1,655 | 2,085 |
| | | | | | | 1'–0" | 1,195 | 1,195 | 835 | 835 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'–4" | 895 | 895 | 625 | 625 | 385 | 515 | 930 | 1,175 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 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 shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-2713.



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# **Strong-Bolt® 2** Wedge Anchor

A wedge-type expansion anchor designed for optimal performance in cracked and uncracked concrete as well as uncracked masonry. The Strong-Bolt 2 is available in carbon steel (¼" through 1" diameter), Type 304 (¼" diameter only) and Type 316 stainless steel (¼" through ¾" diameter).

**Features:**

- Code listed under IBC/IRC for cracked and uncracked concrete per ICC-ES ESR-3037
- Code listed under IBC/IRC for masonry per IAPMO UES ER-240
- Qualified for static and seismic loading conditions (seismic design categories A through F)
- Suitable for horizontal, vertical and overhead applications
- Qualified for minimum concrete thickness of 3¼", and lightweight concrete-over-metal deck thickness of 2½" and 3¼"
- 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 L.A. RR25891 (concrete), RR25936 (carbon steel in CMU); Florida FL-15731.2; FL-16230.4; UL File Ex3605; FM 3043342 and 3047639; Mulitiple DOT listings; meets the requirements of Federal Specifications A-A-1923A, Type 4

**Material**: Carbon-steel stud with special alloy clip; stainless-steel stud with stainless-steel clip

**Coating**: Zinc plated

c UL us LISTED  FM APPROVED

**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**

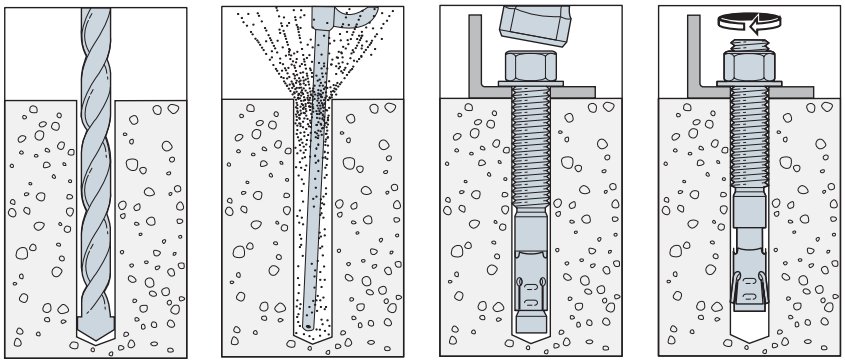
Cracked Concrete CODE LISTED



**Head Stamp**

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

## Installation Sequence





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# **Strong-Bolt® 2** Wedge Anchor

## Strong-Bolt® 2 Anchor Product Data

| Size (in.) | Type 304 Stainless Steel Model No. | Type 316 Stainless Steel Model No. | Drill Bit Diameter (in.) | Thread Length (in.) | Quantity | |
|---|---|---|---|---|---|---|
| | | | | | Box | Carton |
| ¼ x 1¾ | STB2-251344SS | STB2-251346SS | ¼ | 1 5/16 | 100 | 500 |
| ¼ x 2¼ | STB2-252144SS | STB2-252146SS | ¼ | 1 7/16 | 100 | 500 |
| ¼ x 3¼ | STB2-253144SS | STB2-253146SS | ¼ | 2 7/16 | 100 | 500 |
| ⅜ x 2¾ | STB2-372344SS | STB2-372346SS | ⅜ | 1 5/16 | 50 | 250 |
| ⅜ x 3 | STB2-373004SS | STB2-373006SS | ⅜ | 1 9/16 | 50 | 250 |
| ⅜ x 3½ | STB2-373124SS | STB2-373126SS | ⅜ | 2 1/16 | 50 | 250 |
| ⅜ x 3¾ | STB2-373344SS | STB2-373346SS | ⅜ | 2 5/16 | 50 | 250 |
| ⅜ x 5 | STB2-375004SS | STB2-375006SS | ⅜ | 3 9/16 | 50 | 200 |
| ⅜ x 7 | STB2-377004SS | STB2-377006SS | ⅜ | 5 9/16 | 50 | 200 |
| ½ x 3¾ | STB2-503344SS | STB2-503346SS | ½ | 2 1/16 | 25 | 125 |
| ½ x 4¼ | STB2-504144SS | STB2-504146SS | ½ | 2 9/16 | 25 | 100 |
| ½ x 4¾ | STB2-504344SS | STB2-504346SS | ½ | 3 1/16 | 25 | 100 |
| ½ x 5½ | STB2-505124SS | STB2-505126SS | ½ | 3 13/16 | 25 | 100 |
| ½ x 7 | STB2-507004SS | STB2-507006SS | ½ | 5 5/16 | 25 | 100 |
| ½ x 8½ | STB2-508124SS | STB2-508126SS | ½ | 6 | 25 | 50 |
| ½ x 10 | STB2-501004SS | STB2-501006SS | ½ | 6 | 25 | 50 |
| ⅝ x 4½ | STB2-624124SS | STB2-624126SS | ⅝ | 2 7/16 | 20 | 80 |
| ⅝ x 5 | STB2-625004SS | STB2-625006SS | ⅝ | 2 15/16 | 20 | 80 |
| ⅝ x 6 | STB2-626004SS | STB2-626006SS | ⅝ | 3 15/16 | 20 | 80 |
| ⅝ x 7 | STB2-627004SS | STB2-627006SS | ⅝ | 4 15/16 | 20 | 80 |
| ⅝ x 8½ | STB2-628124SS | STB2-628126SS | ⅝ | 6 | 20 | 40 |
| ⅝ x 10 | STB2-621004SS | STB2-621006SS | ⅝ | 6 | 10 | 20 |
| ¾ x 5½ | STB2-755124SS | STB2-755126SS | ¾ | 3 3/16 | 10 | 40 |
| ¾ x 6¼ | STB2-756144SS | STB2-756146SS | ¾ | 3 15/16 | 10 | 40 |
| ¾ x 7 | STB2-757004SS | STB2-757006SS | ¾ | 4 1/16 | 10 | 40 |
| ¾ x 8½ | STB2-758124SS | STB2-758126SS | ¾ | 6 | 10 | 20 |



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# **Strong-Bolt® 2** Wedge Anchor

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

| Characteristic | Symbol | Units | Nominal Anchor Diameter, $d_a$ (in.) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ¼[4] | ⅜[5] | | ½[5] | | ⅝[5] | | ¾[5] | | 1[5] | |
| **Installation Information** | | | | | | | | | | | | | | |
| Nominal diameter | $d_a$ | in. | ¼ | ⅜ | | ½ | | ⅝ | | ¾ | | 1 | |
| Drill bit diameter | $d$ | in. | ¼ | ⅜ | | ½ | | ⅝ | | ¾ | | 1 | |
| Baseplate clearance hole diameter[2] | $d_c$ | in. | 5⁄16 | 7⁄16 | | 9⁄16 | | 11⁄16 | | 7⁄8 | | 1⅛ | |
| Installation torque | $T_{inst}$ | ft-lbf | 4 | 30 | | 60 | | 90 | | 150 | | 230 | |
| Nominal embedment depth | $h_{nom}$ | in. | 1¾ | 1⅞ | 2⅞ | 2¾ | 3⅞ | 3⅜ | 5⅛ | 4⅛ | 5¾ | 5¼ | 9¾ |
| Effective embedment depth | $h_{ef}$ | in. | 1½ | 1½ | 2½ | 2¼ | 3⅜ | 2¾ | 4½ | 3⅜ | 5 | 4½ | 9 |
| Minimum hole depth | $h_{hole}$ | in. | 1⅞ | 2 | 3 | 3 | 4⅛ | 3⅝ | 5⅜ | 4⅜ | 6 | 5½ | 10 |
| Minimum overall anchor length | $\ell_{anch}$ | in. | 2¼ | 2¾ | 3½ | 3¾ | 5½ | 4½ | 6 | 5½ | 7 | 7 | 13 |
| Critical edge distance | $c_{ac}$ | in. | 2½ | 6½ | 6 | 6½ | 6½ | 7½ | 7½ | 9 | 9 | 8 | 18 | 13½ |
| Minimum edge distance | $c_{min}$ | in. | 1¾ | 6 | | 7 | 4 | 4 | 6½ | | 6½ | | 8 | |
| | for $s \geq$ | in. | — | — | | — | — | — | — | | 8 | | — | |
| Minimum spacing | $s_{min}$ | in. | 2¼ | 3 | | 7 | 4 | 4 | 5 | | 7 | | 8 | |
| | for $c \geq$ | in. | — | — | | — | — | — | — | | ? | | — | |
| Minimum concrete thickness | $h_{min}$ | in | 3¼ | 3¼ | 4½ | 4½ | 5½ | 6 | 5½ | 7⅞ | 6¾ | 8¾ | 9 | 13½ |
| **Additional Data** | | | | | | | | | | | | | | |
| Yield strength | $f_{ya}$ | psi | 56,000 | 92,000 | | 85,000 | | | | 70,000 | | 60,000 | | |
| Tensile strength | $f_{uta}$ | psi | 70,000 | 115,000 | | | | | | 110,000 | | 78,000 | | |
| Minimum tensile and shear stress area | $A_{se}$ | in.[2] | 0.0318 | 0.0514 | | 0.105 | | 0.166 | | 0.270 | | 0.472 | | |
| Axial stiffness in service load range — Cracked and uncracked concrete | $\beta$ | lb./in. | 73,700[3] | 34,820 | | 63,570 | | 91,370 | | 118,840 | | 299,600 | | |

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17.
2. The clearance must comply with applicable code requirements for the connected element.
3. The tabulated value of β for ¼"-diameter carbon steel Strong-Bolt 2 anchor is for installations in uncracked concrete only.
4. The ¼"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.
5. The ⅜" through 1"-diameter (9.5mm through 25.4mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.

## Strong-Bolt 2 Carbon Steel — Tension Loads Attaching Cold-Formed Steel to Normal-Weight Concrete (lb.)[6]

| Anchor Dia. (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ | ⅜ | 6 | 6 | 1⅞ | 3¼ | 4½ | 635 | 845 | 445 | 505 | 615 | 805 | 1,460 | 1,835 |
| | | | | 2⅞ | 4½ | 7½ | 1,355 | 1,805 | 950 | 1,085 | | | | |
| ½ | ½ | 7 | 7 | 2¾ | 4½ | 7 | 1,400 | 1,865 | 980 | 1,120 | 825 | 1,080 | 1,955 | 2,460 |
| | | 4 | 4 | 2¾ | 5½ | 6¾ | 1,400 | 1,865 | 980 | 1,120 | | | | |
| | | 4 | 4 | 3⅞ | 6 | 4 | 1,390 | 1,850 | 975 | 1,110 | | | | |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. 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-3037 for further information.
5. Cold-formed steel (CFS) tension pullover values are based on AISI S-100, Eq. E4.4.2-1, $d_w$ = 0.793" (⅜" STB2), $d_w$ = 1.062" (½" STB2) and Ω = 3.0. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5. Tension values do not account for weak axis bending in the sill member.
6. Governing load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.4.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be multiplied by 0.68.



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# Strong-Bolt® 2 Wedge Anchor

## Strong-Bolt 2 Carbon Steel — Shear Loads Perpendicular to Edge in Normal-Weight Concrete (lb.)[6]

| Anchor Dia. (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ | ⅜ | 6 | 6 | 1⅞ | 3¼ | 4½ | 850 | 850 | 595 | 510 | 510 | 685 | 1,240 | 1,565 |
| | | | | 2⅞ | 4½ | 7½ | 1,170 | 1,170 | 820 | 700 | | | | |
| ½ | ½ | 7 | 7 | 2¾ | 4½ | 7 | 1,490 | 1,490 | 1,045 | 895 | 595 | 880 | 1,655 | 2,085 |
| | | 4 | 4 | 2¾ | 5½ | 6¾ | 1,125 | 1,125 | 790 | 675 | | | | |
| | | 4 | 4 | 3⅞ | 6 | 4 | 1,065 | 1,065 | 745 | 640 | | | | |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. 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-3037 for further information.
5. Cold-formed steel (CFS) shear values are based on AISI-S100, 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 load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be multiplied by 0.68.

## Strong-Bolt 2 Carbon Steel — Shear Loads Parallel to Edge in Normal-Weight Concrete (lb./ft.)[6]

| Anchor Dia. (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ | ⅜ | 6 | 6 | 1⅞ | 3¼ | 1'– 0" | 1,090 | 1,090 | 765 | 655 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'– 4" | 820 | 820 | 575 | 490 | 385 | 515 | 930 | 1,175 |
| | | | | | | 2' – 0" | 545 | 545 | 380 | 325 | 255 | 340 | 620 | 780 |
| | | | | | | 2' – 8" | 410 | 410 | 285 | 245 | 190 | 255 | 465 | 585 |
| | | | | | | 4' – 0" | 275 | 275 | 195 | 165 | 130 | 170 | 310 | 390 |
| | | | | | | 6' – 0" | 180 | 180 | 125 | 110 | 85 | 115 | 205 | 260 |
| ⅜ | ⅜ | 6 | 6 | 2-⅞ | 4½ | 0' – 8" | 1,755 | 1,755 | 1,230 | 1,055 | 765 | 1,030 | 1,860 | 2,350 |
| | | | | | | 1'– 0" | 1,170 | 1,170 | 820 | 700 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'– 4" | 880 | 880 | 615 | 530 | 385 | 515 | 930 | 1,175 |
| | | | | | | 2' – 0" | 585 | 585 | 410 | 350 | 255 | 340 | 620 | 780 |
| | | | | | | 2' – 8" | 440 | 440 | 310 | 265 | 190 | 255 | 465 | 585 |
| | | | | | | 4' – 0" | 295 | 295 | 205 | 175 | 130 | 170 | 310 | 390 |
| | | | | | | 6' – 0" | 195 | 195 | 135 | 115 | 85 | 115 | 205 | 260 |
| ½ | ½ | 4 | 4 | 2¾ | 5½ | 1'– 0" | 1,345 | 1,345 | 940 | 805 | 595 | 880 | 1,655 | 2,085 |
| | | | | | | 1'– 4" | 1,010 | 1,010 | 705 | 605 | 445 | 660 | 1,240 | 1,565 |
| | | | | | | 2' – 0" | 675 | 675 | 470 | 405 | 300 | 440 | 830 | 1,045 |
| | | | | | | 2' – 8" | 505 | 505 | 355 | 305 | 220 | 330 | 620 | 780 |
| | | | | | | 4' – 0" | 335 | 335 | 235 | 200 | 150 | 220 | 415 | 520 |
| | | | | | | 6' – 0" | 225 | 225 | 160 | 135 | 100 | 145 | 275 | 350 |
| ½ | ½ | 4 | 4 | 3⅞ | 6 | 1'– 0" | 1,520 | 1,520 | 1,065 | 910 | 595 | 880 | 1,655 | 2,085 |
| | | | | | | 1'– 4" | 1,140 | 1,140 | 800 | 685 | 445 | 660 | 1,240 | 1,565 |
| | | | | | | 2' – 0" | 760 | 760 | 530 | 455 | 300 | 440 | 830 | 1,045 |
| | | | | | | 2' – 8" | 570 | 570 | 400 | 340 | 220 | 330 | 620 | 780 |
| | | | | | | 4' – 0" | 380 | 380 | 265 | 230 | 150 | 220 | 415 | 520 |
| | | | | | | 6' – 0" | 255 | 255 | 180 | 155 | 100 | 145 | 275 | 350 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. 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-3037 for further information.
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 load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in sand-lightweight concrete, concrete values shall be multiplied by 0.68.



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# **Strong-Bolt® 2** Wedge Anchor

## Carbon Steel Strong-Bolt 2 — Tension Loads Attaching Cold-Formed Steel to Top of Normal-Weight Concrete over Metal Deck (lb.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ x 2¾ | ⅜ | 4¾ | 4¾ | 1⅞ | 2½ | 7 | 695 | 925 | 485 | 555 | 615 | 805 | 1,460 | 1,835 |
| ⅜ x 2¾ | ⅜ | 4½ | 4½ | 1⅞ | 3¼ | 6½ | | | | | | | | |
| ½ x 3¾ | ½ | 4¾ | 4¾ | 2¾ | 3¼ | 8 | 1,530 | 2,040 | 1,070 | 1,225 | 825 | 1,080 | 1,955 | 2,460 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 psi. Reference ICC-ES ESR-3037 for further information.
5. Cold-formed steel (CFS) tension pullover values are based on AISI S-100, Eq. E4.4.2-1, $d_w$ = 0.793" (⅜" STB2), $d_w$ = 1.062" (½" STB2) and Ω = 3.0. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5. Tension values do not account for weak axis bending in the sill member.
6. Governing load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.4.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-3037.

## Carbon Steel Strong-Bolt 2 — Shear Loads Perpendicular to Edge in Top of Normal-Weight Concrete over Metal Deck (lb.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ x 2¾ | ⅜ | 4¾ | 4¾ | 1⅞ | 2½ | 7 | 790 | 790 | 555 | 475 | 510 | 685 | 1,240 | 1,565 |
| ⅜ x 2¾ | ⅜ | 4½ | 4½ | 1⅞ | 3¼ | 6½ | 850 | 850 | 595 | 510 | | | | |
| ½ x 3¾ | ½ | 4¾ | 4¾ | 2¾ | 3¼ | 8 | 1,125 | 1,125 | 790 | 675 | 595 | 880 | 1,655 | 2,085 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 psi. Reference ICC-ES ESR-3037 for further information.
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 load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-3037.



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# **Strong-Bolt® 2** Wedge Anchor

## Carbon Steel Strong-Bolt 2 — Shear Loads Parallel to Edge in Top of Normal-Weight Concrete over Metal Deck (lb./ft.)[6,11]

| Anchor Size (in.) | Drill Bit (in.) | Min. Edge Distance (in.) | Min. End Distance (in.) | Emb. Depth (in.) | Min. Concrete Thickness (in.) | Spacing (in.) | Concrete[3,4] | | | | Cold-Formed Steel (ASD)[5] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,9,10] (Seismic) | LRFD[1,8,10] (Wind) | ASD[2,9,10] (Seismic) | ASD[2,8,10] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 68 mil (14 ga.) |
| ⅜ x 2¾ | ⅜ | 4¾ | 4¾ | 1⅞ | 2½ | 1'–0" | 995 | 995 | 695 | 595 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'–4" | 745 | 745 | 520 | 445 | 385 | 515 | 930 | 1,175 |
| ⅜ x 2¾ | ⅜ | 4½ | 4½ | 1⅞ | 3¼ | 1'–0" | 1,075 | 1,075 | 755 | 645 | 510 | 685 | 1,240 | 1,565 |
| | | | | | | 1'–4" | 805 | 805 | 565 | 485 | 385 | 515 | 930 | 1,175 |
| ½ x 3¾ | ½ | 4¾ | 4¾ | 2¾ | 3¼ | 1'–0" | 1,345 | 1,345 | 940 | 805 | 595 | 880 | 1,655 | 2,085 |
| | | | | | | 1'–4" | 1,005 | 1,005 | 705 | 605 | 445 | 660 | 1,240 | 1,565 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume cracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.7 for seismic and 0.6 for wind.
3. Anchor is considered as an individual anchor without influence from other anchors.
4. Concrete shall have a minimum $f'_c$ of 3,000 psi. Reference ICC-ES ESR-3037 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 shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. The listed load values are governed by a brittle failure mode, the Designer shall consider ductility requirements of ACI 318-14 Section 17.2.3.5.3 for designing anchorage in Seismic Design Category C–F.
10. For installation in top of sand-lightweight concrete over metal deck, concrete values shall be be multiplied by 0.68.
11. Metal deck configuration to comply with Figure 5 of ICC-ES ESR-3037.



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# **Titen® 2** Concrete and Masonry Screws

With patented undercutting threads that make installation easier and increase load capacity, the Titen® 2 concrete and masonry screw is ideal for attaching all types of components to concrete and masonry. The improved thread design undercuts the base material more efficiently, reducing installation torque and making it easier to drive without binding, snapping or stripping, even during installation into hard base material.

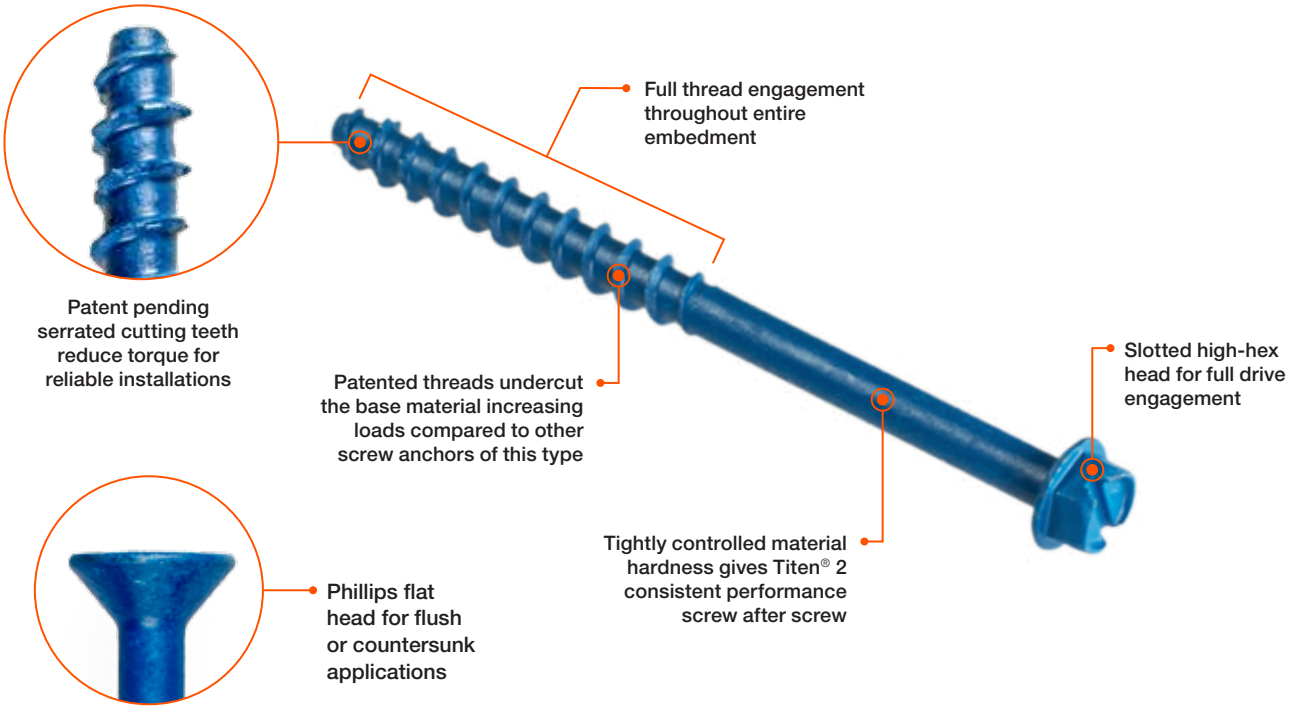
**Features:**

- Patented undercutting threads reduce installation torque
- Innovative design increases load capacity
- Code listed in accordance with ICC-ES AC193 for concrete application (IAPMO UES ER-449) and ICC-ES AC106 for masonry application (IAPMO UES ER-466)
- Suitable for near-edge concrete installations without expansion forces and cracking
- Installs with Standard ANSI drill bits (bit included in larger count boxes)
- Zinc plated with a baked-on ceramic coating
- Preservative treated wood applications: suited for use in non-ammonia formulations of CCA, ACQ-C, ACQ-D, CA-B, BX/DOT and zinc borate
- Use in dry interior environments only




**Blue Titen 2 Hex Head** | **Blue Titen 2 Phillips Flat-Head** | **White Titen 2 Phillips Flat-Head**

U.S. Patent Pending






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# Titen® 2 Concrete and Masonry Screws

## Blue Titen® 2 Product Data (3⁄16" diameter)

| Size | Head Style | Model No. | Drill Bit Diameter | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| 3⁄16" x 1 1⁄4" | 1⁄4" Hex | TTN2-18114H | 5⁄32" | 100 | 1,600 |
| 3⁄16" x 1 3⁄4" | | TTN2-18134H | | 100 | 500 |
| 3⁄16" x 2 1⁄4" | | TTN2-18214H | | 100 | 500 |
| 3⁄16" x 2 3⁄4" | | TTN2-18234H | | 100 | 500 |
| 3⁄16" x 3 1⁄4" | | TTN2-18314H | | 100 | 400 |
| 3⁄16" x 3 3⁄4" | | TTN2-18334H | | 100 | 400 |
| 3⁄16" x 4" | | TTN2-18400H | | 100 | 1,600 |
| 3⁄16" x 1 1⁄4" | #2 Phillips Flat | TTN2-18114PF | 5⁄32" | 100 | 500 |
| 3⁄16" x 1 3⁄4" | | TTN2-18134PF | | 100 | 500 |
| 3⁄16" x 2 1⁄4" | | TTN2-18214PF | | 100 | 500 |
| 3⁄16" x 2 3⁄4" | | TTN2-18234PF | | 100 | 400 |
| 3⁄16" x 3 1⁄4" | | TTN2-18314PF | | 100 | 400 |
| 3⁄16" x 3 3⁄4" | | TTN2-18334PF | | 100 | 400 |
| 3⁄16" x 4" | | TTN2-18400PF | | 100 | 400 |

## Blue Titen® 2 Product Data (1⁄4" diameter)

| Size | Head Style | Model No. | Drill Bit Diameter | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| 1⁄4" x 1 1⁄4" | 5⁄16" Hex | TTN2-25114H | 3⁄16" | 100 | 1,600 |
| 1⁄4" x 1 3⁄4" | | TTN2-25134H | | 100 | 500 |
| 1⁄4" x 2 1⁄4" | | TTN2-25214H | | 100 | 500 |
| 1⁄4" x 2 3⁄4" | | TTN2-25234H | | 100 | 500 |
| 1⁄4" x 3 1⁄4" | | TTN2-25314H | | 100 | 400 |
| 1⁄4" x 3 3⁄4" | | TTN2-25334H | | 100 | 400 |
| 1⁄4" x 4" | | TTN2-25400H | | 100 | 1,600 |
| 1⁄4" x 5" | | TTN2-25500H | | 100 | 500 |
| 1⁄4" x 6" | | TTN2-25600H | | 100 | 500 |
| 1⁄4" x 1 1⁄4" | #3 Phillips Flat | TTN2-25114PF | 3⁄16" | 100 | 500 |
| 1⁄4" x 1 3⁄4" | | TTN2-25134PF | | 100 | 400 |
| 1⁄4" x 2 1⁄4" | | TTN2-25214PF | | 100 | 400 |
| 1⁄4" x 2 3⁄4" | | TTN2-25234PF | | 100 | 400 |
| 1⁄4" x 3 1⁄4" | | TTN2-25314PF | | 100 | 400 |
| 1⁄4" x 3 3⁄4" | | TTN2-25334PF | | 100 | 400 |
| 1⁄4" x 4" | | TTN2-25400PF | | 100 | 400 |
| 1⁄4" x 5" | | TTN2-25500PF | | 100 | 400 |
| 1⁄4" x 6" | | TTN2-25600PF | | 100 | 400 |

## White Titen® 2 Product Data (Phillips Flat-Head)

| Size | Head Style | Model No. | Drill Bit Diameter | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| 3⁄16" x 1 1⁄4" | #2 Phillips Flat | TTN2W18114PF | 5⁄32" | 100 | 1,600 |
| 3⁄16" x 1 3⁄4" | | TTN2W18134PF | | 100 | 500 |
| 3⁄16" x 2 1⁄4" | | TTN2W18214PF | | 100 | 500 |
| 3⁄16" x 2 3⁄4" | | TTN2W18234PF | | 100 | 500 |
| 3⁄16" x 3 1⁄4" | | TTN2W18314PF | | 100 | 400 |
| 3⁄16" x 3 3⁄4" | | TTN2W18334PF | | 100 | 400 |
| 1⁄4" x 1 1⁄4" | #3 Phillips Flat | TTN2W25114PF | 3⁄16" | 100 | 1,600 |
| 1⁄4" x 1 3⁄4" | | TTN2W25134PF | | 100 | 500 |
| 1⁄4" x 2 1⁄4" | | TTN2W25214PF | | 100 | 500 |
| 1⁄4" x 2 3⁄4" | | TTN2W25234PF | | 100 | 500 |
| 1⁄4" x 3 1⁄4" | | TTN2W25314PF | | 100 | 400 |
| 1⁄4" x 3 3⁄4" | | TTN2W25334PF | | 100 | 400 |



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# **Titen® 2** Concrete and Masonry Screws

## Titen 2 — Tension Loads Attaching Cold-Formed Steel to Normal-Weight Concrete (lb.)[6]

| Anchor Diameter (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Min. Spacing (in.) | Concrete[3,4] | | Cold-Formed Steel (ASD)[5] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,8,9] (Wind) | ASD[2,8,9] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) |
| 3/16 | 5/32 | 1 3/4 | 3 | 1 3/4 | 3 1/4 | 4 | 690 | 415 | 240 | 315 |
| 1/4 | 3/16 | 1 3/4 | 3 | 1 3/4 | 3 1/4 | 4 | 690 | 415 | 290 | 380 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume uncracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.6 for wind.
3. 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 IAPMO UES ER-449 for further information.
5. Cold-formed steel (CFS) tension pullover values are based on AISI S-100, Eq. E4.4.2-1, $d_W$ = 5/16" (3/16" Titen 2), $d_W$ = 3/8" (1/4" Titen 2) and $\Omega$ = 3.0. Reference General Notes for CFS properties. To convert from ASD to LRFD multiply value by 1.5. Tension values do not account for weak axis bending in the sill member.
6. Governing load shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.

## Titen 2 — Shear Loads Perpendicular to Edge in Normal-Weight Concrete (lb.)[6]

| Anchor Diameter (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Min. Spacing (in.) | Concrete[3,4] | | Cold-Formed Steel (ASD)[5] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,8,9] (Wind) | ASD[2,8,9] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) |
| 3/16 | 5/32 | 1 3/4 | 3 | 1 3/4 | 3 1/4 | 5 1/4 | 465 | 280 | 265 | 340 |
| 1/4 | 3/16 | 1 3/4 | 3 | 1 3/4 | 3 1/4 | 5 1/4 | 500 | 300 | 350 | 455 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume uncracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.6 for wind.
3. 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 IAPMO UES ER-449 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 shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.



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# **Titen® 2** Concrete and Masonry Screws

## Titen 2 — Shear Loads Parallel to Edge in Normal-Weight Concrete (lb./ft.)[6]

| Anchor Diameter (in.) | Drill Bit (in.) | Edge Distance (in.) | End Distance (in.) | Min. Emb. Depth (in.) | Concrete Thickness (in.) | Min. Spacing (in.) | Concrete[3,4] | | Cold-Formed Steel (ASD)[5] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LRFD[1,8,9] (Wind) | ASD[2,8,9] (Wind) | 33 mil (20 ga.) | 43 mil (18 ga.) |
| 3/16 | 5/32 | 1 3/4 | 3 | 1 3/4 | 3 1/2 | 0' – 8" | 750 | 450 | 400 | 510 |
| | | | | | | 1'– 0" | 500 | 300 | 265 | 340 |
| | | | | | | 1'– 4" | 375 | 225 | 200 | 255 |
| | | | | | | 2' – 0" | 250 | 150 | 135 | 170 |
| | | | | | | 2' – 8" | 190 | 115 | 100 | 130 |
| | | | | | | 4' – 0" | 125 | 75 | 65 | 85 |
| | | | | | | 6' – 0" | 85 | 50 | 45 | 55 |
| 1/4 | 3/16 | 1 3/4 | 3 | 1 3/4 | 3 1/2 | 0' – 8" | 810 | 485 | 525 | 685 |
| | | | | | | 1'– 0" | 540 | 325 | 350 | 455 |
| | | | | | | 1'– 4" | 405 | 245 | 265 | 340 |
| | | | | | | 2' – 0" | 270 | 160 | 175 | 230 |
| | | | | | | 2' – 8" | 205 | 125 | 130 | 170 |
| | | | | | | 4' – 0" | 135 | 80 | 90 | 115 |
| | | | | | | 6' – 0" | 90 | 55 | 60 | 75 |
| 3/16 | 5/32 | 1 3/4 | 5 1/2 | 1 3/4 | 3 1/2 | 0' – 8" | 885 | 530 | 400 | 510 |
| | | | | | | 1'– 0" | 590 | 355 | 265 | 340 |
| | | | | | | 1'– 4" | 445 | 265 | 200 | 255 |
| | | | | | | 2' – 0" | 295 | 175 | 135 | 170 |
| | | | | | | 2' – 8" | 220 | 130 | 100 | 130 |
| | | | | | | 4' – 0" | 150 | 90 | 65 | 85 |
| | | | | | | 6' – 0" | 100 | 60 | 45 | 55 |
| 1/4 | 3/16 | 1 3/4 | 5 1/2 | 1 3/4 | 3 1/2 | 0' – 8" | 1,120 | 670 | 525 | 685 |
| | | | | | | 1'– 0" | 745 | 445 | 350 | 455 |
| | | | | | | 1'– 4" | 560 | 335 | 265 | 340 |
| | | | | | | 2' – 0" | 375 | 225 | 175 | 230 |
| | | | | | | 2' – 8" | 280 | 170 | 130 | 170 |
| | | | | | | 4' – 0" | 185 | 110 | 90 | 115 |
| | | | | | | 6' – 0" | 125 | 75 | 60 | 75 |

1. Anchorage designs conform to ACI 318-14 Chapter 17 and assume uncracked concrete with no supplementary reinforcement.
2. Allowable Stress Design (ASD) values are obtained by multiplying Load Resistance Factor Design (LRFD) capacities by 0.6 for wind.
3. 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 IAPMO UES ER-449 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 shall be the lesser of concrete and CFS.
7. For conditions not covered by this table, use the Simpson Strong-Tie® Anchor Designer™ software available at **strongtie.com**.
8. Wind design values include SDC A&B.
9. For installation in sand-lightweight concrete, concrete values shall be be multiplied by 0.68.



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# **Crimp Drive®** Anchors

The crimp anchor is an easy-to-install 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 tightening procedure. This speeds up anchor installation and reduces the overall cost.

Five crimp anchor head styles are available 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.

**Material:** Carbon steel

**Coating:** Zinc plated and mechanically galvanized

**Codes:** Factory Mutual 3031136 for the ⅜" rod coupler.

**Head Styles:** Mushroom, rod coupler, countersunk, tie-wire and duplex

**Installation:**

**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.

1. 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.
2. 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.
3. 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.

IBC Not Valid for International Building Code



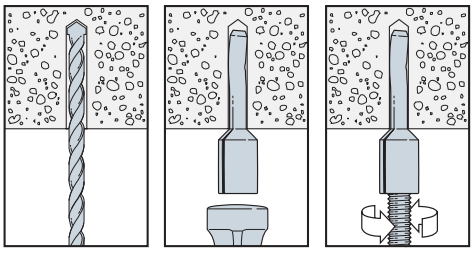
Mushroom Head | Rod Coupler



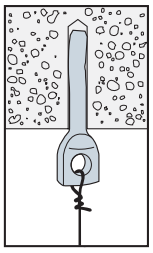
Countersunk Head | Tie-Wire | Duplex

## Installation Sequence

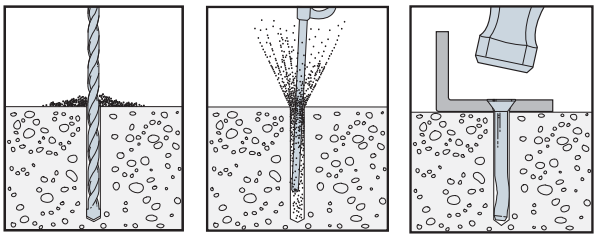
### Rod Coupler



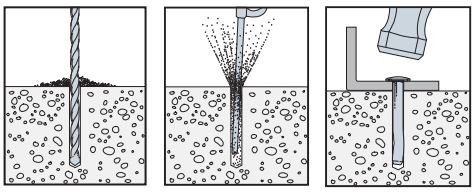
### Tie-Wire



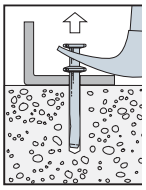
### Countersunk Head



### Mushroom Head



### Duplex



Duplex-head anchor may be removed with a claw hammer



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# **Crimp Drive®** Anchors

## Crimp Drive® Anchor Product Data

| Size (in.) | Model No. | Head Style/Finish | Drill Bit Diameter (in.) | Min. Fixture Hole Size (in.) | Min. Embed. (in.) | Quantity | |
|---|---|---|---|---|---|---|---|
| | | | | | | Pkg. Quantity | Carton Quantity |
| 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 | 1,600 |
| 1/4 x 1 1/4 | CD25114M | | | | 7/8 | 100 | 1,600 |
| 1/4 x 1 1/2 | CD25112M | | | | 1 1/4 | 100 | 1,600 |
| 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 |
| 1/4 x 3 1/2 | CD25312M | | | | 1 1/4 | 100 | 500 |
| 1/4 x 4 | CD25400M | | | | 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 |
| 3/16 x 2 1/2 | CD18212C | Countersunk head/ zinc plated | 3/16 | 1/4 | 1 1/4 | 100 | 500 |
| 3/16 x 3 | CD18300C | | | | 1 1/4 | 100 | 500 |
| 3/16 x 4 | CD18400C | | | | 1 1/4 | 100 | 500 |
| 1/4 x 1 1/2 | CD25112C | | 1/4 | 5/16 | 1 1/4 | 100 | 500 |
| 1/4 x 2 | CD25200C | | | | 1 1/4 | 100 | 500 |
| 1/4 x 2 1/2 | CD25212C | | | | 1 1/4 | 100 | 500 |
| 1/4 x 3 | CD25300C | | | | 1 1/4 | 100 | 500 |
| 1/4 x 3 1/2 | CD25312C | | | | 1 1/4 | 100 | 400 |
| 1/4 x 4 | CD25400C | | | | 1 1/4 | 100 | 400 |
| 1/4 x 3 | CD25300CMG | Countersunk head/ mechanically galvanized[1] | 1/4 | 5/16 | 1 1/4 | 100 | 500 |
| 1/4 x 4 | CD25400CMG | | | | 1 1/4 | 100 | 400 |
| 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 pressure-treated wood sill plate applications. Not for use in other corrosive or outdoor environments. See pp. 18–21 for details.



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## 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 ½ | 2 | 2 ½ | 3 | 3 ½ | 4 |
| Up to but not including | 1 ½ | 2 | 2 ½ | 3 | 3 ½ | 4 | 4 ½ |

## 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 | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 2{,}000$ psi Concrete | $f'_c \geq 4{,}000$ psi Concrete | $f'_c \geq 2{,}000$ psi Concrete | $f'_c \geq 4{,}000$ psi Concrete |
| | | | | | Allowable Load (lb.) | Allowable Load (lb.) | Allowable Load (lb.) | Allowable Load (lb.) |
| **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 | 1,305 |
| **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 ½ 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.



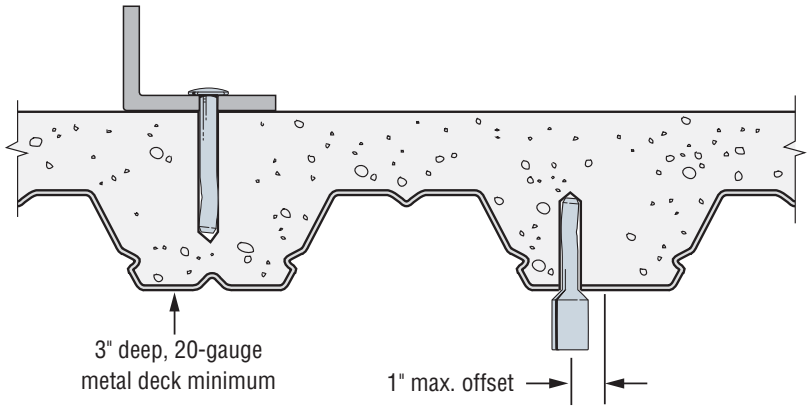
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# **Crimp Drive®** Anchors

## 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) |
|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 3{,}000$ psi Concrete | $f'_c \geq 3{,}000$ psi Concrete | $f'_c \geq 3{,}000$ psi Concrete | $f'_c \geq 3{,}000$ psi Concrete |
| | | | | | Allowable Load (lb.) | Allowable Load (lb.) | Allowable Load (lb.) | Allowable Load (lb.) |
| **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 | 1,030 | 1,085 |
| **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**



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# Zinc Nailon™ Pin Drive Anchors

Zinc Nailon™ anchors are low-cost, easy-to-install anchors for applications under static loads.

**Features:**

- Available with carbon and stainless-steel pins
- Pin and head configuration designed to make anchor tamper-resistant

**Materials:** Body — Die-cast Zamac 3 alloy
Pin — Carbon steel; Type 304 stainless steel

**Code:** Meets Federal Specification A-A-1925A, Type 1

**Installation:**

**Caution:** Not for use in overhead applications.

**Caution:** Nailon anchors are not recommended for eccentric tension (prying) loads — capacity will be greatly reduced in such applications

1. Drill a hole in base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to specified embedment depth, plus ¼" for pin extension, and blow hole clean using compressed air. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling.
2. Position fixture and insert Nailon anchor.
3. Tap with hammer until flush with fixture, then drive pin until flush with top of head.

IBC Not Valid for International Building Code



**Zinc Nailon™ Anchor**
*(mushroom)*

## Zinc Nailon™ Product Data

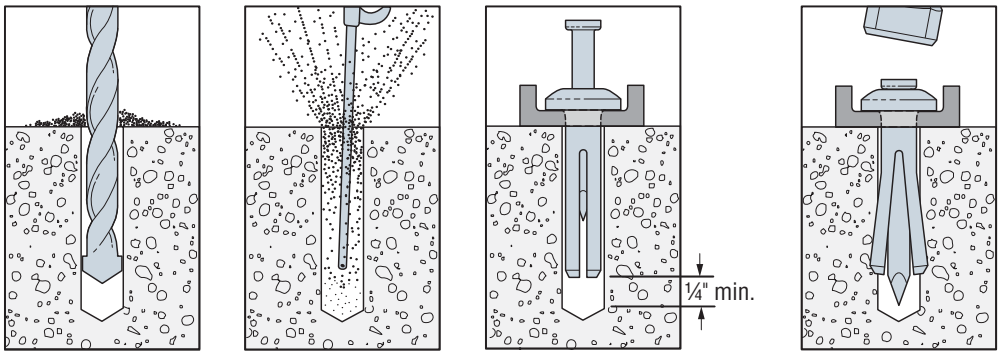
| Size (in.) | Carbon Steel Pin Model No. | Stainless Steel Pin Model No. | Quantity | | |
|---|---|---|---|---|---|
| | | | Box | Carton | Bulk |
| 3⁄16 x 7⁄8 | ZN18078 | — | 100 | 1,600 | 3,000 |
| ¼ x ¾ | ZN25034 | ZN25034SS | 100 | 500 | 2,000 |
| ¼ x 1 | ZN25100 | ZN25100SS | 100 | 500 | 1,500 |
| ¼ x 1¼ | ZN25114 | ZN25114SS | 100 | 500 | 1,500 |
| ¼ x 1½ | ZN25112 | ZN25112SS | 100 | 500 | 1,000 |
| ¼ x 2 | ZN25200 | ZN25200SS | 100 | 400 | 1,000 |
| ¼ x 2½ | ZN25212 | ZN25212SS | 100 | 400 | 1,000 |
| ¼ x 3 | ZN25300 | ZN25300SS | 100 | 400 | 1,000 |

## Allowable Tension and Shear Loads for Zinc Nailon™ in Normal-Weight Concrete

| Size (in.) | Drill Bit Dia. (in.) | Embed. Depth (in.) | Ultimate Load (lb.) | | Allowable Load (lb.)[1] | |
|---|---|---|---|---|---|---|
| | | | $f'_c \geq 3{,}000$ psi | | $f'_c \geq 3{,}000$ psi | |
| | | | Tension | Shear | Tension | Shear |
| 3⁄16 | 3⁄16 | 5⁄8 | 460 | 465 | 115 | 115 |
| ¼ | ¼ | 5⁄8 | 590 | 635 | 150 | 160 |
| | | ¾ | 780 | 765 | 195 | 190 |
| | | 1½ | 1,050 | 1,050 | 265 | 265 |

1. The allowable loads are based on a safety factor of 4.0.

## Installation Sequence






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# **Tie-Wire** Wedge Anchor

The Tie-Wire anchor is a wedge-style expansion anchor for use in normal-weight concrete or in concrete over metal deck. With a tri-segmented, dual-embossed clip, the Tie-Wire anchor is ideal for the installation of acoustic ceiling grid and is easily set with the claw of a hammer.

**Features:**

- ¼" eyelet for easy threading of wire
- Sets with claw of hammer
- Tri-segmented clip – each segment adjusts independently to hole irregularities
- Dual embossments on each clip segment enable the clip to undercut into the concrete, increasing follow-up expansion
- Wedge-style expansion anchor for use in normal weight concrete or concrete over metal deck

**Material:** Carbon steel

**Coating:** Zinc plated

**Installation:**

- Drill a hole at least 1½" deep using a ¼" diameter carbide tipped bit
- Drive the anchor into the hole until the bottom of the head is flush with the base material
- Set the anchor by prying/pulling the head with the claw end of the hammer

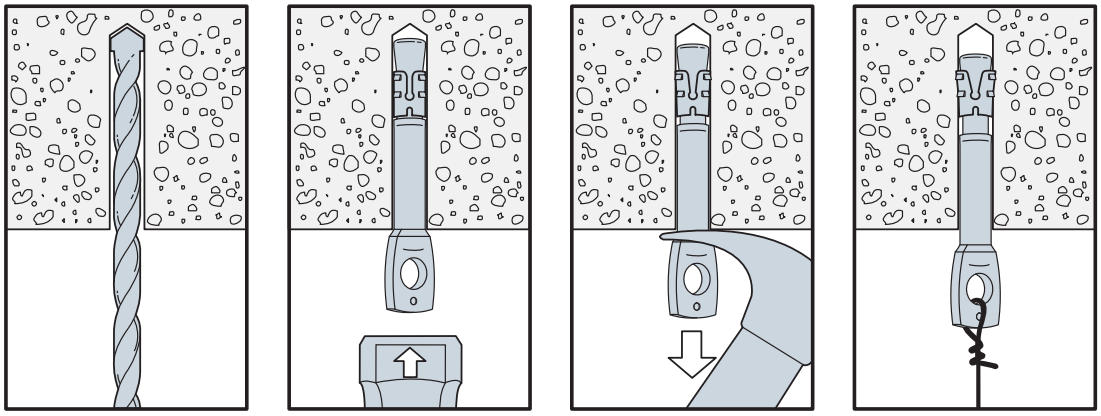
IBC
Not Valid for International Building Code



Tie-Wire Anchor

| Size (in.) | Model No. | Drill Bit Diameter (in.) | Eyelet Hole Size (in.) | Quantity | |
|---|---|---|---|---|---|
| | | | | Box | Carton |
| ¼ x 1½ | TW25112 | ¼ | ¼ | 100 | 500 |

## Installation Sequence





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# **Tie-Wire** Wedge Anchor

## Tie-Wire Anchor — Allowable Tension and Shear Loads in Normal-Weight Concrete

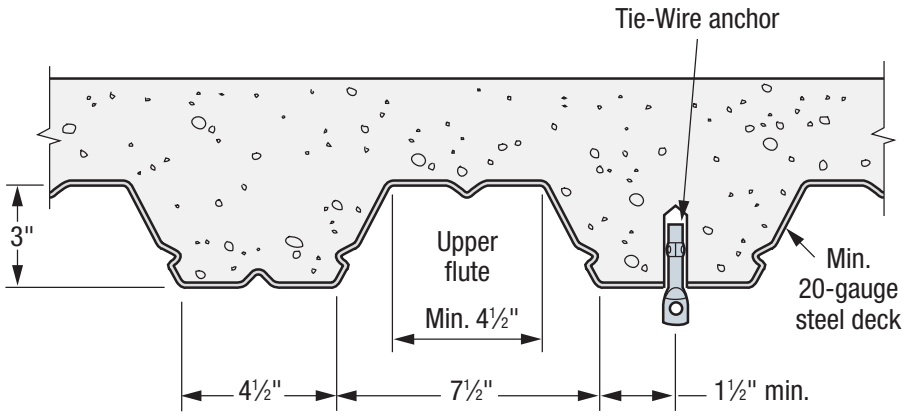
| Size in. (mm) | Drill Bit Diameter in. | Embed Depth in. (mm) | Critical End Dist. in. (mm) | Critical Spacing in. (mm) | Tension Load | | Shear Load | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 2{,}500$ psi (17.2 MPa) | | $f'_c \geq 2{,}500$ psi (17.2 MPa) | |
| | | | | | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) |
| ¼ (6.4) | ¼ | 1½ (38) | 2½ (64) | 5 (127) | 1,155 (5.1) | 290 (1.3) | 380 (1.7) | 95 (0.4) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. The minimum concrete thickness is 1½ times the embedment depth.

## Tie-Wire Anchor — Allowable Tension and Shear Loads in the Soffit of Normal-Weight Concrete or Sand-Lightweight Concrete over Metal Deck

| Size in. (mm) | Drill Bit Diameter in. | Embed Depth in. (mm) | Critical End Dist.[5] in. (mm) | Critical Spacing in. (mm) | Tension Load | | Shear Load | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 3{,}000$ psi (20.7 MPa) | | $f'_c \geq 3{,}000$ psi (20.7 MPa) | |
| | | | | | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) |
| ¼ (6.4) | ¼ | 1½ (38) | 2½ (64) | 5 (127) | 1,155 (5.1) | 290 (1.3) | 460 (2.0) | 115 (0.5) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. The minimum concrete thickness is 1½ times the embedment depth.
3. Metal deck must be minimum 20-gauge thick with minimum yield strength of 33 ksi.
4. Anchors installed in the bottom flute of the steel deck must have a minimum edge distance of 1½" away from inclined edge of the bottom flute. See the figure below.
5. Critical end distance is defined as the distance from the end of the slab in the direction of the flute.




**Installation in the Soffit of Concrete over Metal Deck**



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# **Drop-In** Internally Threaded Anchor (DIAB)

## Expansion Shell Anchors for Use in Solid Base Materials

Simpson Strong-Tie introduces a new, redesigned Drop-In Anchor (DIAB) that provides easier installation into base materials. Improved geometry in the preassembled expansion plug improves setting capability so the anchor installs with 40% fewer hammer strikes than previous versions. These displacement-controlled expansion anchors are easily set by driving the plug toward the bottom of the anchor using either the hand- or power-setting tools. DIAB anchors feature a positive-set marking indicator at the top of the anchor — helping you see more clearly when proper installation has taken place.

Use a Simpson Strong-Tie fixed-depth stop bit to take the guesswork out of drilling to the correct depth. The fluted design of the tip draws debris away from the hole during drilling, allowing for a cleaner installation.

**Features:**

- New design offers easier installation then previous drop-in anchor design — sets with 40% fewer hammer hits
- Positive-set marking system indicates when anchor is properly set
- Lipped drop-in version available for flush installation
- Hand- and power-setting tools available for fast, easy and economical installation
- Fixed-depth stop bit helps you drill to the correct depth every time

c UL us LISTED  FM APPROVED

**Material:** Carbon steel

**Coating:** Zinc plated

IBC Not Valid for International Building Code

NEW



Drop-In



Lipped Drop-In

### Drop-In Anchor Hand Setting Tool

| Model No. | For Use With | Box Quantity |
|---|---|---|
| DIABST25 | DIAB25, DIABL25 | 10 |
| DIABST37 | DIAB37, DIABL37 | 10 |
| DIABST50 | DIAB50, DIABL50 | 10 |
| DIABST62 | DIAB62 | 5 |
| DIABST75 | DIAB75 | 5 |

1. Setting tools sold separately; tools may be ordered by the piece.



Hand Setting Tool

### Drop-In Anchor Power Setting Tool

| Model No. | For Use With | Box Quantity |
|---|---|---|
| DIABST25-SDS | DIAB25, DIABL25 | 10 |
| DIABST37-SDS | DIAB37, DIABL37 | 10 |
| DIABST50-SDS | DIAB50, DIABL50 | 10 |



Power Setting Tool



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# **Drop-In** Internally Threaded Anchor (DIAB)

## DIAB — Allowable Tension and Shear Loads in Normal-Weight Concrete

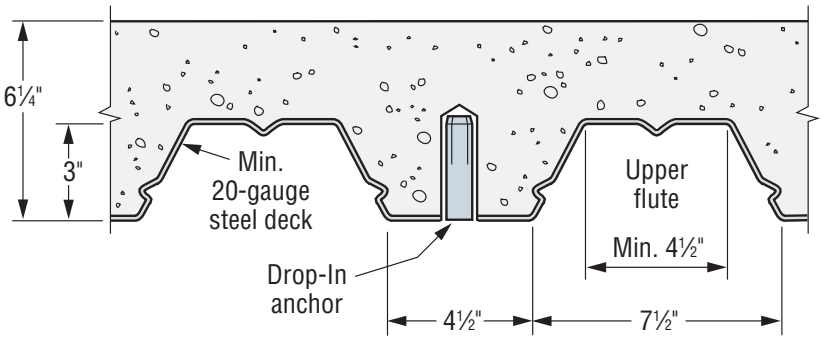
| Model No. | Rod Size in. (mm) | Drill Bit Diameter in. | Embed Depth in. (mm) | Critical Edge Dist. in. (mm) | Critical Spacing in. (mm) | $f'_c \geq 2{,}500$ psi (17.2 MPa) | | | | $f'_c \geq 4{,}000$ psi (27.6 MPa) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Tension Load | | Shear Load | | Tension Load | | Shear Load | |
| | | | | | | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) |
| DIAB25<br>DIABL25 | ¼<br>(6.4) | ⅜ | 1<br>(25) | 3<br>(76) | 4<br>(102) | 1,565<br>(7.0) | 390<br>(1.7) | 1,840<br>(8.2) | 460<br>(2.0) | 1,965<br>(8.7) | 490<br>(2.2) | 1,840<br>(8.2) | 460<br>(2.0) |
| DIAB37<br>DIABL37 | ⅜<br>(9.5) | ½ | 1 9⁄16<br>(40) | 4½<br>(114) | 6<br>(152) | 2,950<br>(13.1) | 740<br>(3.3) | 4,775<br>(21.2) | 1,195<br>(5.3) | 3,910<br>(17.4) | 980<br>(4.4) | 4,775<br>(21.2) | 1,195<br>(5.3) |
| DIAB50<br>DIABL50 | ½<br>(12.7) | ⅝ | 2<br>(51) | 6<br>(152) | 8<br>(203) | 5,190<br>(23.1) | 1,300<br>(5.8) | 6,760<br>(30.1) | 1,690<br>(7.5) | 6,515<br>(29.0) | 1,630<br>(7.3) | 6,760<br>(30.1) | 1,690<br>(7.5) |
| DIAB62 | ⅝<br>(15.9) | ⅞ | 2½<br>(64) | 7½<br>(191) | 10<br>(254) | 7,010<br>(31.2) | 1,755<br>(7.8) | 12,190<br>(54.2) | 3,050<br>(13.6) | 9,060<br>(40.3) | 2,265<br>(10.1) | 12,190<br>(54.2) | 3,050<br>(13.6) |
| DIAB75 | ¾<br>(19.1) | 1 | 3⅛<br>(79) | 9<br>(229) | 12½<br>(318) | 9,485<br>(42.2) | 2,370<br>(10.5) | 15,960<br>(71.0) | 3,990<br>(17.7) | 11,660<br>(51.9) | 2,915<br>(13.0) | 15,960<br>(71.0) | 3,990<br>(17.7) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Refer to allowable load-adjustment factors for edge distance and spacing on p. 217.
3. Allowable loads may be linearly interpolated between concrete strength listed.
4. The minimum concrete thickness is 1½ times the embedment depth.

## DIAB — Allowable Tension and Shear Loads in Soffit of Sand-Lightweight Concrete over Metal Deck

| Model No. | Rod Size in. (mm) | Drill Bit Diameter in. | Embed Depth in. (mm) | Critical End Dist.[6] in. (mm) | Critical Spacing in. (mm) | $f'_c \geq 3{,}000$ psi (20.7 MPa) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Tension Load | | Shear Load | |
| | | | | | | Ultimate lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Allowable lb. (kN) |
| DIAB37<br>DIABL37 | ⅜<br>(9.5) | ½ | 1 9⁄16<br>(40) | 4½<br>(114) | 6<br>(152) | 2,895<br>(12.9) | 725<br>(3.2) | 3,530<br>(15.7) | 885<br>(3.9) |
| DIAB50<br>DIABL50 | ½<br>(12.7) | ⅝ | 2<br>(51) | 6<br>(152) | 8<br>(203) | 4,100<br>(18.2) | 1,025<br>(4.6) | 4,685<br>(20.8) | 1,170<br>(5.2) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
3. Refer to allowable load-adjustment factors for edge distance and spacing on p. 217.
4. Anchors were installed in the center of the bottom flute of the steel deck.
5. Metal deck must be minimum 20-gauge thick with minimum yield strength of 33 ksi.
6. Critical end distance is defined as the distance from end of the slab in the direction of the flute.




**Lightweight Concrete over Metal Deck**



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# **Drop-In** (DIAB) Design Information — Concrete

## DIAB — Load-Adjustment Factors in Normal-Weight Concrete and Sand-Lightweight Concrete over Metal Deck: Edge Distance and Spacing, Tension and Shear Loads

### Edge Distance Tension ($f_c$)

| Edge Dist. $c_{act}$ (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $c_{cr}$ | 3 | 4½ | 6 | 7½ | 9 |
| | $c_{min}$ | 1¾ | 2⅝ | 3½ | 4⅜ | 5¼ |
| | $f_{cmin}$ | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 |
| 1¾ | | 0.77 | | | | |
| 2 | | 0.82 | | | | |
| 2½ | | 0.91 | | | | |
| 2⅝ | | 0.93 | 0.77 | | | |
| 3 | | 1.00 | 0.82 | | | |
| 3½ | | | 0.88 | 0.77 | | |
| 4 | | | 0.94 | 0.82 | | |
| 4⅜ | | | 0.98 | 0.85 | 0.77 | |
| 4½ | | | 1.00 | 0.86 | 0.78 | |
| 5 | | | | 0.91 | 0.82 | |
| 5¼ | | | | 0.93 | 0.83 | 0.77 |
| 5½ | | | | 0.95 | 0.85 | 0.79 |
| 6 | | | | 1.00 | 0.89 | 0.82 |
| 6½ | | | | | 0.93 | 0.85 |
| 7 | | | | | 0.96 | 0.88 |
| 7½ | | | | | 1.00 | 0.91 |
| 8 | | | | | | 0.94 |
| 8½ | | | | | | 0.97 |
| 9 | | | | | | 1.00 |

1. $c_{act}$ = actual edge distance at which anchor is installed (inches).
2. $c_{cr}$ = critical edge distance for 100% load (inches).
3. $c_{min}$ = minimum edge distance for reduced load (inches).
4. $f_c$ = adjustment factor for allowable load at actual edge distance.
5. $f_{ccr}$ = adjustment factor for allowable load at critical edge distance. $f_{ccr}$ is always = 1.00.
6. $f_{cmin}$ = adjustment factor for allowable load at minimum edge distance.
7. $f_c = f_{cmin} + [(1 - f_{cmin})\ (c_{act} - c_{min})\ /\ (c_{cr} - c_{min})]$.

### Edge Distance Shear ($f_c$)

| Edge Dist. $c_{act}$ (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $c_{cr}$ | 3 | 4½ | 6 | 7½ | 9 |
| | $c_{min}$ | 1¾ | 2⅝ | 3½ | 4⅜ | 5¼ |
| | $f_{cmin}$ | 0.54 | 0.54 | 0.64 | 0.64 | 0.64 |
| 1¾ | | 0.54 | | | | |
| 2 | | 0.63 | | | | |
| 2½ | | 0.82 | | | | |
| 2⅝ | | 0.86 | 0.54 | | | |
| 3 | | 1.00 | 0.63 | | | |
| 3½ | | | 0.75 | 0.64 | | |
| 4 | | | 0.88 | 0.71 | | |
| 4⅜ | | | 0.97 | 0.77 | 0.64 | |
| 4½ | | | 1.00 | 0.78 | 0.65 | |
| 5 | | | | 0.86 | 0.71 | |
| 5¼ | | | | 0.89 | 0.74 | 0.64 |
| 5½ | | | | 0.93 | 0.77 | 0.66 |
| 6 | | | | 1.00 | 0.83 | 0.71 |
| 6½ | | | | | 0.88 | 0.76 |
| 7 | | | | | 0.94 | 0.81 |
| 7½ | | | | | 1.00 | 0.86 |
| 8 | | | | | | 0.90 |
| 8½ | | | | | | 0.95 |
| 9 | | | | | | 1.00 |

1. $c_{act}$ = actual edge distance at which anchor is installed (inches).
2. $c_{cr}$ = critical edge distance for 100% load (inches).
3. $c_{min}$ = minimum edge distance for reduced load (inches).
4. $f_c$ = adjustment factor for allowable load at actual edge distance.
5. $f_{ccr}$ = adjustment factor for allowable load at critical edge distance. $f_{ccr}$ is always = 1.00.
6. $f_{cmin}$ = adjustment factor for allowable load at minimum edge distance.
7. $f_c = f_{cmin} + [(1 - f_{cmin})\ (c_{act} - c_{min})\ /\ (c_{cr} - c_{min})]$.

### Spacing Tension ($f_s$)

| Spacing $s_{act}$ (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $s_{cr}$ | 4 | 6 | 8 | 10 | 12½ |
| | $s_{min}$ | 1½ | 2¼ | 3 | 3¾ | 4¾ |
| | $f_{smin}$ | 0.72 | 0.72 | 0.80 | 0.80 | 0.80 |
| 1½ | | 0.72 | | | | |
| 2 | | 0.78 | | | | |
| 2¼ | | 0.80 | 0.72 | | | |
| 2½ | | 0.83 | 0.74 | | | |
| 3 | | 0.89 | 0.78 | 0.80 | | |
| 3½ | | 0.94 | 0.81 | 0.82 | | |
| 3¾ | | 0.97 | 0.83 | 0.83 | 0.80 | |
| 4 | | 1.00 | 0.85 | 0.84 | 0.81 | |
| 4½ | | | 0.89 | 0.86 | 0.82 | |
| 4¾ | | | 0.91 | 0.87 | 0.83 | 0.80 |
| 5 | | | 0.93 | 0.88 | 0.84 | 0.81 |
| 5½ | | | 0.96 | 0.90 | 0.86 | 0.82 |
| 6 | | | 1.00 | 0.92 | 0.87 | 0.83 |
| 6½ | | | | 0.94 | 0.89 | 0.85 |
| 7 | | | | 0.96 | 0.90 | 0.86 |
| 7½ | | | | 0.98 | 0.92 | 0.87 |
| 8 | | | | 1.00 | 0.94 | 0.88 |
| 8½ | | | | | 0.95 | 0.90 |
| 9 | | | | | 0.97 | 0.91 |
| 9½ | | | | | 0.98 | 0.92 |
| 10 | | | | | 1.00 | 0.94 |
| 10½ | | | | | | 0.95 |
| 11 | | | | | | 0.96 |
| 11½ | | | | | | 0.97 |
| 12 | | | | | | 0.99 |
| 12½ | | | | | | 1.00 |

1. $s_{act}$ = actual spacing distance at which anchor is installed (inches).
2. $s_{cr}$ = critical spacing distance for 100% load (inches).
3. $s_{min}$ = minimum spacing distance for reduced load (inches).
4. $f_s$ = adjustment factor for allowable load at actual spacing distance.
5. $f_{scr}$ = adjustment factor for allowable load at critical spacing distance. $f_{scr}$ is always = 1.00.
6. $f_{smin}$ = adjustment factor for allowable load at minimum spacing distance.
7. $f_s = f_{smin} + [(1 - f_{smin})\ (s_{act} - s_{min})\ /\ (s_{cr} - s_{min})]$.

### Spacing Shear ($f_s$)

| Spacing $s_{act}$ (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $s_{cr}$ | 4 | 6 | 8 | 10 | 12½ |
| | $s_{min}$ | 1½ | 2¼ | 3 | 3¾ | 4¾ |
| | $f_{smin}$ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1½ | | 1.00 | | | | |
| 2 | | 1.00 | | | | |
| 2¼ | | 1.00 | 1.00 | | | |
| 2½ | | 1.00 | 1.00 | | | |
| 3 | | 1.00 | 1.00 | 1.00 | | |
| 3½ | | 1.00 | 1.00 | 1.00 | | |
| 3¾ | | 1.00 | 1.00 | 1.00 | 1.00 | |
| 4 | | 1.00 | 1.00 | 1.00 | 1.00 | |
| 4½ | | | 1.00 | 1.00 | 1.00 | |
| 4¾ | | | 1.00 | 1.00 | 1.00 | 1.00 |
| 5 | | | 1.00 | 1.00 | 1.00 | 1.00 |
| 5½ | | | 1.00 | 1.00 | 1.00 | 1.00 |
| 6 | | | 1.00 | 1.00 | 1.00 | 1.00 |
| 6½ | | | | 1.00 | 1.00 | 1.00 |
| 7 | | | | 1.00 | 1.00 | 1.00 |
| 7½ | | | | 1.00 | 1.00 | 1.00 |
| 8 | | | | 1.00 | 1.00 | 1.00 |
| 8½ | | | | | 1.00 | 1.00 |
| 9 | | | | | 1.00 | 1.00 |
| 9½ | | | | | 1.00 | 1.00 |
| 10 | | | | | 1.00 | 1.00 |
| 10½ | | | | | | 1.00 |
| 11 | | | | | | 1.00 |
| 11½ | | | | | | 1.00 |
| 12 | | | | | | 1.00 |
| 12½ | | | | | | 1.00 |

1. $s_{act}$ = actual spacing distance at which anchor is installed (inches).
2. $s_{cr}$ = critical spacing distance for 100% load (inches).
3. $s_{min}$ = minimum spacing distance for reduced load (inches).
4. $f_s$ = adjustment factor for allowable load at actual spacing distance.
5. $f_{scr}$ = adjustment factor for allowable load at critical spacing distance. $f_{scr}$ is always = 1.00.
6. $f_{smin}$ = adjustment factor for allowable load at minimum spacing distance.
7. $f_s = f_{smin} + [(1 - f_{smin})\ (s_{act} - s_{min})\ /\ (s_{cr} - s_{min})]$.



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# **Drop-In** Internally Threaded Anchor (DIA)

Drop-In anchors are internally threaded drop-in expansion anchors for use in flush-mount applications in solid base materials. Available in stainless steel (DIA), short (DIAS) or coil-thread (DIAC) versions. Minimum thread engagement should be equal to the nominal diameter of the threaded insert.

**Features:**

- Lipped edge (DIAS) eliminates need for precisely drilled-hole depth
- Available in coil-thread version for ½" and ¾" coil-threaded rod
- Short length (DIAS) enables shallow embedment to help avoid drilling into rebar or pre-stressed/post-tensioned cables
- Short Drop-In anchors include a setting tool compatible with the anchor to ensure consistent installation

**Material:** Carbon and stainless steel

**Coating:** Carbon steel; zinc plated

**Codes:** Drop-In — DOT; Factory Mutual 3017082; Underwriters Laboratories File Ex3605. Meets requirements of Federal Specifications A-A-55614, Type I.

Short Drop-In — Factory Mutual 3017082 and Underwriters Laboratories File Ex3605.

**Caution:** The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

**Installation:**

- Drill a hole in the base material using the appropriate diameter carbide drill bit as specified in the table. Drill the hole to the specified embedment depth plus ⅛" for flush mounting. Blow the hole clean using compressed air. Overhead installations need not be blown clean.
- Insert designated anchor into hole. Tap with hammer until flush against surface.
- Using the designated drop-in setting tool, drive expander plug toward the bottom of the anchor until shoulder of setting tool makes contact with the top of the anchor.
- Minimum thread engagement should be equal to the nominal diameter of the threaded insert.

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

IBC Not Valid for International Building Code



Drop-In Stainless Steel



Short Drop-In



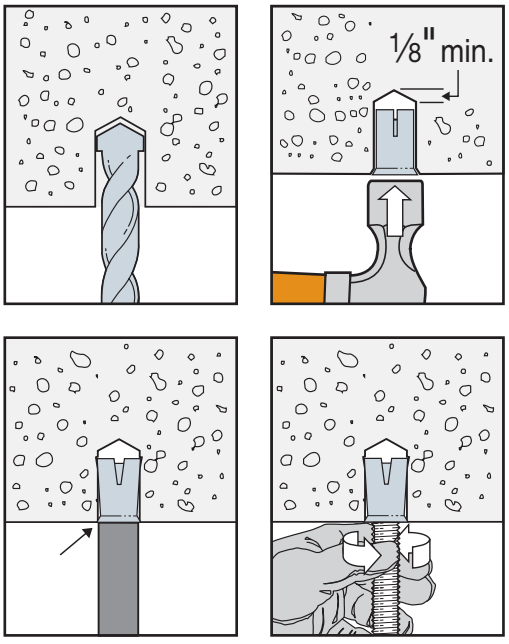
Coil-Thread Drop-In

## Material Specifications

| Anchor Component | Component Material | | |
|---|---|---|---|
| | Zinc-Plated Carbon Steel | Type 303/304 Stainless Steel | Type 316 Stainless Steel |
| Anchor body | Meets minimum 70,000 psi tensile | AISI 303. Meets chemical requirements of ASTM A582 | Type 316 |
| Expander plug | Meets minimum 50,000 psi tensile | AISI 303 | Type 316 |
| Thread | UNC / Coil-thread | UNC | UNC |

Note: DIA37S, DIA50C and DIA75C are not available in stainless steel.

## Installation Sequence






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# **Drop-In** Internally Threaded Anchor (DIA)

## Drop-In Anchor Product Data — Stainless Steel

| Rod Size (in.) | Type 303/304 Stainless Model No. | Type 316 Stainless Model No. | Drill Bit Diameter (in.) | Bolt Thread (per in.) | Body Length (in.) | Thread Length (in.) | Quantity | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Box | Carton |
| ¼ | DIA25SS | DIA256SS | ⅜ | 20 | 1 | ⅜ | 100 | 500 |
| ⅜ | DIA37SS | DIA376SS | ½ | 16 | 1 9⁄16 | ⅝ | 50 | 250 |
| ½ | DIA50SS | DIA506SS | ⅝ | 13 | 2 | ¾ | 50 | 200 |
| ⅝ | DIA62SS | — | ⅞ | 11 | 2½ | 1 | 25 | 100 |
| ¾ | DIA75SS | — | 1 | 10 | 3⅛ | 1¼ | 20 | 80 |

## Short Drop-In Anchor Product Data

| Rod Size (in.) | Model No. | Drill Bit Diameter (in.) | Bolt Thread (per in.) | Body Length (in.) | Thread Length (in.) | Quantity | |
|---|---|---|---|---|---|---|---|
| | | | | | | Box | Carton |
| ⅜ | DIA37S[1] | ½ | 16 | ¾ | ¼ | 100 | 500 |
| ½ | DIA50S[1] | ⅝ | 13 | 1 | 5⁄16 | 50 | 200 |

1. A dedicated setting tool is included with each box of DIA37S and DIA50S.

## Coil-Thread Drop-In Anchor Product Data

| Rod Size (in.) | Carbon Steel Model No. | Drill Bit Diameter (in.) | Bolt Thread (per in.) | Body Length (in.) | Thread Length (in.) | Quantity | |
|---|---|---|---|---|---|---|---|
| | | | | | | Box | Ctn. |
| ½ | DIA50C[1] | ⅝ | 6 | 2 | ¾ | 50 | 200 |
| ¾ | DIA75C[1] | 1 | 5 | 3⅛ | 1¼ | 20 | 80 |

1. DIA50C and DIA75C accept ½" and ¾" coil-thread rod, respectively.

## Drop-In Anchor Setting Tool Product Data

| Model No. | For Use With | Box Qty. |
|---|---|---|
| DIAST25 | DIA25SS, DIA256SS | 10 |
| DIAST37 | DIA37SS, DIA376SS | 10 |
| DIAST50 | DIA50SS, DIA506SS, DIA50C | 10 |
| DIAST62 | DIA62SS | 5 |
| DIAST75 | DIA75SS, DIA75C | 5 |

1. Setting tools sold separately except for DIA37S and DIA50S.
2. Setting tools for use with carbon and stainless-steel drop-in anchors.
3. Setting tools may be ordered by the piece.



Drop-In Anchor Setting Tool

## Drop-In Anchor (DIA) Power Setting Tool

| Model No. | For Use With | Box Qty. |
|---|---|---|
| DIAST37S-SDS | DIA37S | 10 |
| DIAST50S-SDS | DIA50S | 10 |

Also sold by the piece.



Power Setting Tool

## Drop-In Anchor Stop Bit

| Model No. | Drill Bit Diameter (in.) | Drop-In Anchor (in.) | Drill Depth (in.) |
|---|---|---|---|
| MDPL037DIA | ⅜ | ¼ | 1 1⁄16 |
| MDPL050DIA | ½ | ⅜ | 13⁄16 |
| MDPL062DIA | ½ | ½ | 1 11⁄16 |
| MDPL050DIAS | ⅝ | ⅜ | 1 1⁄16 |
| MDPL062DIAS | ⅝ | ½ | 2 1⁄16 |



Stop Bit



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# **Drop-In** (DIA) Design Information — Concrete

## Drop-In (Stainless Steel) and Coil-Thread Drop-In (Carbon Steel) Anchors — Allowable Tension Loads in Normal-Weight Concrete

| Rod Size in. (mm) | Drill Bit Dia. (in.) | Embed. Depth in. (mm) | Critical Edge Dist. in. (mm) | Critical Spacing in. (mm) | Tension Load | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete | | | $f'_c \geq 3{,}000$ psi (20.7 MPa) Concrete | $f'_c \geq 4{,}000$ psi (27.6 MPa) Concrete | | |
| | | | | | Ultimate lb. (kN) | Std. Dev. lb. (kN) | Allowable lb. (kN) | Allowable lb. (kN) | Ultimate lb. (kN) | Std. Dev. lb. (kN) | Allowable lb. (kN) |
| ¼ (6.4) | ⅜ | 1 (25) | 3 (76) | 4 (102) | 1,400 (6.2) | 201 (0.9) | 350 (1.6) | 405 (1.8) | 1,840 (8.2) | 451 (2.0) | 460 (2.0) |
| ⅜ (9.5) | ½ | 1 9⁄16 (40) | 4½ (114) | 6 (152) | 2,400 (10.7) | 251 (1.1) | 600 (2.7) | 795 (3.5) | 3,960 (17.6) | 367 (1.6) | 990 (4.4) |
| ½ (12.7) | ⅝ | 2 (51) | 6 (152) | 8 (203) | 3,320 (14.8) | 372 (1.7) | 830 (3.7) | 1,178 (5.2) | 6,100 (27.1) | 422 (1.9) | 1,525 (6.8) |
| ⅝ (15.9) | ⅞ | 2½ (64) | 7½ (191) | 10 (254) | 5,040 (22.4) | 689 (3.1) | 1,260 (5.6) | 1,715 (7.6) | 8,680 (38.6) | 971 (4.3) | 2,170 (9.7) |
| ¾ (19.1) | 1 | 3⅛ (79) | 9 (229) | 12½ (318) | 8,160 (36.3) | 961 (4.3) | 2,040 (9.1) | 2,365 (10.5) | 10,760 (47.9) | 1,696 (7.5) | 2,690 (12.0) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Refer to allowable load-adjustment factors for edge distance and spacing on pp. 223–224.
3. Allowable loads may be linearly interpolated between concrete strengths listed.
4. The minimum concrete thickness is 1½ times the embedment depth.

## Drop-In (Stainless Steel) and Coil-Thread Drop-In (Carbon Steel) Anchors — Allowable Shear Loads in Normal-Weight Concrete

| Rod Size in. (mm) | Drill Bit Dia. (in.) | Embed. Depth in. (mm) | Critical Edge Dist. in. (mm) | Critical Spacing in. (mm) | Shear Load | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | $f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete | | | $f'_c \geq 3{,}000$ psi (20.7 MPa) Concrete | $f'_c \geq 4{,}000$ psi (27.6 MPa) Concrete |
| | | | | | Ultimate lb. (kN) | Std. Dev. lb. (kN) | Allowable lb. (kN) | Allowable lb. (kN) | Allowable lb. (kN) |
| ¼ (6.4) | ⅜ | 1 (25) | 3½ (89) | 4 (102) | 1,960 (8.7) | 178 (0.8) | 490 (2.2) | 490 (2.2) | 490 (2.2) |
| ⅜ (9.5) | ½ | 1 9⁄16 (40) | 5¼ (133) | 6 (152) | 3,240 (14.4) | 351 (1.6) | 810 (3.6) | 925 (4.1) | 1,040 (4.6) |
| ½ (12.7) | ⅝ | 2 (51) | 7 (178) | 8 (203) | 7,000 (31.1) | 562 (2.5) | 1,750 (7.8) | 1,750 (7.8) | 1,750 (7.8) |
| ⅝ (15.9) | ⅞ | 2½ (64) | 8¾ (222) | 10 (254) | 11,080 (49.3) | 923 (4.1) | 2,770 (12.3) | 2,770 (12.3) | 2,770 (12.3) |
| ¾ (19.1) | 1 | 3⅛ (79) | 10½ (267) | 12½ (318) | 13,800 (61.4) | 1,781 (7.9) | 3,450 (15.3) | 3,725 (16.6) | 4,000 (17.8) |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Refer to allowable load-adjustment factors for edge distance and spacing on pp. 223–224.
3. Allowable loads may be linearly interpolated between concrete strengths listed.
4. The minimum concrete thickness is 1½ times the embedment depth.



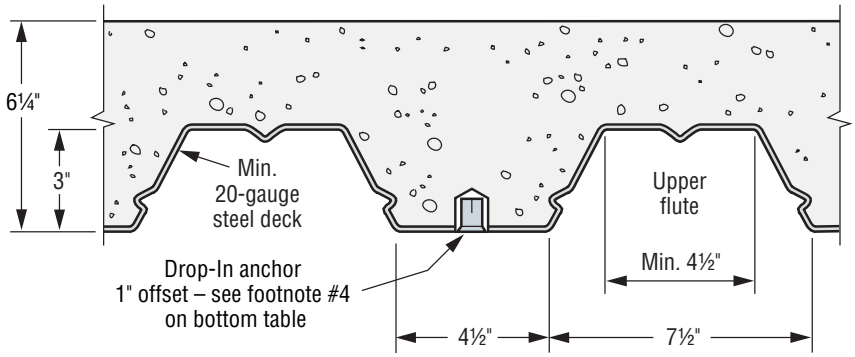
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# **Drop-In** (DIA) Design Information — Concrete

## ⅜" and ½" Short Drop-In Anchor — Allowable Tension and Shear Loads in Sand-Lightweight Concrete Fill over Metal Deck

| Model No. | Rod Size (in.) | Drill Bit Dia. (in.) | Emb. Depth (in.) | Tension Critical End Distance (in.) | Shear Critical End Distance (in.) | Critical Spacing (in.) | Install through the Lower Flute or Upper Flute of Metal Deck, $f'_c \geq 3{,}000$ psi Concrete (20.7 MPa) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tension Load | | Shear Load | |
| | | | | | | | Ultimate (lb.) | Allowable (lb.) | Ultimate (lb.) | Allowable (lb.) |
| DIA37S | ⅜ | ½ | ¾ | 6 | 7 | 8 | 1,344 | 335 | 1,649 | 410 |
| DIA50S | ½ | ⅝ | 1 | 8 | 9⅜ | 10⅝ | 1,711 | 430 | 2,070 | 515 |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
3. Refer to allowable load-adjustment factors for edge distances and spacing on pp. 223–224.
4. Anchors were installed with a 1" offset from the centerline of the flute.




**Lightweight Concrete over Metal Deck**



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# **Drop-In** (DIA) Design Information — Concrete

## ⅜" and ½" Short Drop-In Anchor — Allowable Tension and Shear Loads in Normal-Weight Concrete

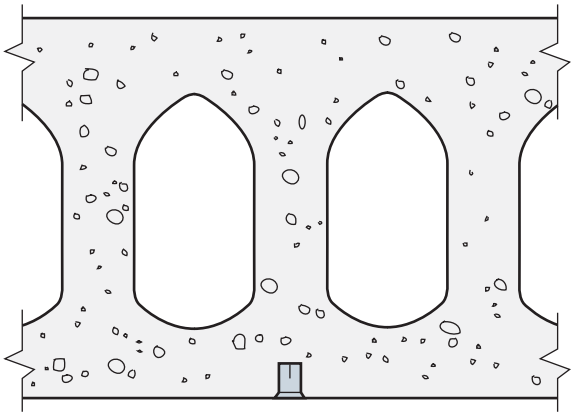
| Model No. | Rod Size (in.) | Drill Bit Dia. (in.) | Emb. Depth (in.) | Tension Critical Edge Distance (in.) | Shear Critical Edge Distance (in.) | Critical Spacing (in.) | Normal-Weight Concrete, $f'_c \geq 2{,}500$ psi | | | | Normal-Weight Concrete, $f'_c \geq 4{,}000$ psi | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tension Load | | Shear Load | | Tension Load | | Shear Load | |
| | | | | | | | Ultimate (lb.) | Allowable (lb.) | Ultimate (lb.) | Allowable (lb.) | Ultimate (lb.) | Allowable (lb.) | Ultimate (lb.) | Allowable (lb.) |
| DIA37S | ⅜ | ½ | ¾ | 4½ | 5¼ | 3 | 1,500 | 375 | 2,274 | 570 | 2,170 | 540 | 3,482 | 870 |
| DIA50S | ½ | ⅝ | 1 | 6 | 7 | 4 | 2,039 | 510 | 3,224 | 805 | 3,420 | 855 | 5,173 | 1,295 |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
3. Refer to allowable load-adjustment factors for edge distances and spacing on pp. 223–224.
4. Allowable loads may be linearly interpolated between concrete strengths.
5. The minimum concrete thickness is 1½ times the embedment depth.

## ⅜" and ½" Short Drop-In Anchor — Allowable Tension and Shear Loads in Hollow-Core Concrete Panel

| Model No. | Rod Size (in.) | Drill Bit Dia. (in.) | Emb. Depth (in.) | Tension Critical Edge Distance (in.) | Shear Critical Edge Distance (in.) | Critical Spacing (in.) | Hollow Core Concrete Panel, $f'_c \geq 4{,}000$ psi | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tension Load | | Shear Load | |
| | | | | | | | Ultimate (lb.) | Allowable (lb.) | Ultimate (lb.) | Allowable (lb.) |
| DIA37S | ⅜ | ½ | ¾ | 4½ | 5¼ | 3 | 1,860 | 465 | 3,308 | 825 |
| DIA50S | ½ | ⅝ | 1 | 6 | 7 | 4 | 2,650 | 660 | 4,950 | 1,235 |

1. The allowable loads listed are based on a safety factor of 4.0.
2. Allowable loads may not be increased for short-term loading due to wind or seismic forces.
3. Refer to allowable load-adjustment factors for edge distances and spacing on pp. 223–224.
4. Allowable loads may be linearly interpolated between concrete strengths.



**Hollow-Core Concrete Panel**
*(anchor can be installed below web or hollow core)*



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# **Drop-In** (DIA) Design Information — Concrete

## Drop-In (Stainless Steel), Coil Thread (Carbon Steel) and Short Drop-In Anchors — Allowable Load-Adjustment Factors in Normal-Weight Concrete: Edge Distance and Spacing, Tension and Shear Loads

**How to use these charts:**

1. The following tables are for reduced edge distance and spacing.
2. Locate the anchor size to be used for either a tension and/or shear load application.
3. Locate the edge distance ($c_{act}$) or spacing ($s_{act}$) at which the anchor is to be installed.
4. The load adjustment factor ($f_c$ or $f_s$) is the intersection of the row and column.
5. Multiply the allowable load by the applicable load adjustment factor.
6. Reduction factors for multiple edges or spacing are multiplied together.

### Edge Distance Tension ($f_c$)

| Edge Dist. Cact (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $c_{cr}$ | 3 | 4½ | 6 | 7½ | 9 |
| | $c_{min}$ | 1¾ | 2⅝ | 3½ | 4⅜ | 5¼ |
| | $f_{cmin}$ | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| 1¾ | | 0.65 | | | | |
| 2 | | 0.72 | | | | |
| 2½ | | 0.86 | | | | |
| 2⅝ | | 0.90 | 0.65 | | | |
| 3 | | 1.00 | 0.72 | | | |
| 3½ | | | 0.81 | 0.65 | | |
| 4 | | | 0.91 | 0.72 | | |
| 4⅜ | | | 0.98 | 0.77 | 0.65 | |
| 4½ | | | 1.00 | 0.79 | 0.66 | |
| 5 | | | | 0.86 | 0.72 | |
| 5¼ | | | | 0.90 | 0.75 | 0.65 |
| 5½ | | | | 0.93 | 0.78 | 0.67 |
| 6 | | | | 1.00 | 0.83 | 0.72 |
| 6½ | | | | | 0.89 | 0.77 |
| 7 | | | | | 0.94 | 0.81 |
| 7½ | | | | | 1.00 | 0.86 |
| 8 | | | | | | 0.91 |
| 8½ | | | | | | 0.95 |
| 9 | | | | | | 1.00 |

See notes below.

### Edge Distance Shear ($f_c$)

| Edge Dist. Cact (in.) | Size | ¼ | ⅜ | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|
| | $c_{cr}$ | 3½ | 5¼ | 7 | 8¾ | 10½ |
| | $c_{min}$ | 1¾ | 2⅝ | 3½ | 4⅜ | 5¼ |
| | $f_{cmin}$ | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| 1¾ | | 0.45 | | | | |
| 2 | | 0.53 | | | | |
| 2½ | | 0.69 | | | | |
| 2⅝ | | 0.73 | 0.45 | | | |
| 3 | | 0.84 | 0.53 | | | |
| 3½ | | 1.00 | 0.63 | 0.45 | | |
| 4 | | | 0.74 | 0.53 | | |
| 4⅜ | | | 0.82 | 0.59 | 0.45 | |
| 4½ | | | 0.84 | 0.61 | 0.47 | |
| 5 | | | 0.95 | 0.69 | 0.53 | |
| 5¼ | | | 1.00 | 0.73 | 0.56 | 0.45 |
| 5½ | | | | 0.76 | 0.59 | 0.48 |
| 6 | | | | 0.84 | 0.65 | 0.53 |
| 6½ | | | | 0.92 | 0.72 | 0.58 |
| 7 | | | | 1.00 | 0.78 | 0.63 |
| 7½ | | | | | 0.84 | 0.69 |
| 8 | | | | | 0.91 | 0.74 |
| 8½ | | | | | 0.97 | 0.79 |
| 8¾ | | | | | 1.00 | 0.82 |
| 9 | | | | | | 0.84 |
| 9½ | | | | | | 0.90 |
| 10 | | | | | | 0.95 |
| 10½ | | | | | | 1.00 |

1. $c_{act}$ = actual edge distance at which anchor is installed (inches).
2. $c_{cr}$ = critical edge distance for 100% load (inches).
3. $c_{min}$ = minimum edge distance for reduced load (inches).
4. $f_c$ = adjustment factor for allowable load at actual edge distance.
5. $f_{ccr}$= adjustment factor for allowable load at critical edge distance. $f_{ccr}$ is always = 1.00.
6. $f_{cmin}$ = adjustment factor for allowable load at minimum edge distance.
7. $f_c = f_{cmin} + [(1 - f_{cmin}) (c_{act} - c_{min}) / (c_{cr} - c_{min})]$.

### Spacing Tension and Shear ($f_s$)

| Sact (in.) | Size | ¼ | ⅜[9] | ⅜ | ½[10] | ½ | ⅝ | ¾ |
|---|---|---|---|---|---|---|---|---|
| | $E$ | 1 | ¾ | 1½ | 1 | 2 | 2½ | 3⅛ |
| | $S_{cr}$ | 4 | 3 | 6 | 4 | 8 | 10 | 12½ |
| | $S_{min}$ | 2 | 1½ | 3 | 2 | 4 | 5 | 6¼ |
| | $f_{smin}$ | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| 1½ | | | 0.50 | | | | | |
| 2 | | 0.50 | 0.67 | | 0.50 | | | |
| 2½ | | 0.63 | 0.83 | | 0.63 | | | |
| 3 | | 0.75 | 1.00 | 0.50 | 0.75 | | | |
| 3½ | | 0.88 | | 0.58 | 0.88 | | | |
| 4 | | 1.00 | | 0.67 | 1.00 | 0.50 | | |
| 4½ | | | | 0.75 | | 0.56 | | |
| 5 | | | | 0.83 | | 0.63 | 0.50 | |
| 5½ | | | | 0.92 | | 0.69 | 0.55 | |
| 6 | | | | 1.00 | | 0.75 | 0.60 | |
| 6¼ | | | | | | 0.78 | 0.63 | 0.50 |
| 7 | | | | | | 0.88 | 0.70 | 0.56 |
| 8 | | | | | | 1.00 | 0.80 | 0.64 |
| 9 | | | | | | | 0.90 | 0.72 |
| 10 | | | | | | | 1.00 | 0.80 |
| 11 | | | | | | | | 0.88 |
| 12 | | | | | | | | 0.96 |
| 12½ | | | | | | | | 1.00 |

1. $E$ = Embedment depth (inches).
2. $s_{act}$ = actual spacing distance at which anchors are installed (inches).
3. $s_{cr}$ = critical spacing distance for 100% load (inches).
4. $s_{min}$ = minimum spacing distance for reduced load (inches).
5. $f_s$ = adjustment factor for allowable load at actual spacing distance.
6. $f_{scr}$ = adjustment factor for allowable load at critical spacing distance. $f_{scr}$ is always = 1.00.
7. $f_{smin}$ = adjustment factor for allowable load at minimum spacing distance.
8. $f_s = f_{smin} + [(1 - f_{smin}) (s_{act} - s_{min}) / (s_{cr} - s_{min})]$.
9. ⅜" short drop-in (DIA37S).
10. ½" short Drop-in (DIA50S).



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# **Drop-In** (DIA) Design Information — Concrete

## Short Drop-in Anchors — Allowable Load-Adjustment Factors in Sand-Lightweight Concrete over Metal Deck: Edge Distance and Spacing, Tension and Shear Loads

**How to use these charts:**

1. The following tables are for reduced edge distance and spacing.
2. Locate the anchor size to be used for either a tension and/or shear load application.
3. Locate the edge distance ($c_{act}$) or spacing ($s_{act}$) at which the anchor is to be installed.
4. The load adjustment factor ($f_c$ or $f_s$) is the intersection of the row and column.
5. Multiply the allowable load by the applicable load adjustment factor.
6. Reduction factors for multiple edges or spacing are multiplied together.

### Edge Distance Tension ($f_c$)

| Edge Dist. Cact (in.) | Size | ⅜ | ½ |
|---|---|---|---|
| | $c_{cr}$ | 6 | 8 |
| | $c_{min}$ | 3½ | 4¾ |
| | $f_{cmin}$ | 0.65 | 0.65 |
| 3½ | | 0.65 | |
| 4 | | 0.72 | |
| 4½ | | 0.79 | |
| 4¾ | | 0.83 | 0.65 |
| 5 | | 0.86 | 0.68 |
| 5½ | | 0.93 | 0.73 |
| 6 | | 1.00 | 0.78 |
| 6½ | | | 0.84 |
| 7 | | | 0.89 |
| 7½ | | | 0.95 |
| 8 | | | 1.00 |

See notes below.

### Edge Distance Shear ($f_c$)

| Edge Dist. Cact (in.) | Size | ⅜ | ½ |
|---|---|---|---|
| | $c_{cr}$ | 7 | 9⅜ |
| | $c_{min}$ | 3½ | 4¾ |
| | $f_{cmin}$ | 0.45 | 0.45 |
| 3½ | | 0.45 | |
| 4 | | 0.53 | |
| 4½ | | 0.61 | |
| 4¾ | | 0.65 | 0.45 |
| 5 | | 0.69 | 0.48 |
| 5½ | | 0.76 | 0.54 |
| 6 | | 0.84 | 0.60 |
| 6½ | | 0.92 | 0.66 |
| 7 | | 1.00 | 0.72 |
| 7½ | | | 0.78 |
| 8 | | | 0.84 |
| 8½ | | | 0.90 |
| 9 | | | 0.96 |
| 9⅜ | | | 1.00 |

1. $c_{act}$ = actual edge distance at which anchor is installed (inches).
2. $c_{cr}$ = critical edge distance for 100% load (inches).
3. $c_{min}$ = minimum edge distance for reduced load (inches).
4. $f_c$ = adjustment factor for allowable load at actual edge distance.
5. $f_{ccr}$ = adjustment factor for allowable load at critical edge distance. $f_{ccr}$ is always = 1.00.
6. $f_{cmin}$ = adjustment factor for allowable load at minimum edge distance.
7. $f_c = f_{cmin} + [(1 - f_{cmin})\ (c_{act} - c_{min})\ /\ (c_{cr} - c_{min})]$.

### Spacing Tension and Shear ($f_s$)

| $s_{act}$ (in.) | Size | ⅜ | ½ |
|---|---|---|---|
| | $s_{cr}$ | 8 | 10⅝ |
| | $s_{min}$ | 4 | 5¼ |
| | $f_{smin}$ | 0.50 | 0.50 |
| 4 | | 0.50 | |
| 4½ | | 0.56 | |
| 5 | | 0.63 | |
| 5¼ | | 0.66 | 0.50 |
| 6 | | 0.75 | 0.57 |
| 6½ | | 0.81 | 0.62 |
| 7 | | 0.88 | 0.66 |
| 7½ | | 0.94 | 0.71 |
| 8 | | 1.00 | 0.76 |
| 8½ | | | 0.80 |
| 9 | | | 0.85 |
| 9½ | | | 0.90 |
| 10 | | | 0.94 |
| 10⅝ | | | 1.00 |

1. $s_{act}$ = actual spacing distance at which anchors are installed (inches).
2. $s_{cr}$ = critical spacing distance for 100% load (inches).
3. $s_{min}$ = minimum spacing distance for reduced load (inches).
4. $f_s$ = adjustment factor for allowable load at actual spacing distance.
5. $f_{scr}$ = adjustment factor for allowable load at critical spacing distance. $f_{scr}$ is always = 1.00.
6. $f_{smin}$ = adjustment factor for allowable load at minimum spacing distance.
7. $f_s = f_{smin} + [(1 - f_{smin})\ (s_{act} - s_{min})\ /\ (s_{cr} - s_{min})]$.



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# **GCN-MEP** Gas-Actuated Concrete Nailer

The GCN-MEP MAG tool is a portable fastener tool for attaching light fixtures to concrete, steel and concrete block (CMU), lightweight concrete over metal deck, and cold formed steel. This tool is ideal for attaching drywall track, furring strips, hat track and angle track using GDP and GDPA collated pins. The GDPMEPMAG tool is actuated with GFC34 fuel cells which means there no need for cords or hoses.

The GCN-MEPMAG tool has a removable magazine and nosepiece which can be removed with no additional hand tools for general maintenance of the tool or for clearing occasional pin jams. This tool also features a pin embedment control for fastening into low strength to high strength base materials.

**Features:**

- Easy magazine attachment with no extra tools
- 3,300 pins per battery charge
- Pin-depth control dial
- Easy nose-piece change out (for 0.25" and 0.300" 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-MEPMAG





GCN-MEPMAGKT
or GCN-MEPKT
*(with no magazine)*

## GDP Pins

GDP concrete pins are designed to work with the GCN-MEPMAG (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 GDPS pins are also designed to work in the GCN-MEPMAG gas-actuated nailer tool 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] (lb./ft.)** | | | | | | | | | | |
| GDP | 0.106 | 0'–4" | 135 | 225 | 855 | 675 | 615 | 445 | 580 | 1,055 |
| | | 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 | 1,015 |
| | | 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] (lb.)** | | | | | | | | | | |
| 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.

## 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] (lb./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] (lb.)** | | | | | | |
| 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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# GDP Pins

GDP concrete pins are designed to work with the GCN-MEPMAG gas-actuated concrete nailer as well as with most major-brand gas-actuated 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, CMU block and sand-lightweight concrete over metal deck.

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



**GDP**
U.S. Patent 605,016

## 0.106"-Diameter Shank Drive Pins

| Model No. | Length (in.) | Qty. Pins / Pack +1 Fuel Cell | Packs / Carton | Compatible with These Tools |
|---|---|---|---|---|
| GDP-50KT | ½ | 1,000 | 5 | Simpson Strong-Tie GCN-MEPMAG<br>Others: TF1100, C3, TF1200 |
| GDP-62KT | ⅝ | 1,000 | 5 | |
| GDP-75KT | ¾ | 1,000 | 5 | |
| GDP-100KT | 1 | 1,000 | 5 | |
| GDP-125KT | 1¼ | 1,000 | 5 | |
| GDP-150KT | 1½ | 1,000 | 5 | |

# GDPS Pins

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



**GDPS**

## 0.118"/0.102"-Diameter Stepped-Shank Drive Pins

| Model No. | Length (in.) | Qty. Pins / Pack + 1 fuel cell | Packs / Carton | Compatible Tools | |
|---|---|---|---|---|---|
| | | | | Simpson Strong-Tie | Others |
| GDPS-50KT | ½ | 1,000 | 5 | GCN-MEPMAG | TF1100, C3, TF1200 |
| GDPS-62KT | ⅝ | 1,000 | 5 | | |
| GDPS-75KT | ¾ | 1,000 | 5 | | |



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# 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 provides faster installation and setup times, which contributes to lower labor costs. The hardened pins quickly and cleanly pierce the cold-formed steel and leave the pin head flush with the wood fixture. The 1⅜" length pin can be used for ½"–¾" thick plywood, and 14–22 gauge steel.



**GDPSK**

## Spiral Knurl Gas Pins

| Model No. | Length (in.) | Qty. Pins / Pack + 1 fuel cell | Packs / Carton | Compatible with These Tools |
|---|---|---|---|---|
| GDPSK-138KT | 1⅜ | 1,000 | 5 | Simpson Strong-Tie: GCN-MEPMAG<br>Others: TF1100, C3 |

# GWL-100 Lathing Washer and GMR-2 Magnetic Ring

The GWL-100 lathing washer is used with the GCN-MEPMAG tool and attaches lath to the wall surface for overlaying scratch coats, brown coats and stucco. The washers are held onto the nose of the tool with the new GMR-2 magnetic ring and are attached to the substrate (including concrete and CMU) with GDP pins, which fasten through the washer. No extra tools are needed to install the magnetic ring to the nosepiece of the tool.



**GWL-100**



**GMR-2**

## Lathing Washer and Magnetic Ring

| Model No. | Description | Pack Qty. | Carton Qty. |
|---|---|---|---|
| GWL-100 | Lathing washer, 1" diameter | 1,000 | 5,000 |
| GMR-2 | Magnetic ring for GCN150 | 10 | 900 |

Lathing washer and magnetic rings are sold separately.

# Fuel Cell

The GFC34 fuel cell is designed to operate with the GCN-MEPMAG and GCN-MEP, and with many major-brand gas-actuated concrete-nailer tools. The fuel cell provides 1,200 shots and can operate at temperatures between 20° and 120°F (–6°–49°C). The fuel cells are offered individually or in a two-per-pack clamshell. Additionally, one fuel cell is included with each pack of 1,000 pins.




**GFC Fuel Cell**

## Gas Fuel Cells for the GCN-MEP

| Model No. | Description | Pack Qty. | Packs/ Carton | Compatible with These Tools |
|---|---|---|---|---|
| GFC34 | 34-gram fuel cells | 12 | — | Simpson Strong-Tie: GCN-MEP and GCN-MEPMAG<br>Others: TrakFast® TF1100, Trak-It® C3 |
| GFC34-RC2 | (2) 34-gram fuel cells | 2 | 6 | |



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# **PT-27** General Purpose Tool

The PT-27 is a semi-automatic and fast-cycling fastening tool that is engineered for continuous use, high reliability and low maintenance. This versatile tool fires a variety of fastener types and lengths.

**Key Fastening Applications**

- Acoustical ceilings
- Electrical applications
- Sill plates
- Drywall track
- Water proofing material and/or lathing

**Specifications**

- Fastener Length: ½" – 2½" (3" or 4" washered)
- Fastener Type: .300" or 8 mm-headed fasteners or ¼" – 20 threaded studs
- Firing Action: Semi-automatic
- Load Caliber: 0.27 strip loads, brown through red (levels 2–5)
- Length: 13½"
- Weight: 5 lb., 4 oz.

**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



**PT-27**




**The full line of Simpson Strong-Tie® powder loads and fasteners begins on p. 232.**

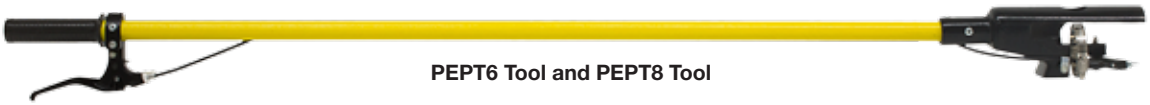
## Replacement Parts — PT-27

| Description | Model No. |
|---|---|
| Annular Spring | PT-301014 |
| Ball Bearing (6 mm) | PT-301013 |
| Barrel | PT-301006 |
| Baseplate | PT-301009 |
| Piston – Concave (includes ring) | PT-301217 |
| Piston – Flat (includes ring) | PT-301903 |
| Piston Ring | PT-301208 |
| Piston Stop | PT-301012 |
| Shear Clip | PT-301011 |

For tool repair and maintenance kits and complete tool schematics and parts list, visit **strongtie.com**.

**Complementary Products**

Extension pole tool for the PT-27 available in 6' and 8' lengths



**PEPT6 Tool and PEPT8 Tool**



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# **PTP-27S and PTP-27SMAGR** Premium Tools

**Features:**

- PTP-27S: Automatic fastening: no sliding barrel, just load and shoot
- PTP-27SMAGR: Fully automatic tool with rotating fastener magazine

**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
- The PTP-27S can be converted to a magazine tool and the PTP-27SMAGR can be converted to a single-shot tool

**Specifications:**

- Fastener Length: PTP-27S — ½" thru 1⅝"
  PTP-27SMAGR — ½" thru 1¼"
- Fastener Type: 0.300" or 8mm diameter
- Firing Action: PTP-27S — Automatic
  PTP-27SMAGR — Fully automatic
- Load Caliber: 0.27 strip loads, brown through purple (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)



PTP-27S

PTP-27SMAGR



Adjustable power increases versatility





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



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# **PTP-27S and PTP-27SMAGR** Premium Tools

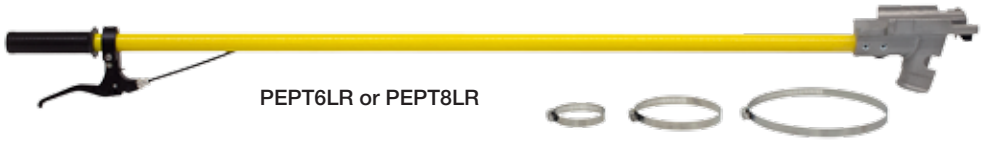
## Common Repair Parts — PTP-27S

| 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 **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 |




**Extension Pole Tool (for the PTP-27S)**



**Rotating magazine allows for installation flexibility**



**Collated pins for fully automatic fastening and quick loading**



**Simpson Strong-Tie® Powder-Actuated Fasteners are featured on pp. 232–233.**



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# Powder-Actuated Fasteners

## 0.300" Headed Fasteners with 0.157" Shank Diameter

| Length (in.) | Model No. | Description | Pack Qty. | Carton Qty. | Compatible Tools | |
|---|---|---|---|---|---|---|
| | | | | | Simpson Strong-Tie | Others |
| ½ | PDPA-50 | 0.157 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 | 0.157 x ½" knurl | 100 | 1,000 | | |
| ⅝ knurled | PDPA-62K | 0.157 x ⅝" knurl | 100 | 1,000 | | |
| ¾ | PDPA-75 | 0.157 x ¾" | 100 | 1,000 | | |
| 1 | PDPA-100 | 0.157 x 1" | 100 | 1,000 | | |
| 1 ¼ | PDPA-125 | 0.157 x 1 ¼" | 100 | 1,000 | | |
| 1 ½ | PDPA-150 | 0.157 x 1 ½" | 100 | 1,000 | | |
| 1 ⅞ | PDPA-187 | 0.157 x 1 ⅞" | 100 | 1,000 | | |
| 2 | PDPA-200 | 0.157 x 2" | 100 | 1,000 | | |
| 2 ½ | PDPA-250 | 0.157 x 2 ½" | 100 | 1,000 | | |
| 2 ⅞ | PDPA-287 | 0.157 x 2 ⅞" | 100 | 1,000 | | |

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



PDPA

## 0.300" Headed Fasteners with 0.157" Shank Diameter 10 Pin Collation

| Length (in.) | Model No. | Description | Pack Qty. | Carton Qty. | Compatible Tools | |
|---|---|---|---|---|---|---|
| | | | | | Simpson Strong-Tie | Others |
| ½ | PDPAS-50 | 0.157 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 | 0.157 x ½" knurl | 100 | 1,000 | | |
| ⅝ knurled | PDPAS-62K | 0.157 x ⅝" knurl | 100 | 1,000 | | |
| ¾ | PDPAS-75 | 0.157 x ¾" | 100 | 1,000 | | |
| 1 | PDPAS-100 | 0.157 x 1" | 100 | 1,000 | | |
| 1 1⁄16 | PDPAS-106 | 0.157 x 1 1⁄16" | 100 | 1,000 | | |
| 1 ¼ | PDPAS-125 | 0.157 x 1 ¼" | 100 | 1,000 | | |
| 1 5⁄16 | PDPAS-131 | 0.157 x 1 5⁄16" | 100 | 1,000 | | |
| 1 ½ | PDPAS-150 | 0.157 x 1 ½" | 100 | 1,000 | | |
| 1 ⅞ | PDPAS-187 | 0.157 x 1 ⅞" | 100 | 1,000 | | |
| 2 | PDPAS-200 | 0.157 x 2" | 100 | 1,000 | | |
| 2 ½ | PDPAS-250 | 0.157 x 2 ½" | 100 | 1,000 | | |
| 2 ⅞ | PDPAS-287 | 0.157 x 2 ⅞" | 100 | 1,000 | | |



PDPAS

## 0.300" Headed Tophat Fasteners with 0.157" Shank Diameter

| Length (in.) | Model No. | Description | Pack Qty. | Carton Qty. | Compatible Tools | |
|---|---|---|---|---|---|---|
| | | | | | Simpson Strong-Tie | Others |
| ½ knurled | PDPAT-50K | 0.157 x ½" knurl | 100 | 1,000 | PTP-27L PTP-27S PT-27 PT-27HD PT-22 PT-22GS PT-22P PT-22H | DX-460, 721, D-60, U-2000 and most other low-velocity tools. |
| ⅝ knurled | PDPAT-62K | 0.157 x ⅝" knurl | 100 | 1,000 | | |
| ⅝ knurled | PDPAT-62KP | 0.157 x ⅝" knurl | 100 | 1,000 | | |
| ¾ | PDPAT-75 | 0.157 x ¾" | 100 | 1,000 | | |
| 1 | PDPAT-100 | 0.157 x 1" | 100 | 1,000 | | |



GTH



**PDPAT-62KP**
*(point protrusion for hole spotting)*



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# Powder-Actuated Fasteners

## Pre-Assembled Ceiling Clips — 0.300" Headed Fasteners with 0.157" Shank Diameter

| Length (in.) | Model No. | Description | Pack Qty. | Carton Qty. | Compatible Tools | |
|---|---|---|---|---|---|---|
| | | | | | Simpson Strong-Tie | Others |
| ⅞ | PCLDPA-87 | Ceiling clip with ⅞" pin | 100 | 1,000 | PTP-27L PTP-27S PT-27 PT22 PT-22GS PT-22P PT-22H | DX-350, DX-460, System 1 721 and most other tools. |
| 1 1⁄16 | PCLDPA-106 | Ceiling clip with 1 1⁄16" pin | 100 | 1,000 | | |
| 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 Ceiling Clips — Tension and Oblique Loads in Sand-Lightweight Concrete over Metal Deck[1]

| Model No. | Shank Diameter in. (mm) | Minimum Embedment in. (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 lb. (kN) | Allowable Oblique Load lb. (kN) | Allowable Tension Load lb. (kN) | Allowable Oblique Load lb. (kN) |
| PCLDPA-87 | 0.157 (4.0) | ¾ (19) | 115 (0.51) | 155 (0.69) | 60 (0.27) | 175 (0.78) |
| PCLDPA-106 | | 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-106 | | ⅞ (22) | 80 (0.36) | 110 (0.49) | 95 (0.42) | 110 (0.49) |
| 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" from the edge of the deck web and 4" from the end of the deck. The minimum fastener spacing is 4".
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" from the edge of the deck web and 4" from the end of the deck. The minimum fastener spacing is 4".



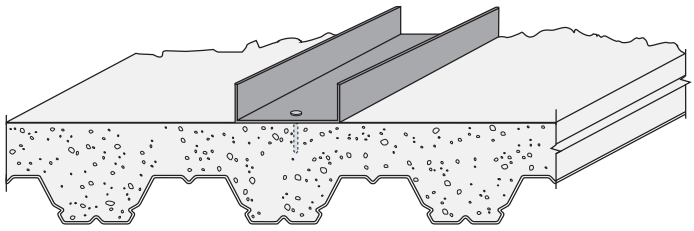
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# Powder-Actuated Fasteners

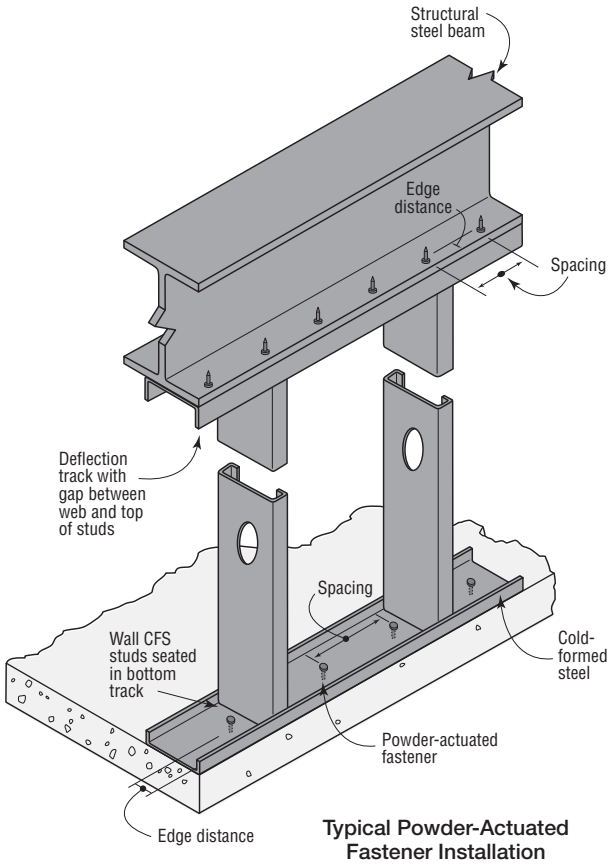
## PDPA and PDPAT Pins — Shear and Tension Loads

| 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[4,5,13] (lb./ft.) | | | | | | | | | | | | | | | |
| | 0.157 | 0'-6" | 1 | 570 | 620 | 1 | 450 | 560 | 820 | 730 | 770[10] | 770[10] | 650[9] | 760[12] | 990[12] | 1,800[12] |
| | | | 1¼ | 720 | 840 | 1¼ | 840 | 640 | | | | | | | | |
| | | 0'-8" | 1 | 430 | 465 | 1 | 340 | 420 | 615 | 550 | 580[10] | 580[10] | 490[9] | 570[12] | 745[12] | 1,350[12] |
| | | | 1¼ | 540 | 630 | 1¼ | 630 | 480 | | | | | | | | |
| | | 1'-0" | 1 | 285 | 310 | 1 | 225 | 280 | 410 | 365 | 385[10] | 385[10] | 325[9] | 380[12] | 495[12] | 900[12] |
| | | | 1¼ | 360 | 420 | 1¼ | 420 | 320 | | | | | | | | |
| | | 2'-0" | 1 | 145 | 155 | 1 | 115 | 140 | 205 | 185 | 195[10] | 195[10] | 165[9] | 190[12] | 250[12] | 450[12] |
| | | | 1¼ | 180 | 210 | 1¼ | 210 | 160 | | | | | | | | |
| | | 3'-0" | 1 | 95 | 105 | 1 | 75 | 95 | 135 | 120 | 130[10] | 130[10] | 110[9] | 125[12] | 165[12] | 300[12] |
| | | | 1¼ | 120 | 140 | 1¼ | 140 | 105 | | | | | | | | |
| | Allowable Tension Load[4,5] (lb.) | | | | | | | | | | | | | | | |
| | 0.157 | — | 1 | 210 | 310 | 1 | 150 | 145 | 260 | 370 | 380[10] | 530[10] | 195[9] | 225[11] | 295[11] | 535[11] |
| | | | 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 $f'_c$ = 3,000 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" (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.
11. The following CFS allowable tension loads may be used for PDPAT: 390 lb. (33 mil), 505 lb. (42 mil), 915 lb. (54 mil).
12. CFS allowable shear load may be multiplied by 1.15 for PDPAT fastener.
13. Shear loads listed do not account for indirect tension due to eccentricity of load at the deflection track. Designer to evaluate combined loading as needed.



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 (lb.) |
|---|---|---|---|---|---|---|---|
| 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 (lb.) |
|---|---|---|---|---|---|---|---|
| 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.

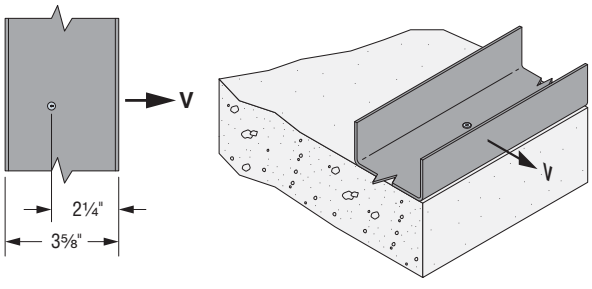



Figure 1: 3⅝" Track – One Fastener

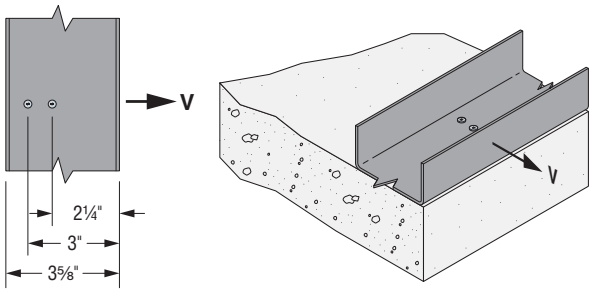



Figure 2: 3⅝" Track – Two Fasteners

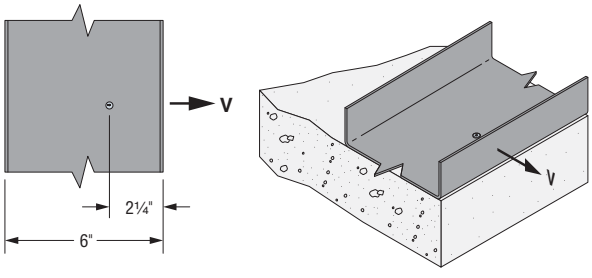



Figure 3: 6" Track – One Fastener

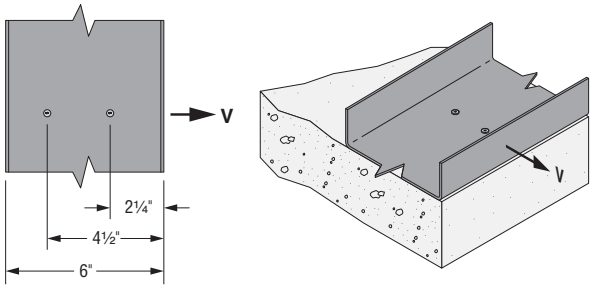



Figure 4: 6" Track – Two Fasteners



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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"-diameter 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"-diameter anchor.

SB anchor bolts are code listed by ICC-ES under the 2009, 2012 and 2015 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

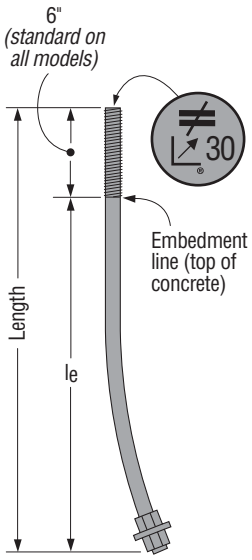
**Material:** ASTM F-1554, Grade 36

**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 2,500 psi.
- When rebar is required it does not need to be tied to the SB.

**Codes:** See p. 11 for Code Reference Key Chart



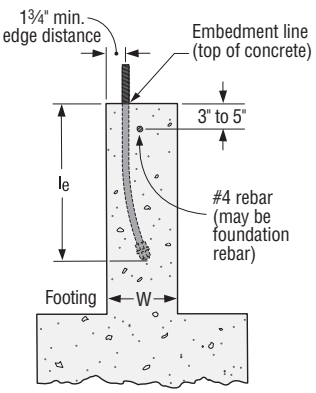

**SB1x30**
*(Other models similar)*

## SB Bolts at Stemwall

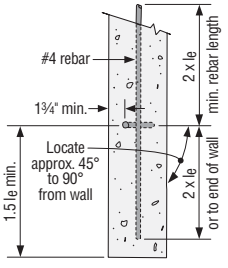
| Model No. | Dimensions (in.) | | | | Allowable Tension Load (lb.) | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stemwall Width | Dia. | Length | Min. Embed. ($l_e$) | Wind and SDC A&B | | | SDC C–F | | | |
| | | | | | Midwall | Corner | End Wall | Midwall | Corner | End Wall | |
| SB⅝x24 | 6 | ⅝ | 24 | 18 | 6,675 | 6,675 | 6,675 | 6,675 | 5,730 | 5,730 | I5, FL, 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.

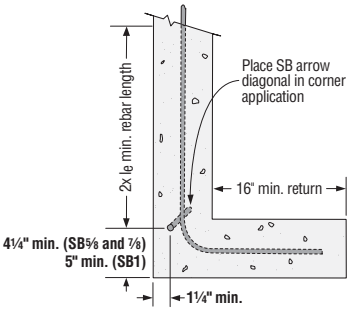
1. For other SB anchorage conditions, reference p. 56 of C-C-2017.



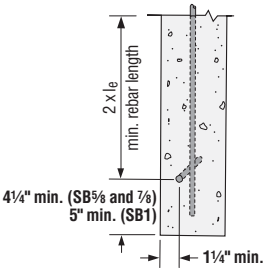

**Typical SB Installation**




**Midwall**

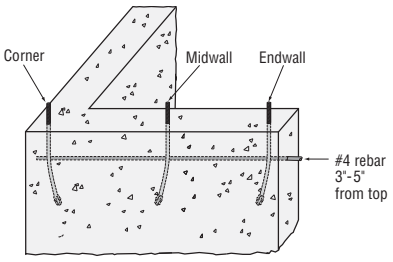



**Corner**

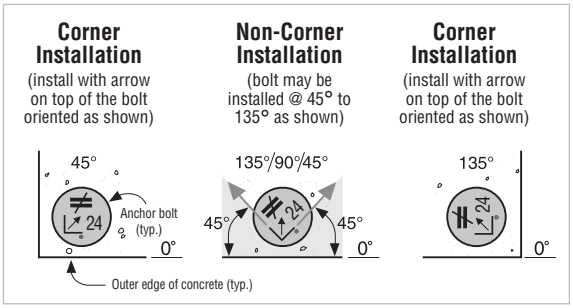



**End Wall**

**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, 2012 and 2015 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.

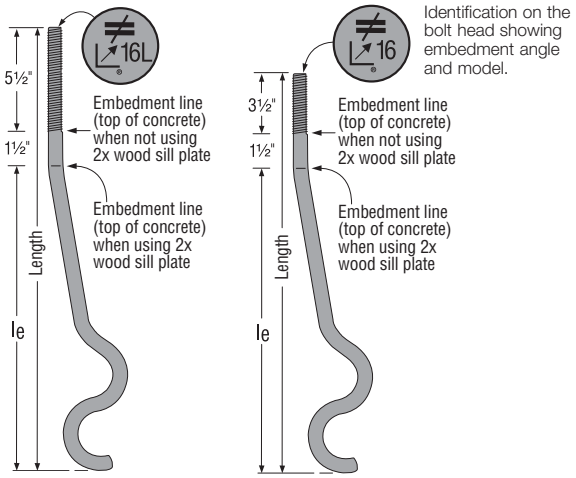
**Installation:**

- 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 NUT⅝-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 2,500 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 (two total vertical rebars for end-wall corner, three total vertical rebars for midwall)

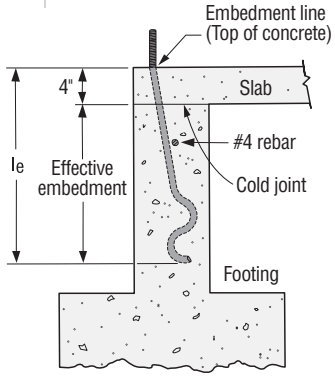
**Codes:** See p. 11 for Code Reference Key Chart




**SSTB16L** *(other models similar)*

**SSTB16** *(other models similar)*

**See pp. 238–239 for additional installation details.**




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

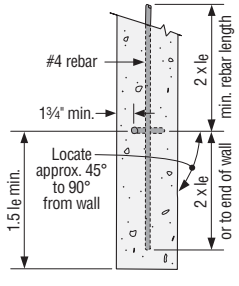
- When using the SSTB20, use the equivalent loads of the SSTB16
- When using the SSTB24, use the equivalent loads of the SSTB20
- When using the SSTB34 or 36, use the equivalent loads of the SSTB28

## SSTB Bolts at Stemwall

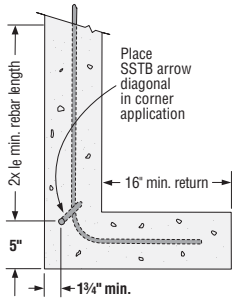
| Model No. | Dimensions (in.) | | | | Allowable Tension Load (lb.) | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stemwall Width | Dia. | Length | Min. Embed. ($l_e$) | Wind and SDC A&B | | | SDC C–F | | | |
| | | | | | Midwall | Corner | End Wall[2] | Midwall | Corner | End Wall[2] | |
| SSTB16 | 6 | ⅝ | 17⅝ (16L = 19⅝) | 12⅝ | 3,610 | 3,610 | 3,610 | 2,550 | 2,550 | 2,550 | I5, FL, L5 |
| SSTB20 | 6 | ⅝ | 21⅝ (20L = 24⅝) | 16⅝ | 4,315 | 4,040 | 4,040 | 3,145 | 2,960 | 2,960 | |
| SSTB24 | 6 | ⅝ | 25⅝ (24L = 28⅛) | 20⅝ | 5,025 | 4,470 | 4,470 | 3,740 | 3,325 | 3,325 | |
| SSTB28 | 8 | ⅞ | 29⅞ (28L = 32⅞) | 24⅞ | 9,900 | 8,710 | 7,615 | 8,315 | 7,315 | 6,395 | |
| SSTB34 | 8 | ⅞ | 34⅞ | 28⅞ | 9,900 | 8,710 | 7,615 | 8,315 | 7,315 | 6,395 | |
| SSTB36 | 8 | ⅞ | 36⅞ | 28⅞ | 9,900 | 8,710 | 7,615 | 8,315 | 7,315 | 6,395 | |

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 p. 14 for notes to the Designer.
2. SSTB28, SSTB34 and SSTB36 with 3⅞" end distance allowable loads are 6,605 lb.(Wind and SDC A&B) and 5,550 lb. (SDC C–F).

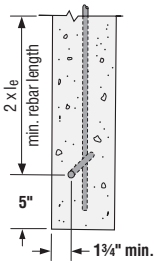



Midwall

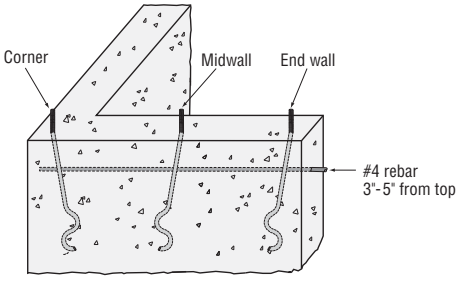



Corner

Stemwall Plan Views




End Wall




Perspective View

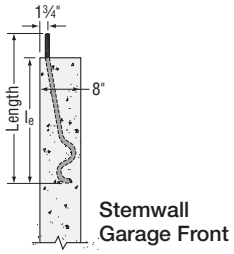


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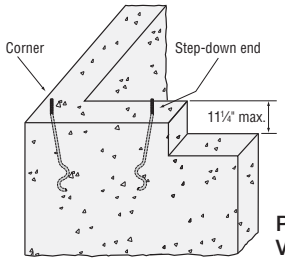
# SSTB® Anchor Bolt

## SSTB Bolts at Stemwall: Garage Front

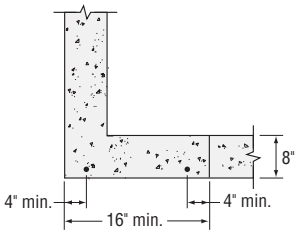
| Model No. | Dimensions (in.) | | | | Allowable Tension Load (lb.) | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | Stemwall Width | Dia. | Length | Min. Embed. ($l_e$) | Wind and SDC A&B | | SDC C–F | | |
| | | | | | Step-Down End | Corner | Step-Down End | Corner | |
| SSTB28 | 8 | 7/8 | 29 7/8 | 24 7/8 | 7,015 | 7,045 | 5,895 | 5,920 | I5, FL, L5 |



Stemwall Garage Front



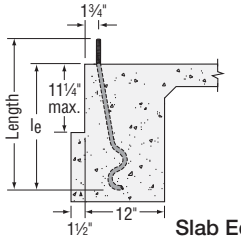
Perspective View



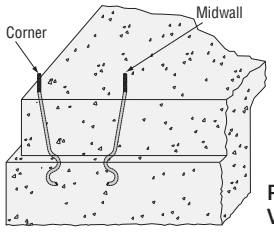
Plan View

## SSTB Bolts at Slab on Grade: Edge

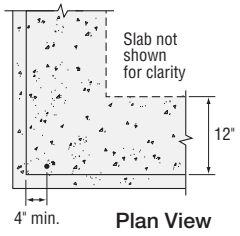
| Model No. | Dimensions (in.) | | | | Allowable Tension Load (lb.) | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | Footing Width | Dia. | Length | Min. Embed. ($l_e$) | Wind and SDC A&B | | SDC C–F | | |
| | | | | | Midwall | Corner | Midwall | Corner | |
| SSTB16 | 12 | 5/8 | 17 5/8 | 12 5/8 | 5,355 | 5,355 | 3,780 | 3,780 | I5, FL, L5 |
| SSTB20 | 12 | 5/8 | 25 5/8 | 16 5/8 | 6,550 | 6,550 | 4,785 | 4,785 | |
| SSTB24 | 12 | 5/8 | 25 5/8 | 20 5/8 | 6,675 | 6,675 | 5,790 | 5,790 | |
| SSTB28 | 12 | 7/8 | 29 7/8 | 24 7/8 | 13,080 | 13,080 | 11,060 | 11,645 | |
| SSTB34 | 12 | 7/8 | 34 7/8 | 28 7/8 | 13,080 | 13,080 | 11,060 | 11,645 | |
| SSTB36 | 12 | 7/8 | 36 7/8 | 28 7/8 | 13,080 | 13,080 | 11,060 | 11,645 | |



Slab Edge



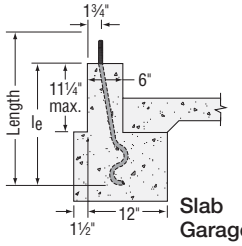
Perspective View



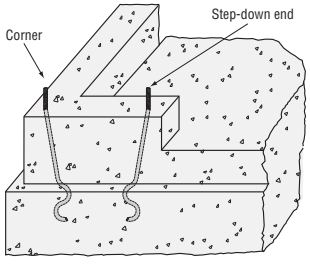
Plan View

## SSTB Bolts at Slab on Grade: Garage Curb

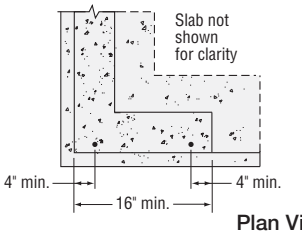
| Model No. | Dimensions (in.) | | | | Allowable Tension Load (lb.) | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | Curb Width | Dia. | Length | Min. Embed. ($l_e$) | Wind and SDC A&B | | SDC C–F | | |
| | | | | | Step-Down End | Corner | Step-Down End | Corner | |
| SSTB28 | 6 | 7/8 | 29 7/8 | 24 7/8 | 10,085 | 12,375 | 8,475 | 10,395 | I5, FL, L5 |



Slab Garage Curb



Perspective View



Plan View

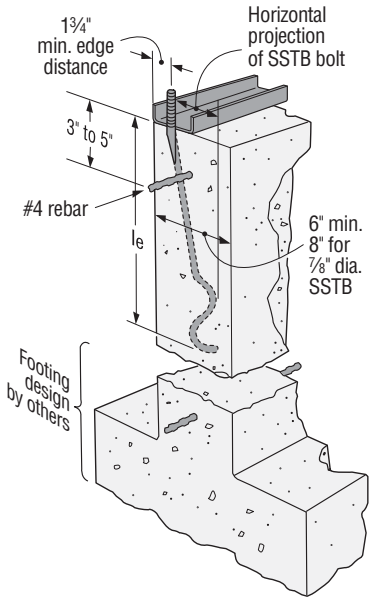
**Notes to the Designer:**

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. To obtain LRFD values for cast-in-place bolts, multiply ASD seismic load values by 14 and wind load values 1.6 (1.67 for 2015 IBC).
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 $l_e$.

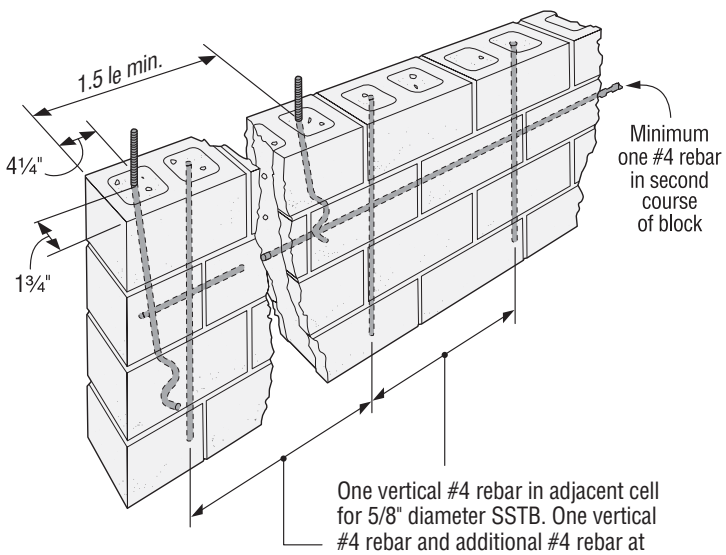


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# SSTB® Anchor Bolt




**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.)*

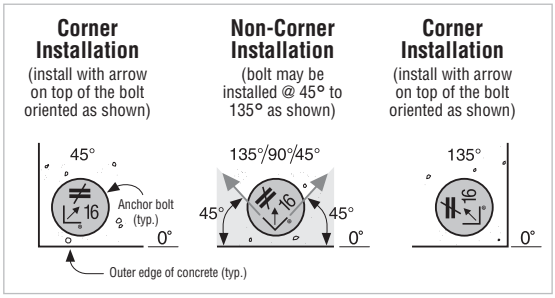
**Typical SSTB Installation in Grouted Concrete Block**

## SSTB Bolts in 8" GFCMU

| Model No. | Dimensions (in.) | | | Allowable Tension Load (lb.) | | Code Ref. |
|---|---|---|---|---|---|---|
| | Dia. | Length | Min. Embed. ($l_e$) | Midwall | Corner/ End Wall | |
| SSTB16 | ⅝ | 17⅝ (16L = 19⅝) | 12⅝ | 2,865 | 1,220 | 170 |
| SSTB20 | ⅝ | 21⅝ (20L = 24⅝) | 16⅝ | 2,865 | 1,220 | |
| SSTB24 | ⅝ | 25⅝ (24L = 28⅛) | 20⅝ | 2,865 | 1,220 | |
| SSTB28 | ⅞ | 29⅞ (28L = 32⅞) | 24⅞ | 4,185 | 3,000 | |
| SSTB34 | ⅞ | 34⅞ | 28⅞ | 4,185 | 3,000 | |
| SSTB36 | ⅞ | 36⅞ | 28⅞ | 4,185 | 3,000 | |

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 1,500 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.
5. Allowable loads are based on the average ultimate load with a safety factor of 5.0 per ACI 530.



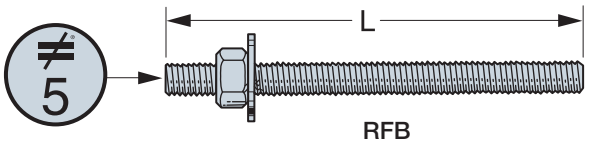

**Plan View of SSTB Placement in Concrete**

# 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 (in.) |
|---|---|---|
| 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

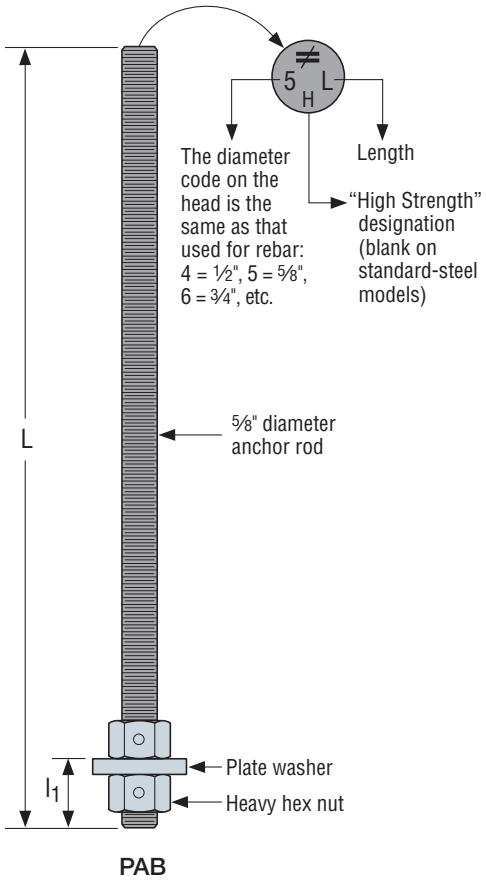
**Finish:** None. May be ordered in HDG; contact Simpson Strong-Tie.

**Installation:**

- On HDG PABs, chase the threads to use standard nuts or couplers or use overtapped products in accordance with ASTM A563; for example, Simpson Strong-Tie® NUT ⅝-OST, NUT ⅞-OST, CNW ⅝-OST, CNW ⅞-OST. Some OST couplers are typically oversized on one end of the coupler nut only and will be marked with an "O" on oversized side. Couplers may be oversized on both ends. Contact Simpson Strong-Tie.

**Codes:** See p. 11 for Code Reference Key Chart

The Simpson Strong-Tie® Anchor Designer™ Software analyzes and suggests anchor solutions using the ACI 318-14 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

## 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")**

### 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 3 x 3 | 1⅞ | PAB8-XX | |
| 1⅛ | ⅝ x 3½ x 3½ | 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 3 x 3 | 1⅞ | PAB8H-XX | |
| 1⅛ | ⅝ x 3½ x 3½ | 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.

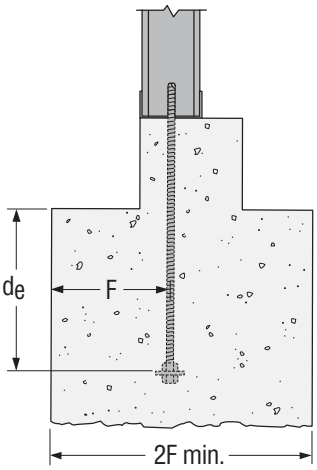


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# **PAB** Pre-Assembled Anchor Bolt

## PAB Anchor Bolt — Anchorage Solutions

| Design Criteria | Diameter (in.) | Anchor Bolt | 2,500 psi Concrete | | | | 3,000 psi Concrete | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dimensions (in.) | | Tension Load (lb.) | | Dimensions (in.) | | Tension Load (lb.) | | |
| | | | $d_e$ | F | ASD | LRFD | $d_e$ | F | ASD | LRFD | |
| Wind | ½ | PAB4 | 4½ | 7 | 4,270 | 6,405 | 4 | 6 | 4,270 | 6,405 | 200 |
| | ⅝ | PAB5 | 4 | 6 | 4,030 | 6,720 | 4 | 6 | 4,415 | 7,360 | |
| | | | 6 | 9 | 6,675 | 10,010 | 5½ | 8½ | 6,675 | 10,010 | |
| | ¾ | PAB6 | 5½ | 8½ | 6,500 | 10,835 | 5 | 7½ | 6,175 | 10,290 | |
| | | | 7½ | 11½ | 9,610 | 14,415 | 7 | 10½ | 9,610 | 14,415 | |
| | ⅞ | PAB7 | 6 | 9 | 7,405 | 12,345 | 5½ | 8½ | 7,120 | 11,870 | |
| | | | 9 | 13½ | 13,080 | 19,620 | 8½ | 13 | 13,080 | 19,620 | |
| | | PAB7H | 9 | 13½ | 13,610 | 22,680 | 8½ | 13 | 13,680 | 22,805 | |
| | | | 14 | 21 | 27,060 | 40,590 | 13½ | 20½ | 27,060 | 40,590 | |
| | 1 | PAB8 | 8 | 12 | 11,405 | 19,005 | 7½ | 11½ | 11,340 | 18,900 | |
| | | | 10½ | 16 | 17,080 | 25,565 | 10 | 15 | 17,080 | 25,560 | |
| | | PAB8H | 10½ | 16 | 17,150 | 28,580 | 10 | 15 | 17,460 | 29,100 | |
| | | | 16½ | 25 | 35,345 | 53,015 | 15½ | 23½ | 35,345 | 53,015 | |
| | 1⅛ | PAB9 | 9 | 13½ | 13,610 | 22,680 | 8 | 12 | 12,495 | 20,820 | |
| | | | 12½ | 19 | 21,620 | 32,430 | 12 | 18 | 21,620 | 32,430 | |
| | 1¼ | PAB10 | 14 | 21 | 26,690 | 40,035 | 13½ | 20½ | 26,690 | 40,035 | |
| Seismic | ½ | PAB4 | 5 | 7½ | 4,270 | 6,405 | 4½ | 7 | 4,270 | 6,405 | |
| | ⅝ | PAB5 | 6½ | 10 | 6,675 | 10,010 | 6 | 9 | 6,675 | 10,010 | |
| | ¾ | PAB6 | 7½ | 11½ | 9,060 | 12,940 | 7 | 10½ | 8,945 | 12,780 | |
| | | | 8 | 12 | 9,610 | 14,415 | 7½ | 11½ | 9,610 | 14,415 | |
| | ⅞ | PAB7 | 9 | 13½ | 11,905 | 17,010 | 8½ | 13 | 11,970 | 17,100 | |
| | | | 10 | 15 | 13,080 | 19,620 | 9½ | 14½ | 13,080 | 19,620 | |
| | | PAB7H | 14½ | 22 | 25,350 | 36,215 | 13½ | 20½ | 24,650 | 35,215 | |
| | | | 15½ | 23½ | 27,060 | 40,590 | 14½ | 22 | 27,060 | 40,590 | |
| | 1 | PAB8 | 11 | 16½ | 15,996 | 22,850 | 10½ | 16 | 16,435 | 23,480 | |
| | | | 11½ | 17½ | 17,080 | 25,625 | 11 | 16½ | 17,080 | 25,625 | |
| | | PAB8H | 17 | 25½ | 33,045 | 47,205 | 16 | 24 | 32,720 | 46,740 | |
| | | | 18 | 27 | 35,345 | 53,015 | 17 | 25½ | 35,345 | 53,015 | |
| | 1⅛ | PAB9 | 12½ | 19 | 19,795 | 28,275 | 12 | 18 | 20,255 | 28,940 | |
| | | | 13½ | 20½ | 21,620 | 32,430 | 12½ | 19 | 21,620 | 32,430 | |
| | 1¼ | PAB10 | 14½ | 22 | 25,350 | 36,215 | 14 | 21 | 26,190 | 37,415 | |
| | | | 15 | 22½ | 26,690 | 40,035 | 14½ | 22 | 26,690 | 40,035 | |



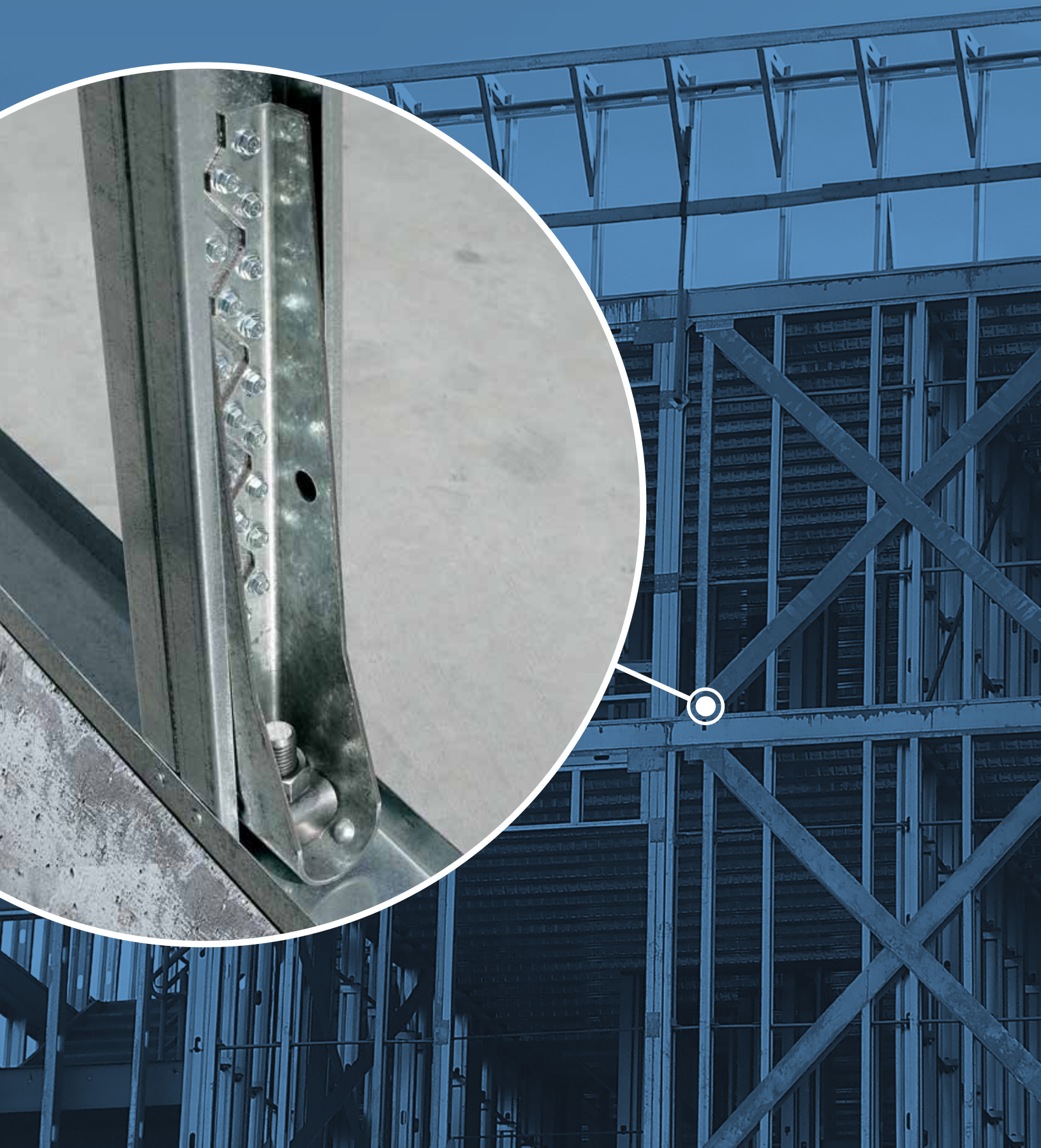

**Design loads are calculated using a full shear cone. Coverage on each side of the bolt shall be a minimum of F or reductions must be taken.**

1. Anchorage designs conform to ACI 318-14 and assume cracked concrete with no supplementary reinforcement.
2. Seismic indicates Seismic Design Category C through F and designs comply with ACI 318-14 Section 17.2.3.4. Per Section 1613 of the IBC, detached one- and two-family dwellings in SDC C may use wind values.
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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# Holdowns and Tension Ties



# **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 screws into the studs reduces installation time and saves labor cost.

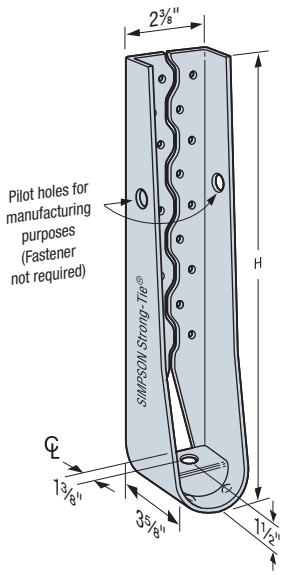
**Material:** 118 mil (10 ga.)

**Finish:** Galvanized

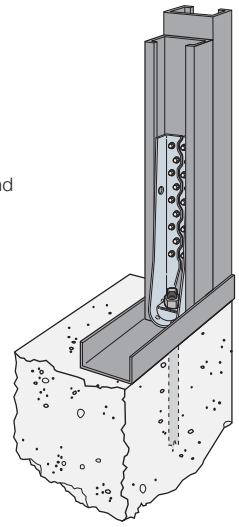
**Installation:**

- 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 pp. 236–241 for cast-in-place anchorage options
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options

**Codes:** See p. 11 for Code Reference Key Chart




**S/HDU**
U.S. Patents 5,979,130 and 6,112,495

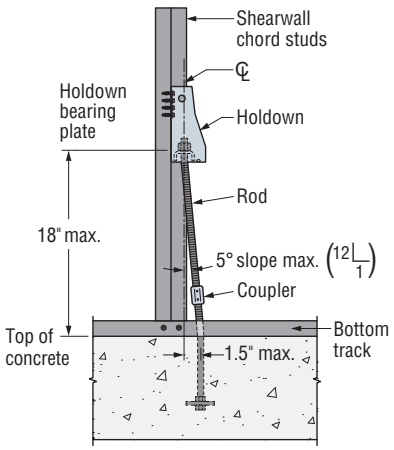


**Typical S/HDU Installation**

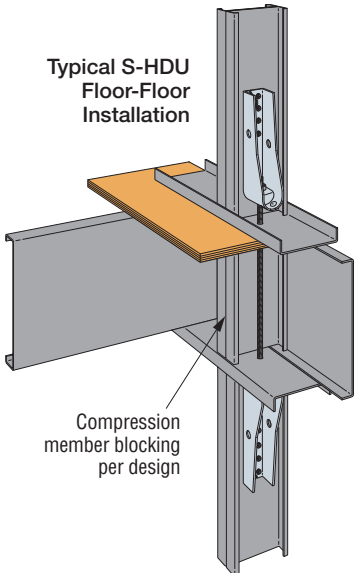
| Model | H (in.) | Fasteners: Anchor Bolt Diameter[1] (in.) | Fasteners: Stud Fasteners[7] | Stud Member Thickness[2] mil (ga.) | ASD (lb.): Tension Load | ASD (lb.): Deflection at ASD Load[5] | LRFD (lb.): Tension Load | LRFD (lb.): Deflection at LRFD Load[5] | Nominal Tension Load[6] (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| S/HDU4 | 7⅞ | ⅝ | (6) #14 | 2–33 (2–20) | 2,320 | 0.093 | 3,705 | 0.149 | 5,685 | IP1, L2, FL |
| | | | | 2–43 (2–18) | 3,825 | 0.115 | 6,105 | 0.190 | 9,365 | |
| | | | | 2–54 (2–16) | 3,970 | 0.093 | 6,345 | 0.156 | 9,730 | |
| | | | | Steel fixture | 4,470 | 0.063 | 7,165 | 0.103 | 12,120 | |
| S/HDU6 | 10⅜ | ⅝ | (12) #14 | 2–33 (2–20) | 4,895 | 0.125 | 8,495 | 0.250 | 10,470 | |
| | | | | 2–43 (2–18) | 6,125 | 0.119 | 9,690 | 0.250 | 15,460 | |
| | | | | 2–54 (2–16) | 6,125 | 0.108 | 9,785 | 0.234 | 15,005 | |
| | | | | Steel fixture | 5,995 | 0.060 | 9,580 | 0.136 | 14,695 | |
| S/HDU9 | 12⅞ | ⅞ | (18) #14 | 2–33 (2–20) | 6,965 | 0.103 | 11,125 | 0.189 | 13,165 | |
| | | | | 2–43 (2–18) | 9,255 | 0.125 | 15,485 | 0.250 | 21,810 | |
| | | | | 2–54 (2–16) | 9,990 | 0.106 | 15,960 | 0.225 | 24,480 | |
| | | | | Steel fixture | 12,715 | 0.125 | 20,510 | 0.177 | 31,455 | |
| S/HDU11 | 16⅝ | ⅞ | (27) #14 | 2–33 (2–20) | 6,965 | 0.103 | 11,125 | 0.189 | 13,165 | |
| | | | | 2–43 (2–18) | 9,595 | 0.096 | 15,330 | 0.162 | 23,515 | |
| | | | | 2–54 (2–16) | 9,675 | 0.110 | 15,460 | 0.158 | 23,710 | |
| | | ⅞ with heavy hex nut | (27) #14 | 2–43 (2–18)[6] | 11,100 | 0.125 | 17,500 | 0.250 | 24,955 | |
| | | | | 2–54 (2–16)[6] | 12,175 | 0.125 | 19,445 | 0.243 | 29,825 | |
| | | | | Steel fixture[6] | 12,945 | 0.111 | 20,680 | 0.163 | 31,715 | |

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" 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




**Holdown Raised Off CFS Bottom Track**




**Typical S-HDU Floor-Floor Installation**



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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.

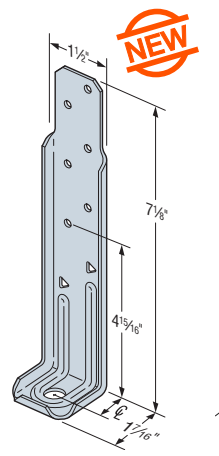
**Material:** HTT — 111 mil (11 ga.)
DTT1Z, S/DTT2Z — 68 mil (14 ga.)
S/LTT20B — Strap: 97 mil (12 ga.); Plate: 229 mil (3 ga.)

**Finish:** HTT, S/LTT — Galvanized;
DTT1Z, S/DTT2Z — ZMAX® coating

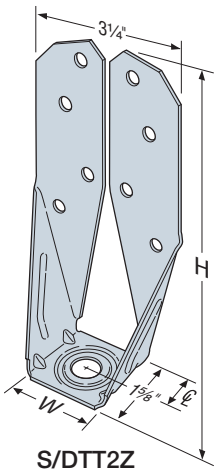
**Installation:**

- 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 pp. 236–239 for anchorage options.
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options.

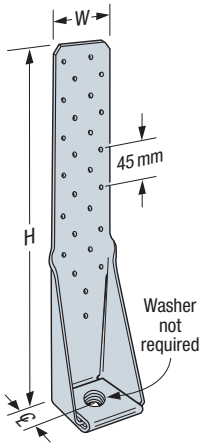
**Codes:** See p. 11 for Code Reference Key Chart



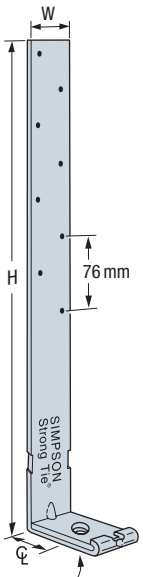

**DTT1Z**
U.S. Patent Pending



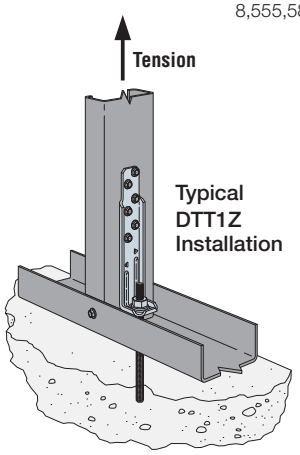

**S/DTT2Z**
U.S. Patent 8,555,580



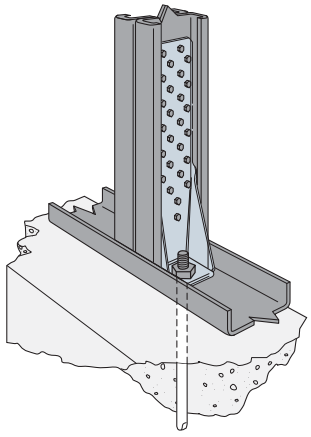

**HTT5**
*(HTT4 similar)*




**S/LTT20**




**Typical DTT1Z Installation**



**Typical HTT5 Installation as a Holdown**

| Model | Dimensions (in.) | | | Fasteners | | Stud Member Thickness mil (ga.) | ASD (lb.) | | LRFD (lb.) | | Nominal Tension Load[4] (lb.) | 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] | | |
| NEW DTT1Z | 1½ | 7⅛ | ¾ | ⅜ | (6) #10 | 33 (20) | 905 | 0.156 | 1,270 | 0.250 | 3,485 | IP1, L2, FL |
| S/LTT20 | 2 | 20 | 1½ | ½ | (8) #10 | 33 (20) | 1,200 | 0.125 | 1,890 | 0.250 | 4,625 | |
| S/DTT2Z | 1⅝ | 6¹⁵⁄₁₆ | ¹³⁄₁₆ | ½ | (8) #14 | 33 (20) | 1,570 | 0.138 | 2,200 | 0.250 | 4,265 | |
| | | | | | | 43 (18) | 1,685 | 0.151 | 2,355 | 0.250 | 5,570 | |
| | | | | | | 2–33 (2–20) | 1,735 | 0.153 | 2,430 | 0.250 | 5,735 | |
| HTT4 | 2½ | 12⅜ | 1⅜ | ⅝ | (18) #10 | 33 (20) | 3,180 | 0.104 | 4,770 | 0.187 | 8,215 | |
| | | | | | | 2–33 (2–20) | 4,395 | 0.125 | 6,675 | 0.250 | 11,835 | |
| HTT5 | 2½ | 16 | 1⅜ | ⅝ | (26) #10 | 43 (18) | 4,240 | 0.125 | 6,505 | 0.250 | 11,585 | |
| | | | | | | 2–43 (2–18) | 4,670 | 0.125 | 6,970 | 0.250 | 12,195 | |
| | | | | | | 1–54 (1–16) | 4,150 | 0.125 | 6,425 | 0.250 | 12,365 | |

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 p. 243 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 pp. 138 through 171 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 prepunch the bolt holes.

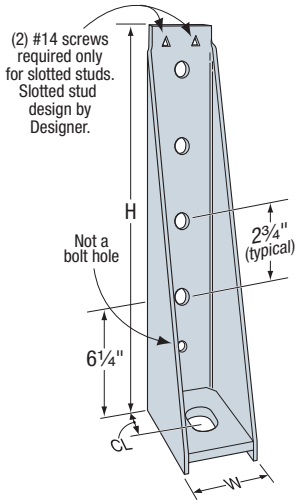
**Material:** See table

**Finish:** Simpson Strong-Tie® gray paint. Hot-dip galvanized is available; see Corrosion-Information, pp. 18–21.

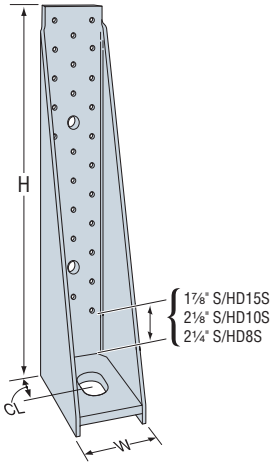
**Installation:**

- 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 pp. 236–241 for anchorage options.
- See SET-XP® and AT-XP® adhesive products for anchor bolt retrofit options.

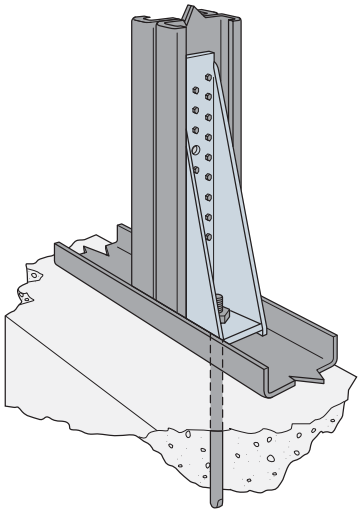
**Codes:** See p. 11 for Code Reference Key Chart



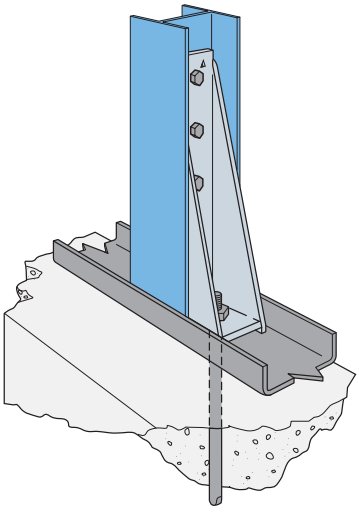

**S/HD15B**



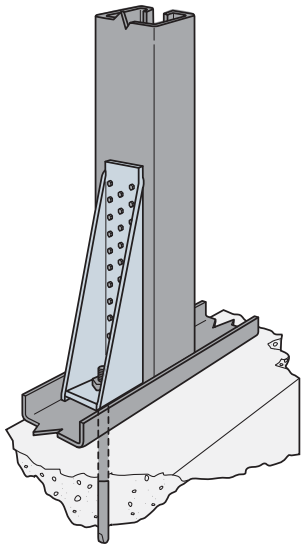

**S/HD15S**
*(S/HD8S and S/HD10S similar)*



**Typical S/HD10S Back-to-Back Stud Installation**



**Typical S/HD10B PACO Column Installation**
*See Code Report*



**Typical S/HD10S Heavy-Duty (Large Flange) Stud Application**
*See Code Report*



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# S/HDS and S/HDB Holdowns



| Model No. | Mil (Ga.) | H (in.) | W (in.) | ℄ (in.) | Fasteners | | Stud Member Thickness mil (ga.) | ASD (lb.) | | LRFD (lb.) | | Nominal Tension Load (lb.) | 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 (2–20) | 7,335 | 0.12 | 11,715 | 0.204 | 13,720 | IP1, L2, FL |
| | | | | | | | 2–43 (2–18) | 8,750 | 0.086 | 13,975 | 0.146 | 21,435 | |
| | | | | | | | 2–54 (2–16) | 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 (2–20) | 7,400 | 0.122 | 11,815 | 0.192 | 13,835 | |
| | | | | | | | 2–43 (2–18) | 11,120 | 0.112 | 17,755 | 0.124 | 20,795 | |
| | | | | | | | 2–54 (2–16) | 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 (2–18) | 12,110 | 0.096 | 19,340 | 0.164 | 22,645 | |
| | | | | | | | 2–54 (2–16) | 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 (2–20) | 3,895 | 0.081 | 5,620 | 0.144 | 8,645 | |
| | | | | | | | 2–43 (2–18) | 5,345 | 0.098 | 7,710 | 0.146 | 11,865 | |
| | | | | | | | 2–54 (2–16) | 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 (2–20) | 5,840 | 0.070 | 8,430 | 0.124 | 12,970 | |
| | | | | | | | 2–43 (2–18) | 8,015 | 0.087 | 11,565 | 0.12 | 17,795 | |
| | | | | | | | 2–54 (2–16) | 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 (2–18) | 16,020 | 0.118 | 15,425 | 0.179 | 22,165 | |
| | | | | | | | 2–54 (2–16) | 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 A36 or A307 anchor bolts.
2. Stud design by Specifier. Tabulated loads are based on a minimum stud thickness for fastener connection.
3. ¼" 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 p. 243 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 pp. 138 through 171 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.

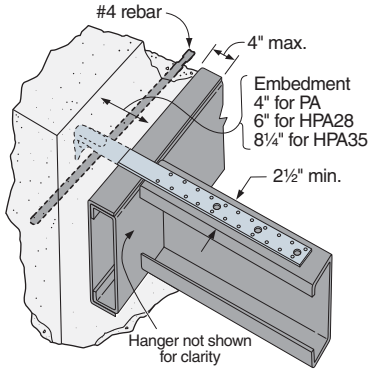
D Minimum masonry compressive strength, $f'_m$ = 1,500 psi.

**Options:** See S/LTT and HTT Tension Ties for alternate retrofit solutions

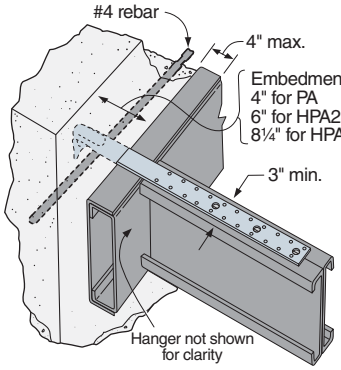
**Codes:** See p. 11 for Code Reference Key Chart

**The ASCE 7-10 12.11.2.2.5 states:**

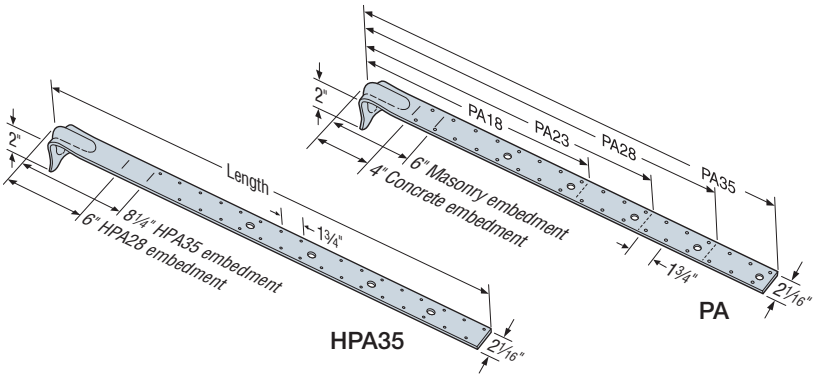
*... Diaphragm to structural wall anchorage using embedded straps shall be attached to, or hooked around the reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel.*

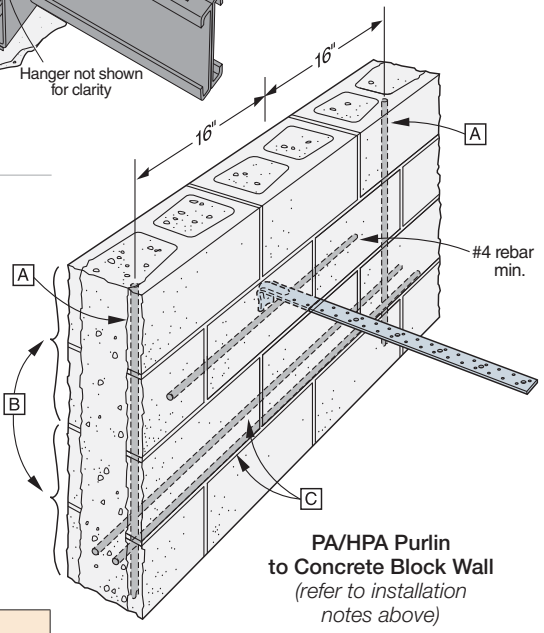



**PA/HPA Purlin to Concrete Wall Single C-Shape Joist Installation**




**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.) | $l_e$ (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 Load (lb.)** | | | | | | | | | | |
| PA18 | 18½ | 4 | (16) #10 | (16) #10 | (8) #10 | 2,830 | 2,360 | NA | 1,895 | |
| PA23 | 23¾ | 4 | (22) #10 | (16) #10 | (8) #10 | 3,220 | 2,360 | NA | 2,815 | |
| PA28 | 29 | 4 | (22) #10 | (16) #10 | (8) #10 | 3,370 | 2,360 | NA | 2,815 | |
| PA35 | 35 | 4 | (22) #10 | (16) #10 | (8) #10 | 3,370 | 2,360 | NA | 2,815 | |
| HPA28 | 32½ | 6 | (28) #10 | (20) #10 | (10) #10 | 4,845 | 4,845 | NA | — | |
| HPA35 | 38½ | 8¼ | (32) #10 | (22) #10 | (12) #10 | 5,145 | 5,145 | NA | — | |
| **SDC C–F — Allowable Load (lb.)** | | | | | | | | | | I8 |
| PA18 | 18½ | 4 | (16) #10 | (16) #10 | (8) #10 | 2,830 | 1,980 | 3,220 | 1,895 | |
| PA23 | 23¾ | 4 | (22) #10 | (16) #10 | (8) #10 | 2,830 | 1,980 | 3,220 | 2,815 | |
| PA28 | 29 | 4 | (22) #10 | (16) #10 | (8) #10 | 2,830 | 1,980 | 3,935 | 2,815 | |
| PA35 | 35 | 4 | (22) #10 | (16) #10 | (8) #10 | 2,830 | 1,980 | 3,935 | 2,815 | |
| HPA28 | 32½ | 6 | (28) #10 | (20) #10 | (10) #10 | 4,845 | 4,090 | 5,145 | — | |
| HPA35 | 38½ | 8¼ | (32) #10 | (22) #10 | (12) #10 | 5,145 | 5,145 | 5,145 | — | |

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, $f'_c$ = 3,000 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 ($S_{min} = 3 \times l_e$) 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



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# STHD/LSTHD Strap Tie Holdowns

*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

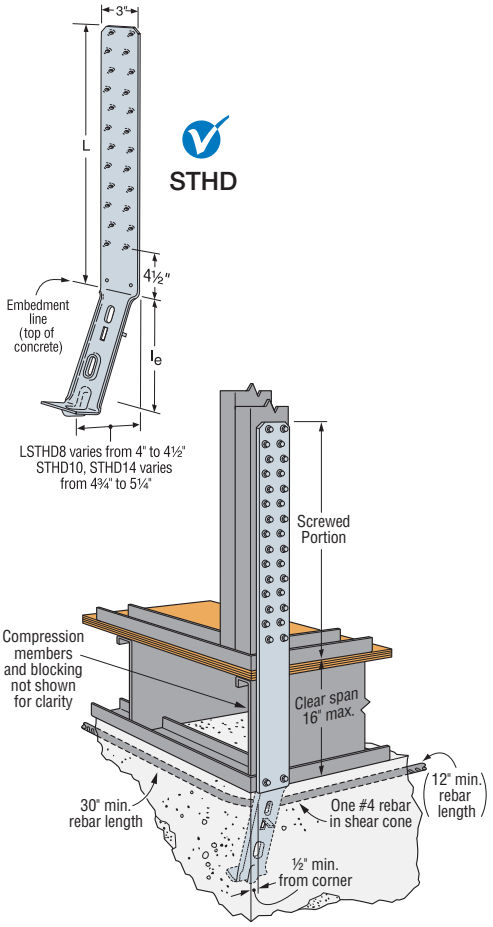
**Material:** LSTHD8, LSTHD8RJ — 14 gauge, all others — 12 gauge

**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.
- For installation in severe corrosion environments, refer to **strongtie.com** for additional considerations.

**Codes:** See p. 11 for Code Reference Key Chart




**Typical STHD14RJ Rim Joist Application**

## Allowable Stress Design (ASD) Loads for STHD Strap Style Hold-Down on CFS — 2,500 psi Concrete

| Wind and SDC A&B — Allowable Tension Load (lb.) — 33 mil (20 ga.) Studs | | | | | | | | | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. Stem Wall (in.) | Model No. | | Strap Length (L) | | $l_e$ (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 | 3,115 | 2,700 | 1,690 | (16) #10 | 2,675 | 2,320 | 1,455 | I8, FL |
| | STHD10 | STHD10RJ | 24⅝ | 38⅛ | 10 | (24) #10 | 3,690 | 3,820 | 2,050 | (22) #10 | 3,140 | 3,140 | 1,705 | |
| | STHD14 | STHD14RJ | 26⅛ | 39⅝ | 14 | (30) #10 | 5,150 | 5,150 | 3,200 | (30) #10 | 5,150 | 5,150 | 3,200 | |
| 8 | LSTHD8 | LSTHD8RJ | 18⅝ | 32⅛ | 8 | (20) #10 | 3,115 | 2,700 | 2,230 | (16) #10 | 2,675 | 2,320 | 1,915 | |
| | STHD10 | STHD10RJ | 24⅝ | 38⅛ | 10 | (28) #10 | 4,755 | 4,120 | 3,145 | (26) #10 | 4,195 | 3,500 | 2,585 | |
| | STHD14 | STHD14RJ | 26⅛ | 39⅝ | 14 | (30) #10 | 5,300 | 5,300 | 4,210 | (30) #10 | 5,300 | 5,300 | 4,210 | |
| **SDC C–F — Allowable Tension Load (lb.) — 33 mil (20 ga.) Studs** | | | | | | | | | | | | | | |
| Min. Stem Wall (in.) | Model No. | | Strap Length (L) | | $l_e$ (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 | 2,270 | 2,090 | 1,220 | (14) #10 | 2,250 | 1,950 | 1,220 | |
| | STHD10 | STHD10RJ | 24⅝ | 38⅛ | 10 | (18) #10 | 2,750 | 2,750 | 1,615 | (18) #10 | 2,640 | 2,640 | 1,435 | |
| | STHD14 | STHD14RJ | 26⅛ | 39⅝ | 14 | (22) #10 | 3,695 | 3,695 | 2,685 | (22) #10 | 3,695 | 3,695 | 2,685 | |
| 8 | LSTHD8 | LSTHD8RJ | 18⅝ | 32⅛ | 8 | (16) #10 | 2,615 | 2,125 | 1,635 | (14) #10 | 2,250 | 1,820 | 1,610 | |
| | STHD10 | STHD10RJ | 24⅝ | 38⅛ | 10 | (20) #10 | 3,400 | 2,940 | 2,295 | (20) #10 | 3,400 | 2,940 | 2,175 | |
| | STHD14 | STHD14RJ | 26⅛ | 39⅝ | 14 | (24) #10 | 3,815 | 3,815 | 3,500 | (24) #10 | 3,815 | 3,815 | 3,500 | |

For SI: 1 in. = 25.4 mm, 1 lb. = 4.45 N, 1 psi = 6.895 kPa.

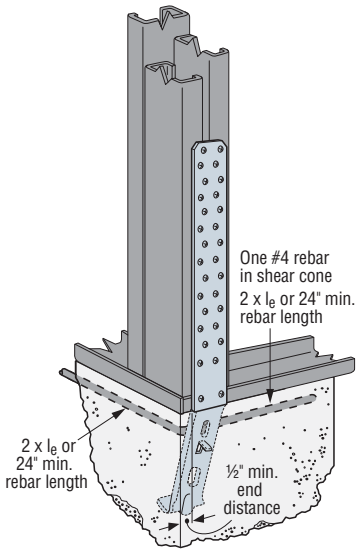
1. Deflection at highest allowable loads for install over CFS double studs are as follows: LSTHD8 = 0.065", STHD8 = 0.071", STHD10 = 0.096" and STHD14 = 0.115".
2. Multiply Seismic and Wind ASD load values by 1.4 or 1.6 respectively to obtain LRFD capacities.
3. Per 2009 and 2013 IBC Section 1613, detached 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 three times the required embedment ($S_{min} = 3x l_e$) for STHD's acting in tension simultaneously. Mid wall install is based on 1.5xle end distance.
5. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



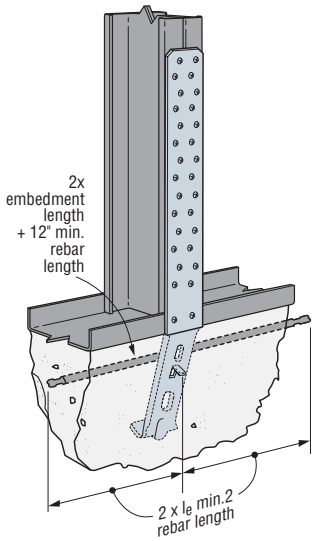


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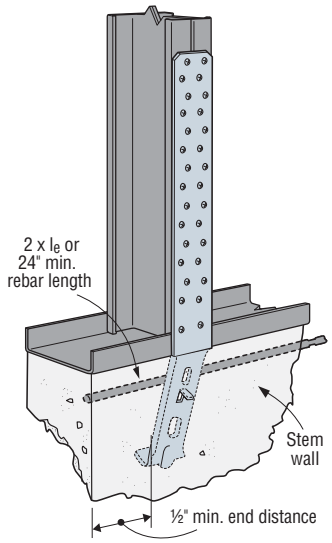
# **STHD/LSTHD** Strap Tie Holdowns



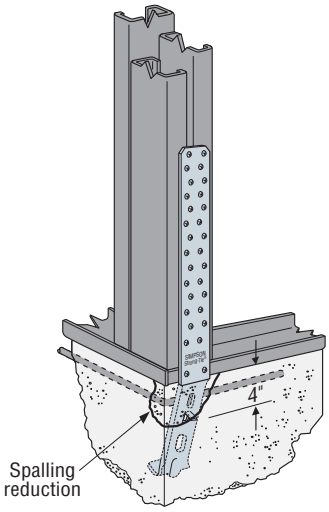

**Typical STHD14 Corner Installation on Three Studs**
*(end of wall similar)*



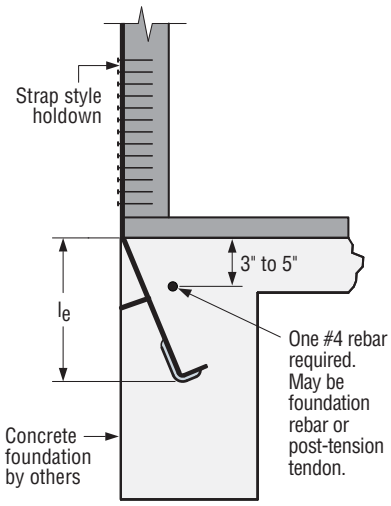

**Typical STHD14 Mid-Wall Installation**



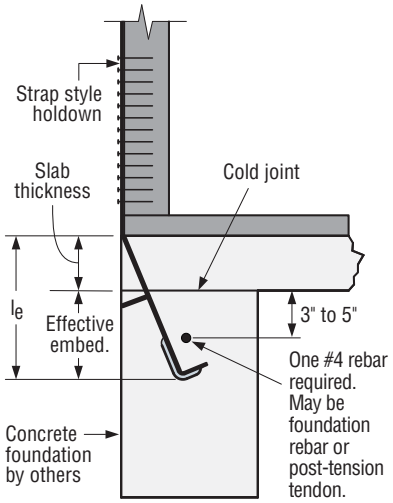

**Typical STHD End Installation**




**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

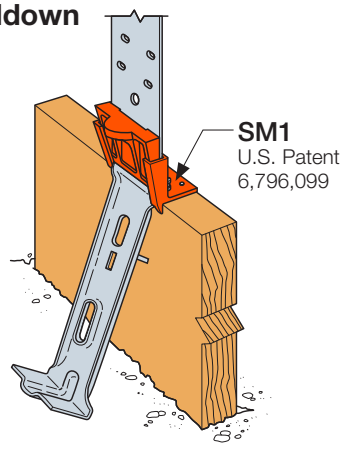
**Features**
- Built-in tab
- StrapMate® locator line
- Additional diamond hole in RJ versions

**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.

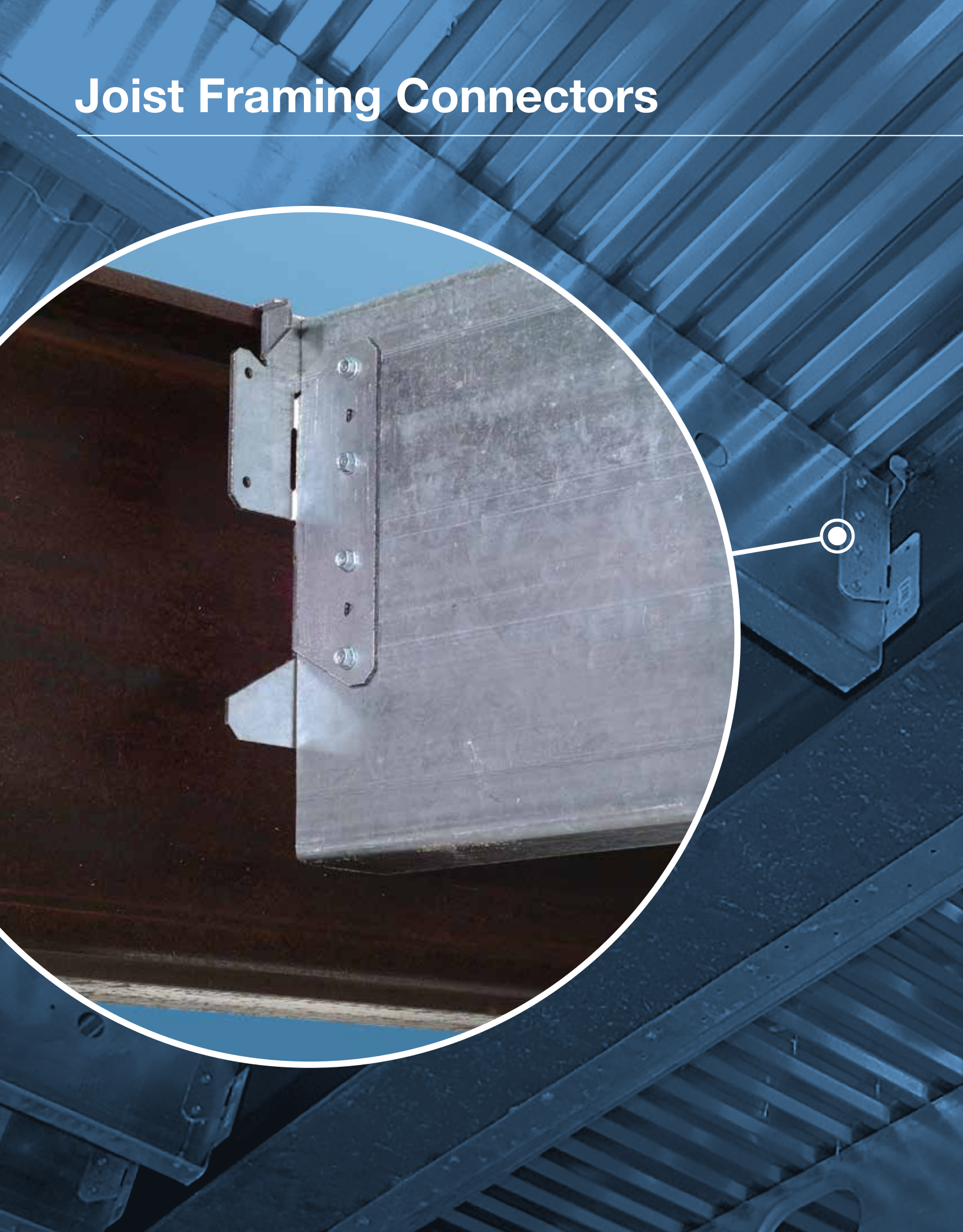
**Additional Diamond Hole:**
- One more fastener to help prevent the STHD RJ models from bowing out at the rim joist section.






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# Joist Framing Connectors

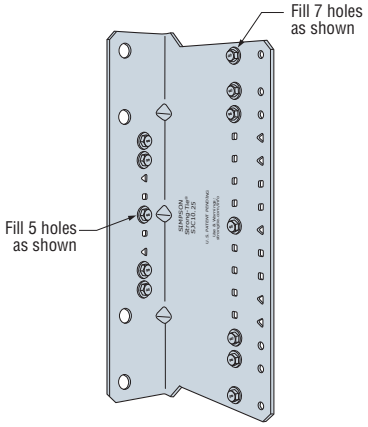


# **SJC** Steel-Joist Connectors

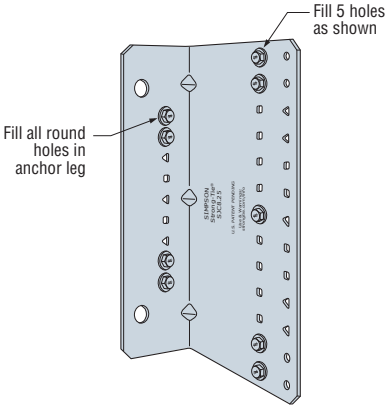
## SJC Connectors: Steel-to-Steel

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Framing Member Depth[5] (in.) | Fasteners[6] | | | Allowable $F_4$ Load (lb.)[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 | 2,930 | IP2 |
| | | | | Max. | (9) #10 | (7) #10 | 1,005 | 1,490 | | |
| | | | | Inner | (5) #10 | (4) #10 | 1,345 | 2,005 | | |
| MSJC8.25 | 97 (12) | 8¼ | 10 | Min. | (4) #10 | (4) #10 | 1,005 | 1,710 | 2,930 | |
| | | | | Max. | (9) #10 | (7) #10 | 1,135 | 1,765 | | |
| | | | | Inner | (5) #10 | (4) #10 | 1,535 | 2,220 | | |
| SJC10.25 | 68 (14) | 10¼ | 12 | Min. | (6) #10 | (4) #10 | 1,170 | 1,625 | 3,935 | |
| | | | | Max. | (11) #10 | (7) #10 | 1,265 | 1,625 | | |
| | | | | Inner | (7) #10 | (5) #10 | 1,620 | 2,170 | | |
| MSJC10.25 | 97 (12) | 10¼ | 12 | Min. | (6) #10 | (4) #10 | 1,200 | 2,045 | 3,935 | |
| | | | | Max. | (11) #10 | (7) #10 | 1,265 | 2,045 | | |
| | | | | Inner | (7) #10 | (5) #10 | 1,730 | 2,635 | | |

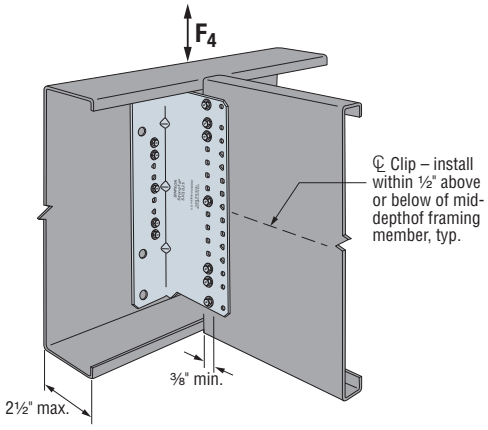
1. See p. 82 for product information.
2. Min. fastener quantity and load values — fill all round holes; Max. fastener quantity and load values — fill all round and triangular holes; Inner fastener quantity and load values — see illustrations for fastener placement.
3. Allowable loads are based on bracing 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



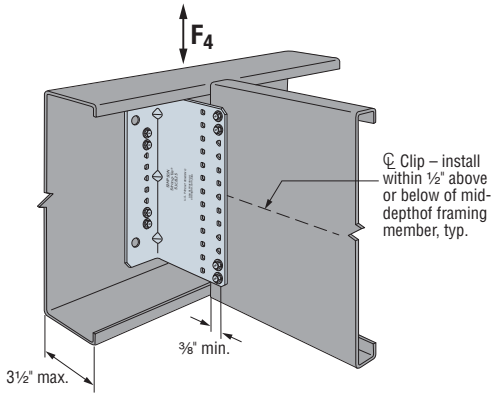

**SJC10.25-Inner Fastener Pattern**
*(MSJC10.25 similar)*




**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/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:**

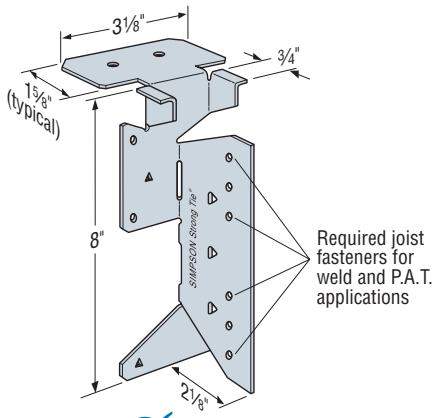
- Uni-directional: Joist can be attached from left or right
- One size fits joists 8" through 14" deep
- Optional holes for additional load capacity
- Simplicity of design
- Quick and easy installation
- Field skewable up to 45° left or right

**Installation:**

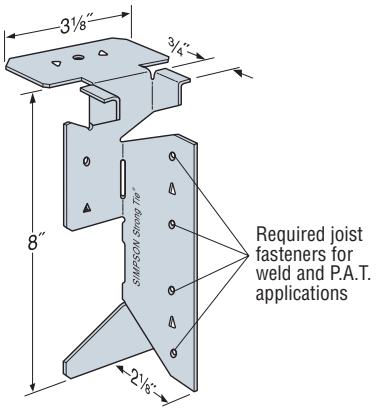
- Attach hanger with specified fasteners. Use round holes for minimum load, use round and triangle holes for maximum load.
- May be used for weld-on applications. The minimum required weld to the top flange is ⅛" x 2½" fillet weld to each side of top flange. Consult the code for special considerations 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 p. 253.

**Codes:** See p. 11 for Code Reference Key Chart

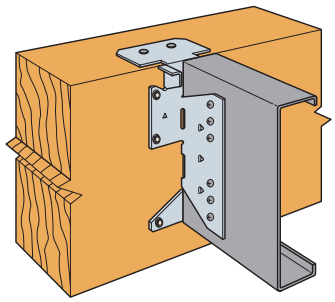
**Ordering Information:** The S/JCT is sold in cartons of 50. The S/HJCT is sold in kits as the S/HJCT-KT and contains five (5) connectors and (95) #14 screws.




S/HJCT
U.S. Patent 6,230,467




S/JCT



**S/HJCT Installation with a 4x10 Wood Header**

| Model No. | Fasteners[7] Top | Face | Joist | Allowable Load[1] Uplift | Down | Code Ref. |
|---|---|---|---|---|---|---|
| **Attached to CFS Header: 54 mil (16 ga.)[3] — Straight Hanger** | | | | | | IP1 L2 FL |
| S/JCT (min.) | (1) #10 | (2) #10 | (4) #10 | 940 | 1,195 | |
| S/JCT (max.) | (1) #10 | (4) #10 | (6) #10 | 1,435 | 2,105 | |
| S/HJCT (min.) | (2) #10 | (4) #14 | (6) #14 | 1,510 | 2,920 | |
| S/HJCT (max.) | (2) #10 | (8) #14 | (9) #14 | 1,670 | 3,855 | |
| **Attached to CFS Header: 54 mil (16 ga.)[3] — Skewed Hanger** | | | | | | |
| S/JCT (min.) | (1) #10 | (2) #10 | (4) #10 | 940 | 1,135 | |
| S/JCT (max.) | (1) #10 | (4) #10 | (6) #10 | 940 | 1,185 | |
| S/HJCT (min.) | (2) #10 | (4) #10 | (6) #14 | 1,510 | 2,305 | |
| **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 | 1,450 | |
| S/HJCT (min.) Skew | | | (4) #14 | 195 | 1,235 | |
| S/JCT (min.) | (2) 0.157" x ⅝" powder-actuated fastener[8] | | (4) #10 | 145 | 750 | 170 |
| S/HJCT (min.) | | | (4) #14 | 195 | 1,185 | |
| **Attached to Masonry — Straight and Skewed Hanger** | | | | | | |
| S/HJCT (min.) | (2) ¼" x 2¼" Titen | (4) ¼" x 2¼" Titen | (6) #14 | 710 | 1,785 | |
| S/HJCT (min.) Skew | | | | 710 | 1,410 | |

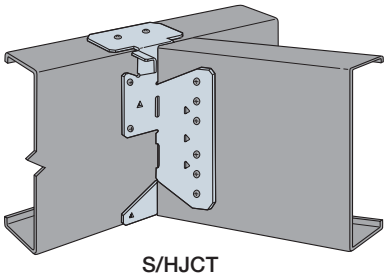
| Model No. | Fasteners[7] Top | Face | Joist | Allowable Load[1,2] Uplift (160) | Down (100) | Code Ref. |
|---|---|---|---|---|---|---|
| **Attached to 4x DF/SP Wood Header — Straight Hanger** | | | | | | IP1 L2 FL |
| S/JCT (min.) | (1) 10d | (2) 10d | (4) #10 | 555 | 945 | |
| S/JCT (max.) | (1) 10d | (4) 10d | (6) #10 | 945 | 1,465 | |
| S/HJCT (min.) | (2) 10d | (4) ¼"x3" SDS | (6) #14 | 1,210 | 2,625 | |
| S/HJCT (max.) | (2) 10d | (8) ¼"x3" SDS | (9) #14 | 1,475 | 2,980 | |
| **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 | 1,300 | |
| S/HJCT (min.) | (2) 10d | (4) ¼" x 3" SDS | (6) #14 | 1,210 | 1,935 | |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.
8. See p. 253 for more information.

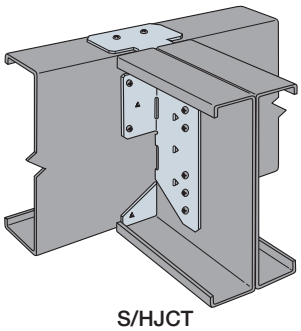


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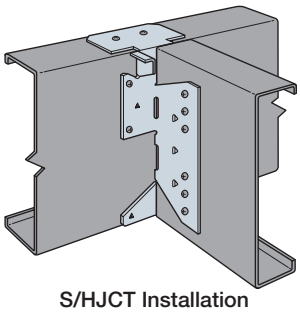
# **S/JCT and S/HJCT** Steel-Joist Connectors



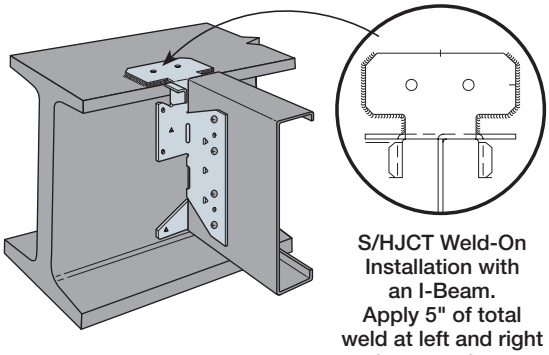
S/HJCT
Skewed 45° Installation



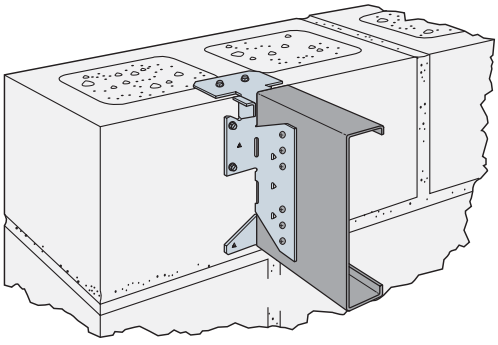
S/HJCT
Double-Joist Installation



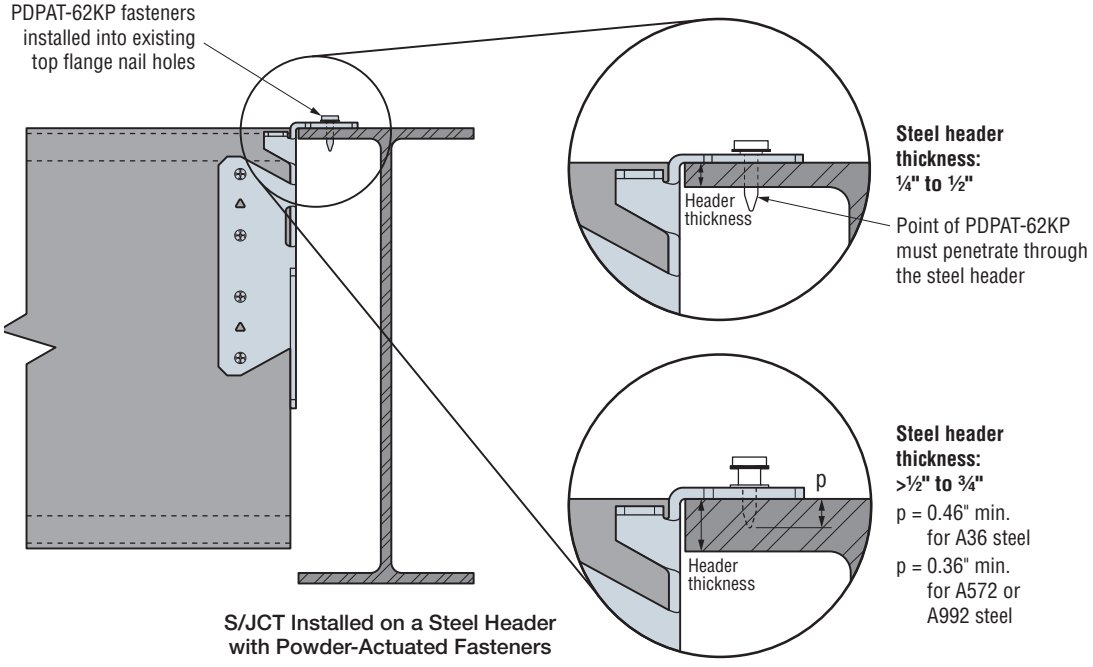
S/HJCT Installation
with a CFS Steel Header



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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# 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 — 68 mil (14 ga.); S/B — 97 mil (12 ga.)

**Finish:** Galvanized

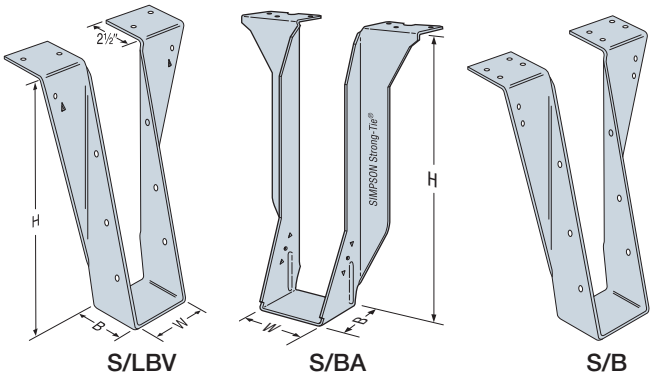
**Installation:**

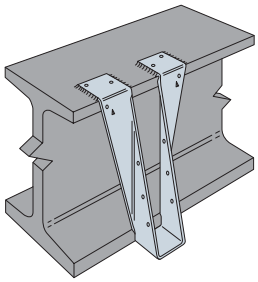
- S/LBV, S/B, and S/BA may be used for weld-on applications; a minimum of ⅛" x 2" fillet weld on each top flange is required. Distribute the weld equally on both top flanges. Consult the code for special consideration when welding galvanized steel. Uplift loads do not apply.
- S/BA may be installed using 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:

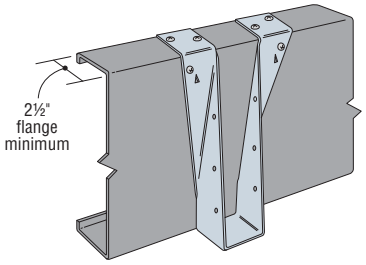
- S/LBV and S/B series (max. width = 5½") can be skewed to a maximum of 45 degrees

**Codes:** See p. 11 for Code Reference Key Chart



**S/LBV, S/B, and S/BA Are Acceptable for Weld-on Applications**
*(S/LBV shown)*



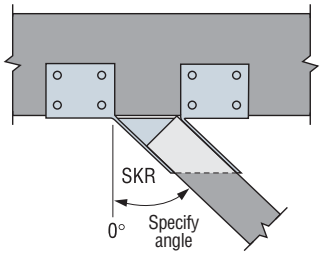

**S/LBV Installation with a CFS Steel Header**

| Model | Dimensions (in.) | | | Fasteners[6] | | | Allowable ASD Load[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 | 1,010 | 3,150 | IP1, FL, L2 |
| S/B | | 6 to 30 | 3 | (8) #10 | (4) #14 | (3) #14 | 1,855 | 5,970 | |
| S/BA | | See table | 3 | (6) #10 | — | (1) #10 | — | 3,475 | |
| **Cold-Formed Steel Header — Skewed Hanger** | | | | | | | | | |
| S/LBV | See table | 6 to 20 | 2¼ | (4) #10 | (2) #10 | (3) #10 | 1,010 | 2,220 | IP1, FL, L2 |
| S/B | | 6 to 30 | 3 | (8) #10 | (4) #14 | (3) #14 | 1,855 | 4,195 | |
| **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 | — | 2,965 | IP1, FL, L2 |
| S/B | | 6 to 30 | 3 | | — | (3) #14 | — | 5,755 | |
| S/BA | | See table | 3 | | — | (1) #10 | — | 2,920 | |
| 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 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

| S/LBV Series Model No. | S/B Series Model No. | W (in.) |
|---|---|---|
| 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 | 2⅜ |
| S/LBV2.56X | S/B2.56X | 2 9⁄16 |
| S/LBV2.68X | S/B2.68X | 2 11⁄16 |
| S/LBV3.12X | S/B3.12X | 3⅛ |
| S/LBV3.56X | S/B3.56X | 3 9⁄16 |
| S/LBV3.62X | S/B3.62X | 3⅝ |
| S/LBV4.06X | S/B4.06X | 4 1⁄16 |
| S/LBV4.12X | S/B4.12X | 4⅛ |
| S/LBV4.28X | S/B4.28X | 4¼ |
| S/LBV4.75X | S/B4.75X | 4¾ |
| — | S/B5.25X | 5¼ |
| S/LBV5.5X | S/B5.5X | 5½ |
| — | S/B5.56X | 5 9⁄16 |
| — | S/B6.06X | 6 1⁄16 |
| — | S/B7.12X | 7⅛ |
| — | S/B7.25X | 7¼ |
| — | S/B7.5X | 7½ |

| S/BA Series Model No. | S/B Series Model No. | S/LBV Series Model No. | W (in.) | H (in.) |
|---|---|---|---|---|
| S/BA2.12/8 | — | — | 2⅛ | 8 |
| S/BA2.12/10 | — | — | | 10 |
| S/BA2.12/12 | — | — | | 12 |
| S/BA2.12/14 | — | — | | 14 |
| — | S/B2.56/8 | S/LBV2.56/8 | 2 9⁄16 | 8 |
| — | S/B2.56/10 | S/LBV2.56/10 | | 10 |
| — | S/B2.56/12 | S/LBV2.56/12 | | 12 |
| — | S/B3.12/8 | S/LBV3.12/8 | 3⅛ | 8 |
| — | S/B3.12/10 | S/LBV3.12/10 | | 10 |
| — | S/B3.12/12 | S/LBV2.56/12 | | 12 |
| 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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# **S/DHUTF** Drywall Hangers

The S/DHUTF top-mount hanger is designed to carry joist loads to a CFS stud wall through two layers of ⅝" gypsum board (drywall). This hanger installs after the drywall is in place and comes in sizes that accommodate most typical joists used in multi-family and commercial construction.

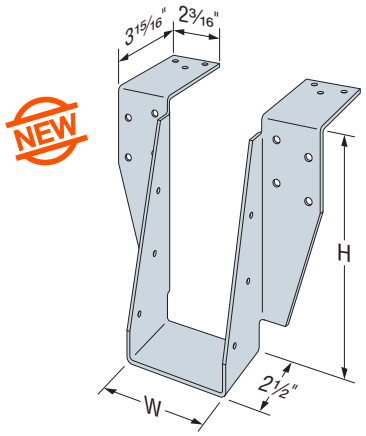
**Material:** 112 mil (12 ga.)

**Finish:** Galvanized (G90)

**Installation:**

- Use all specified fasteners; see General Notes
- Hanger to be framed in-line with vertical wall stud
- Drywall is installed first
- Wall top track must be restrained to counteract load eccentricity from hanger

**Codes:** See p. 11 for Code Reference Key Chart

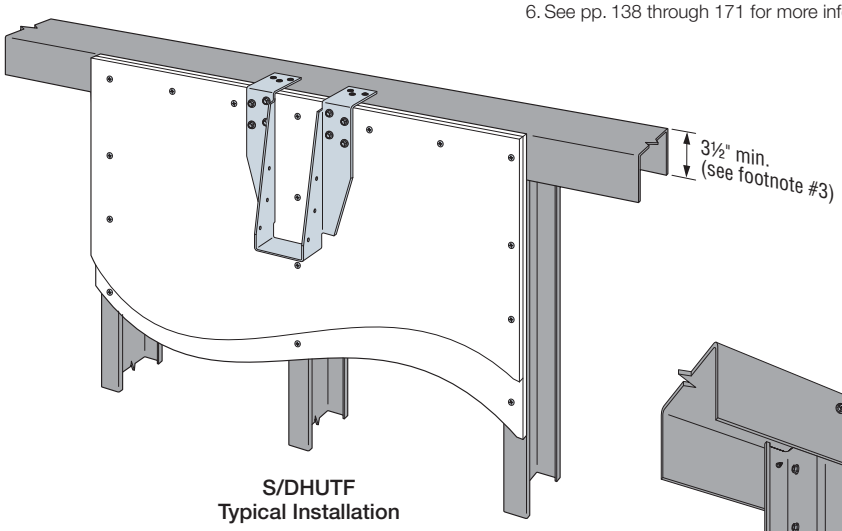



**S/DHUTF**
U.S. Patent 9,394,680

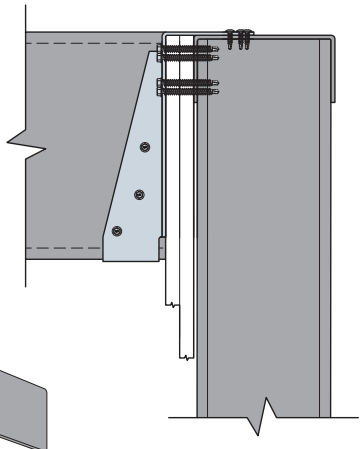
| Model No. | Dimensions (in.) | |
|---|---|---|
| | W | H |
| S/DHU1.68/8TF | 1 1⁄16 | 8 |
| S/DHU1.68/10TF | | 10 |
| S/DHU1.68/12TF | | 12 |
| S/DHU2.1/8TF | 2⅛ | 8 |
| S/DHU2.1/10TF | | 10 |
| S/DHU2.1/12TF | | 12 |
| S/DHU2.56/8TF | 2⅝6 | 8 |
| S/DHU2.56/10TF | | 10 |
| S/DHU2.56/12TF | | 12 |

| Model | Fasteners[6] | | | Allowable Load (lb.) | | Code Ref. |
|---|---|---|---|---|---|---|
| | Top | Face | Joist | Uplift | Down | |
| S/DHUTF | (6) #10 | (8) #14 x 2" | (3) #10 | 1,230 | 1,700 | 170 |

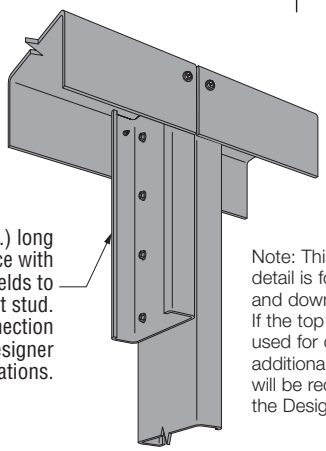
1. Designer shall ensure that the joist member adequately transfers load to the hanger.
2. Tabulated loads assume (2x) ⅝" Type X drywall attached per IBC.
3. Wall studs designed per Designer specifications. At a minimum, the assembly must consist of 600T350-68, Gr. 50 ksi top track and 600S162-43, Gr. 33 ksi wall studs spaced at a maximum of 24" o.c.
4. Tabulated loads are based on testing with full bearing of 3 15⁄16" hanger top flange. The minimum joist gauge is 54 mil (16 ga.).
5. S/DHUTF hanger can be installed ¾" max. from the center of the vertical stud per the in-line framing specifications of the AISI General Provisions without load adjustment.
6. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




**S/DHUTF**
**Typical Installation**



**Typical Installation Over (2) Layers of ⅝" Drywall**




Note: This splice detail is for uplift and download only. If the top track is used for drag, additional detailing will be required by the Designer.

**Typical Top Track Splice**



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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 pp. 18–21.

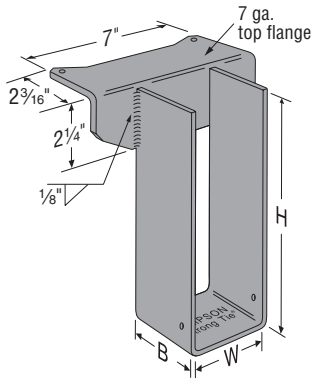
**Installation:** Hangers may be welded to steel headers with ⅛" for W and 3⁄16" for WP by 1½"-fillet welds located at each end of the top flange

**Options:** • W and H dimensions are modifiable

**Sloped and/or Skewed Seat**

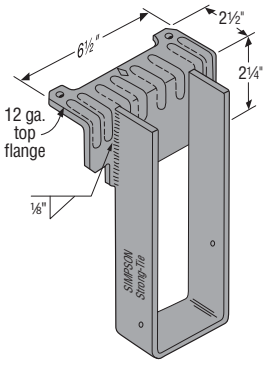
- W/WP series may be skewed to a maximum of 84° and/or sloped to a maximum of 45°.
- For slope only, skew only, or slope and skew combinations, the allowable load is 100% of the table load.
- Specify the slope up or down in degrees from the horizontal plane and/or the skew right or left in degrees from 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 p. 11 for Code Reference Key Chart




WP

*Some model configurations may differ from those shown. Call Simpson Strong-Tie for details.*




W

| Model No. | Dimensions (in.) | | | Fasteners[4] | | Allowable Down Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|
| | W | H | B | Header | Joist | | |
| W | 1½ – 4 | 4˚ – 30 | 2½ – 5 | Weld | (1) #10 | 2,335 | 170 |
| WP | 1 3⁄16 – 7½ | 4˚ – 30 | 2½ – 5 | Weld | (1) #10 | 3,650 | |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

# **HUC** Hangers

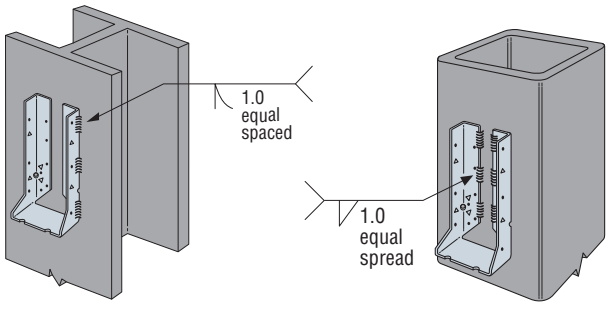
**Material:** 68 mil (14 ga.)

**Finish:** Galvanized

**Installation:**

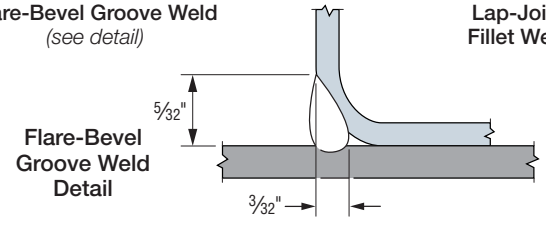
- HUC series hangers may be welded to supporting structural steel members
- Use 1" weld segments equally spaced top and bottom, with half the segments on each side of hanger
- Welds may be either lap joint (on outside edge of flanges) or flare-bevel groove (on flange bend line)

**Codes:** See p. 11 for Code Reference Key Chart




**Flare-Bevel Groove Weld** *(see detail)*

**Lap-Joint Fillet Weld**



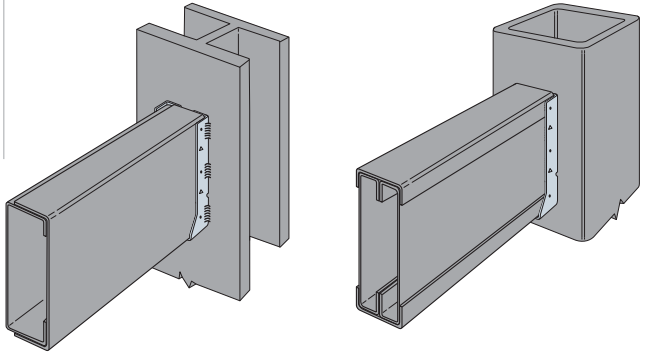

**Flare-Bevel Groove Weld Detail**

| Model Series | Connection Type | | Maximum Allowable Down Load (lb.) | Code Ref. |
|---|---|---|---|---|
| | Joist | Structural Steel | | |
| | Fastener[5,6] | Weld | | |
| HUC | #10 | (4) 1" segments | 3,280 | 170 |
| | #10 | (6) 1" segments | 4,855 | |

1. Loads assume 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 a 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.
6. The number of screws is per Designer specifications.

**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 attach members intersecting at angles.

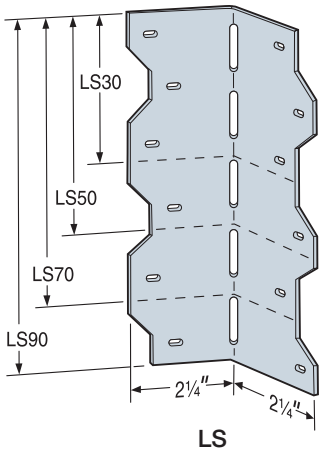
**Material:** L — 54 mil (16 ga.); S/LS and LS — 43 mil (18 ga.)

**Finish:** Galvanized (G90)

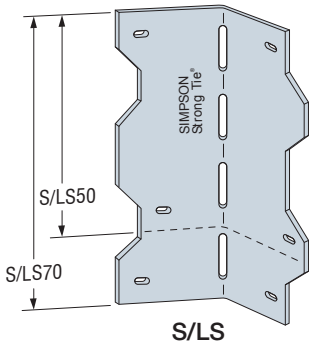
**Installation:**

- 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 p. 11 for Code Reference Key Chart

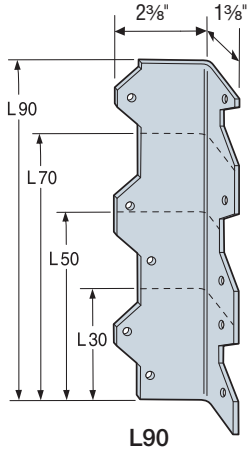



**LS**




**S/LS**

U.S. Patent 4,230,416

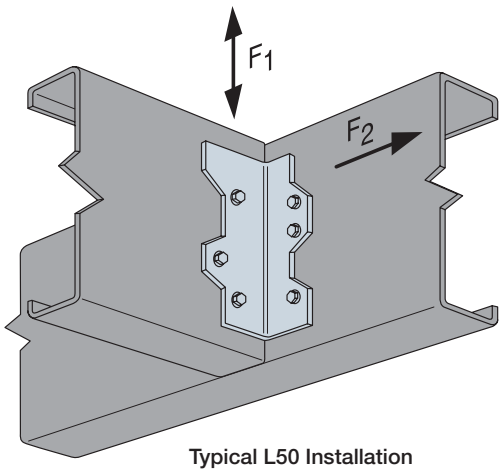



**L90**

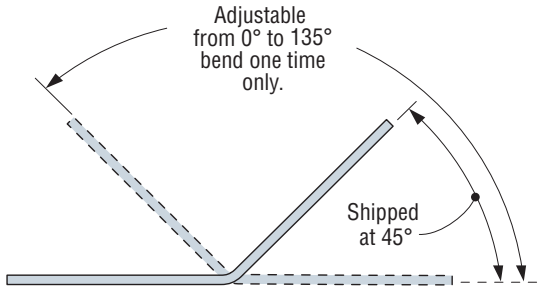
| | Model No. | Length (in.) | Fasteners[2] | Allowable Load (lb.) | | | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 33 mil (20 ga.) | | 43 mil (18 ga.) | | 54 mil (16 ga.) | | |
| | | | | $F_1$ | $F_2$ | $F_1$ | $F_2$ | $F_1$ | $F_2$ | |
| ■ | L30 | 3 | (4) #10 | 200 | 60 | 315 | 85 | 610 | — | 170 |
| ■ | L50 | 5 | (6) #10 | 475 | — | 675 | 90 | 750 | 110 | |
| ■ | L70 | 7 | (8) #10 | 705 | — | 760 | 110 | 1,100 | 110 | |
| ■ | L90 | 9 | (10) #10 | 795 | — | 945 | 110 | 1,740 | 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.

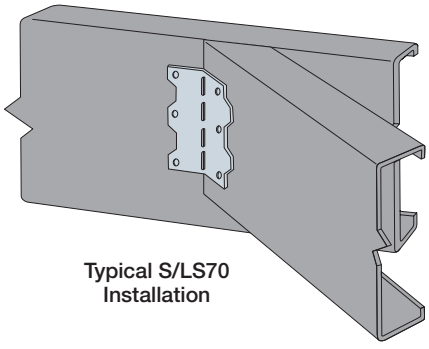
1. Loads are for one part only.
2. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




**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**

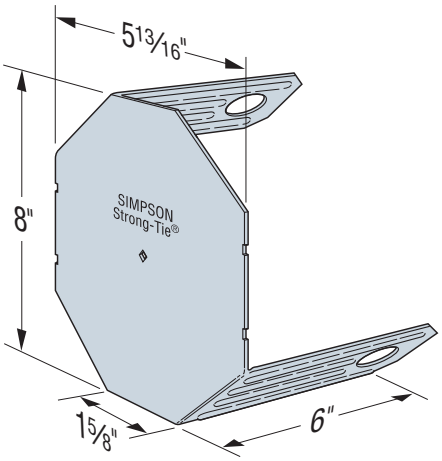
- Snap a chalk line for the bottom of the ledger
- Mark required on-center spacing
- Use ICFVL to mark kerfs locations
- Cut kerfs as marked
- Insert ICFVL flush to the face of the ICF
- Pour concrete

**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 p. 11 for Code 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

| Model No. | Fasteners | Allowable ASD Load (lb.) 54 mil (16 ga.) 68 mil (14 ga.) | | Code Ref. |
|---|---|---|---|---|
| | | Download | Lateral $F_1$ | |
| ICFVL | (4) #14 x ¾"[3] | 1,660 | 1,525 | 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" fasteners may be used.
4. Concrete $f'_c$ = 2,500 psi minimum.
5. When combining download and lateral loads, the Designer shall use the following interaction equation: Design Download/Allowable Download + Design Lateral Load/ Allowable Lateral Load ≤ 1.

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 p. 142 for details.

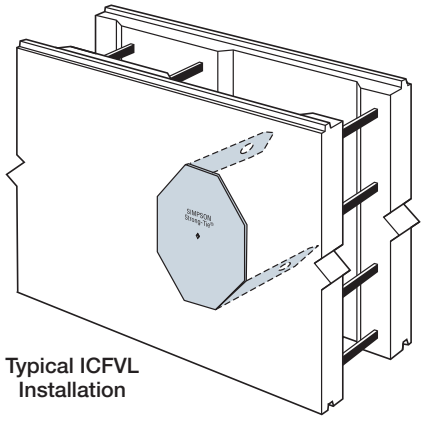


Available in 100 ct. and 2,500 ct. cartons.

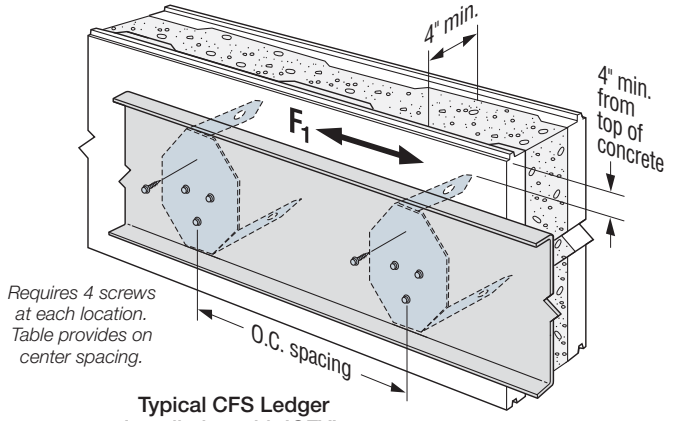
## These tables address vertical load applications only

| Ledger Material Thickness mil (ga.) | Connector Type | ICFVL Spacing to Replace Anchor Bolts on a CFS Ledger (in.)[1,2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ½"-Diameter Anchors at | | | | ⅝"-Diameter 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**




**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.

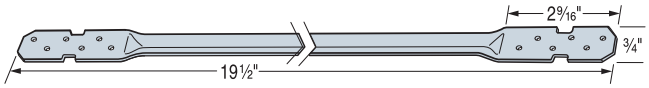
**Material:** LTB — 27 mil (22 ga.); TB — 33 mil (20 ga.)

**Finish:** Galvanized (G90)

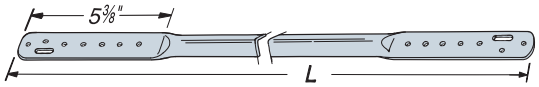
**Installation:**

- Use (2) #10 screws at each end

**Codes:** See p. 11 for Code Reference Key Chart

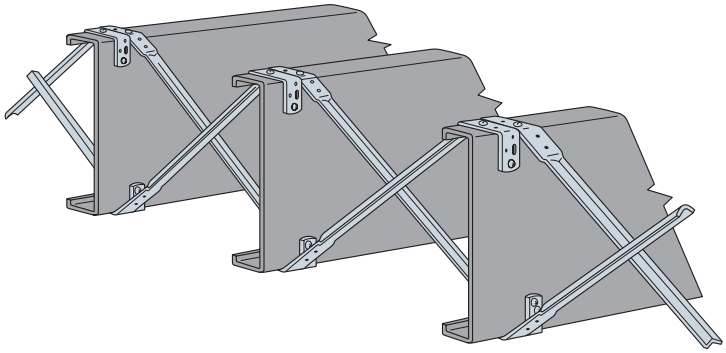



LTB20




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 lb.) and can be cut to length on the jobsite.

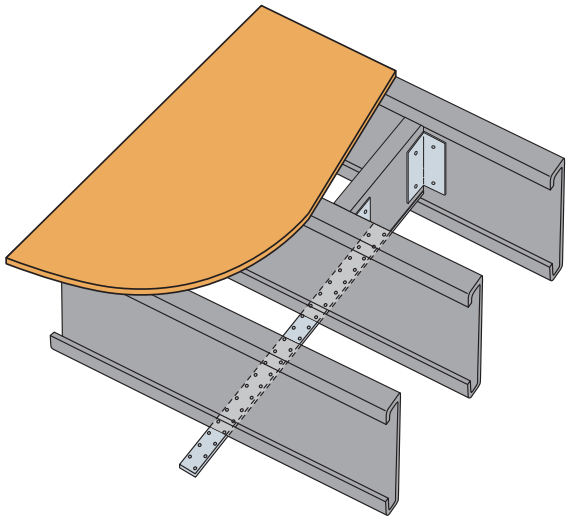
**Material:** See table

**Finish:** Galvanized (G90)

**Installation:**

- Use all specified fasteners
- Refer to the applicable code for minimum edge and end distance

**Codes:** See p. 11 for Code 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 Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | | | Framing Thickness mil (ga.) | | | | |
| | | | | 33 (20 ga.) | 43 (18 ga.) | 54 (16 ga.) | | |
| CS16 | 150 | 54 (16) | 1¼ | (9) #10 | (6) #10 | (4) #10 | 1,550 | IP1, L2, FL |
| CS18 | 200 | 43 (18) | 1¼ | (7) #10 | (5) #10 | (3) #10 | 1,235 | |
| CS20 | 250 | 33 (20) | 1¼ | (6) #10 | (4) #10 | (3) #10 | 945 | |
| CS22 | 300 | 27 (22) | 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:

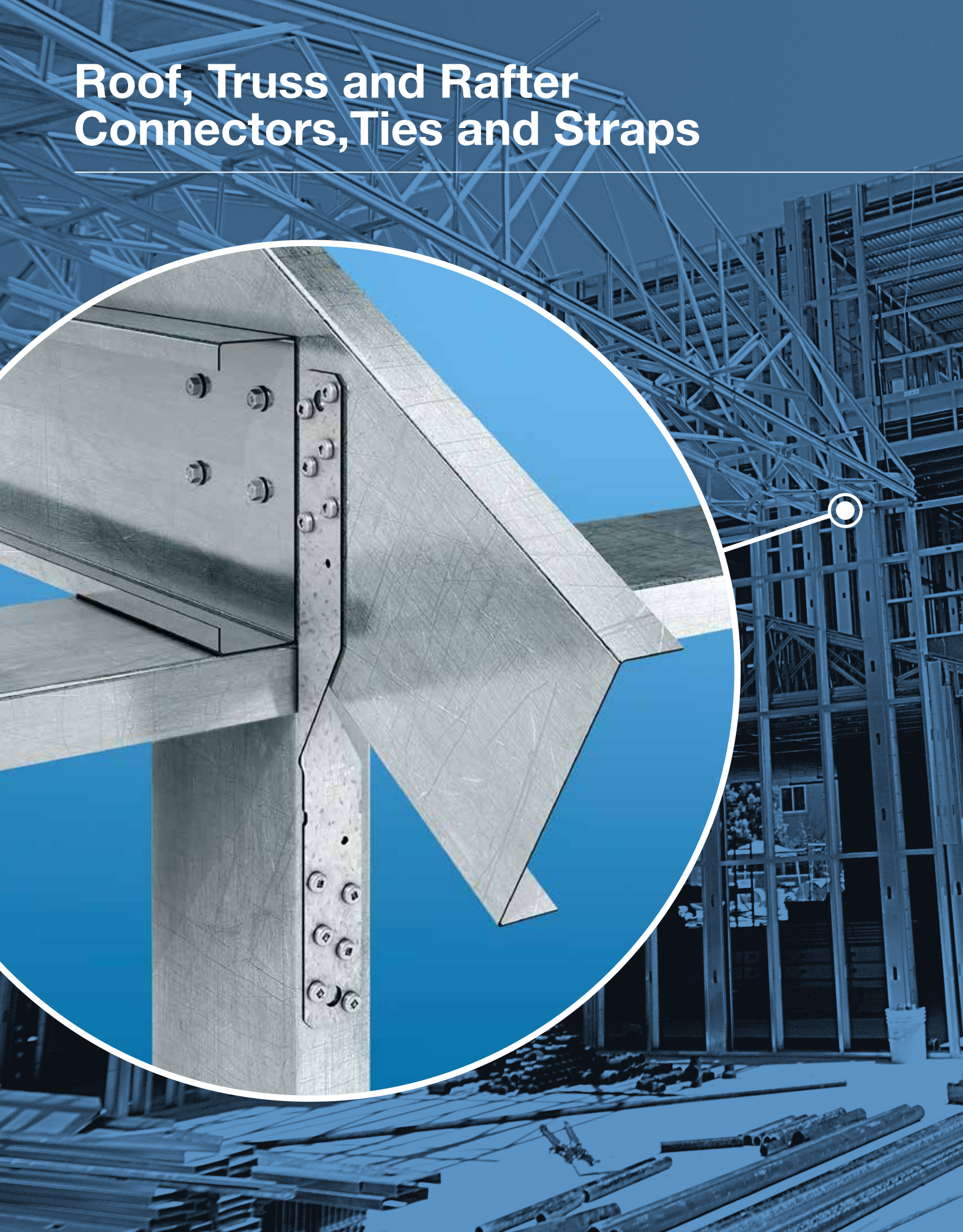
$$\text{Allowable Load} = \frac{\text{No. of Screws Used}}{\text{No. of Screws in Table}} \times \text{Table Load}$$

4. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



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# Roof, Truss and Rafter Connectors,Ties and Straps



# **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, pp. 18–21.

**Installation:** • Use all specified fasteners; see General Notes

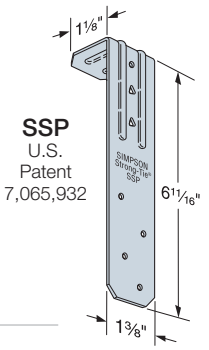
• DSP/SSP — top track installation-fill all round and triangle holes

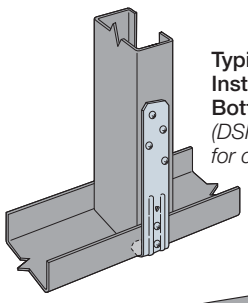
**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Fasteners[4] | | | | Allowable Uplift Load (lb.) | | 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, FL |
| | | — | (2) #10 | — | 340 | 600 | |
| | | (2) #10[3] | (1) #10 | — | 4,051 | 7,151 | |
| | | (2) 10d | (1) #10 | — | 4,801 | 8,401 | |
| DSP | (8) #10 | — | — | (4) #10 | 430 | 695 | |
| | | — | (4) #10 | — | 475 | 775 | |
| | | (4) #10[3] | (2) #10 | — | 5,851 | 9,551 | |
| | | (4) 10d | (2) #10 | — | 7,301 | 12,001 | |
| TSP | (6) #10 | — | — | (3) #10 | 345 | 645 | |
| | | — | (3) #10 | — | 370 | 700 | |
| | (9) #10 | (3) #10[3] | (3) #10 | — | 3,601 | 6,851 | |
| | | (3) 10d | (3) #10 | — | 4,801 | 9,051 | |

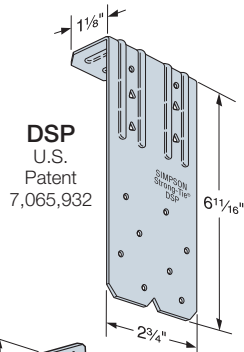
These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

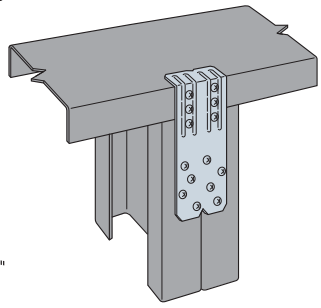
1. For wood plates, noted values only apply to DF/SP members where wood top plates are used. For SPF values, multiply by 0.86.
2. For wood plates, when cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
3. Screws installed into wood plates with a minimum #10 x ¾" self-drilling screw.
4. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



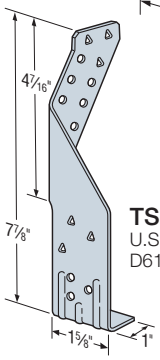



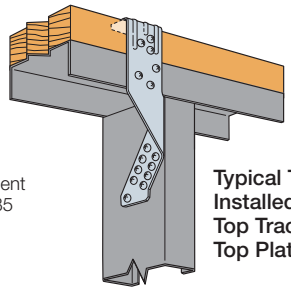
**Typical SSP Installed to Bottom Track** *(DSP similar for double stud)*



**Typical DSP Installed to Top Track** *(SSP similar for single stud)*



**Typical TSP Installed to Top Track with Top Plate**

# **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, pp. 18–21.

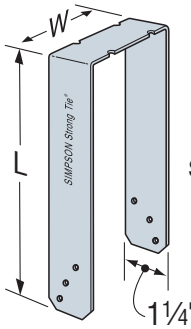
**Installation:** • Use all specified fasteners

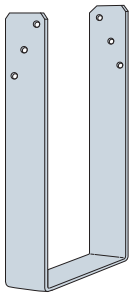
**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Connector Material Thickness mil (ga.) | Dimensions (in.) | | Stud Fasteners[1] | Allowable Uplift Load 33 mil (20 ga.) (lb.) | Code Ref. |
|---|---|---|---|---|---|---|
| | | W | L | | | |
| SP4 | 33 (20) | 3⁹⁄₁₆ | 7¼ | (6) #10 | 825 | IP1, L2, FL |
| SP6 | 33 (20) | 5⁹⁄₁₆ | 7¾ | (6) #10 | 825 | |
| SP8 | 43 (18) | 7⁹⁄₁₆ | 8⁵⁄₁₆ | (6) #10 | 930 | 170 |
| SPH4 | 43 (18) | 3⁹⁄₁₆ | 8¾ | (12) #10 | 1,490 | |
| SPH4R | 43 (18) | 4⅛ | 8¼ | (12) #10 | 1,490 | |
| SPH6 | 43 (18) | 5⁹⁄₁₆ | 9¼ | (12) #10 | 1,490 | |
| SPH6R | 43 (18) | 6⅛ | 8¾ | (12) #10 | 1,490 | |
| SPH8 | 43 (18) | 7⁹⁄₁₆ | 8⅜ | (12) #10 | 1,490 | |

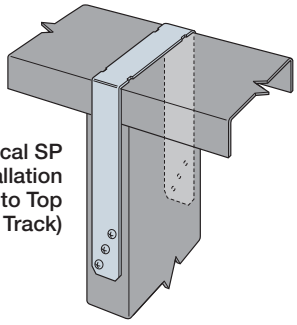
These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

1. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

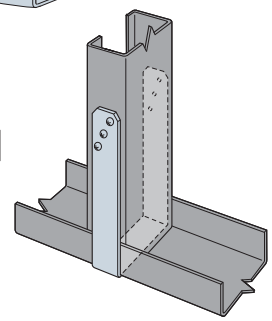


**SPH6**



**Typical SP Installation (Wall to Top Track)**



**Typical SP Installation (Wall to Bottom Track)** *(SPH similar)*



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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.

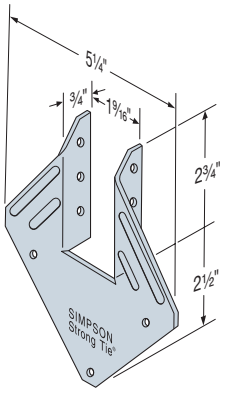
**Material:** See table

**Finish:** Galvanized. Available with ZMAX® coating; see Corrosion Information, pp. 18–21.

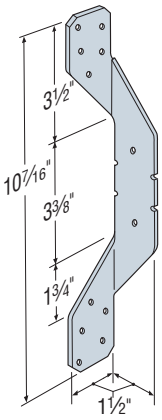
**Installation:** • Use all specified fasteners

- 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

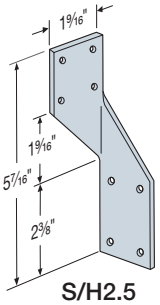
**Codes:** See p. 11 for Code Reference Key Chart



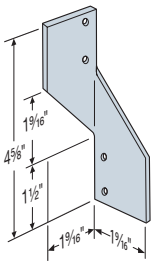
S/H1



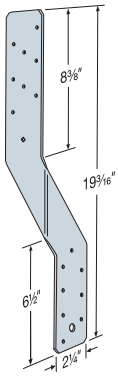
H2A



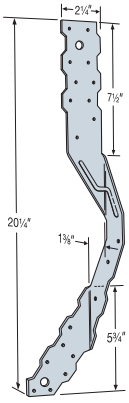
S/H2.5



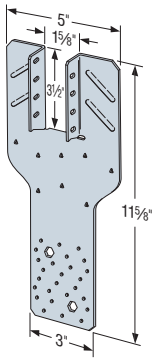
S/H3



H6



H7Z

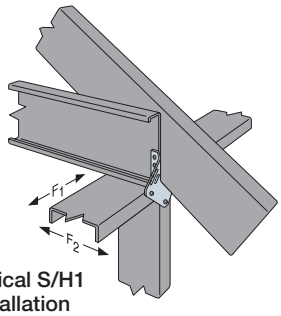


H10S

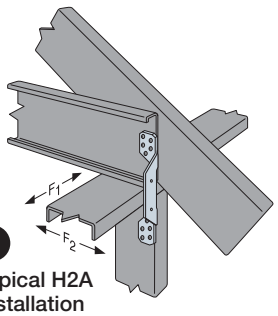
| Model No. | Connector Material Thickness mil (ga.) | Fasteners[5] | | | Allowable Load (lb.) 33 mil (20 ga.) | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | To Rafters /Truss | To Top Track | To Stud | Uplift | Lateral $F_1$ | Lateral $F_2$ | |
| S/H1 | 43 (18) | (3) #10 | (2) #10 | (1) #10 | 305 | 100 | 115 | 170 |
| H2A | 43 (18) | (5) #10 | (1) #10 | (5) #10 | 450 | 90 | 100 | |
| S/H2.5 | 43 (18) | (4) #10 | — | (4) #10 | 390 | 90 | 125 | |
| S/H3 | 43 (18) | (2) #10 | (2) #10 | — | 375 | 90 | 125 | |
| H6 | 54 (16) | — | (8) #10 | (8) #10 | 950 | — | — | |
| H7Z | 54 (16) | (4) #10 | (2) #10 | (8) #10 | 985 | — | — | |
| H10S[4] | 43 (18) | (8) #10 | — | (8) #10 | 930[3] | — | — | |

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.

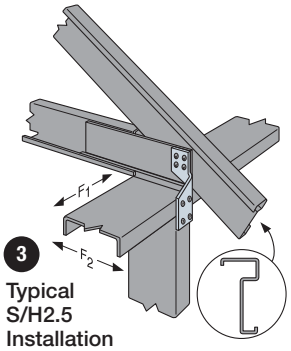
1. Loads are based on attachment of cold-formed steel members having a minimum thickness of 33 mil (20 ga.).
2. Hurricane ties are shown installed on the outside of wall for clarity. Installation inside of wall is acceptable. For Continuous Load Path, connections in the same area must be on same side of wall.
3. For H10S connectors with CFS members having a minimum thickness of 43 mil (18 ga.), the allowable load is 1,260 lb.
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 lb., provided that the screw edges are met.
5. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



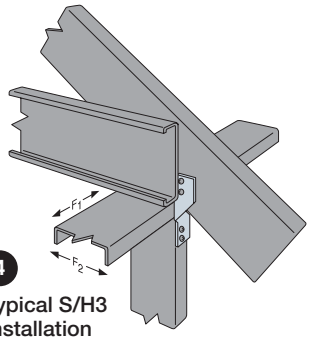
1 Typical S/H1 Installation



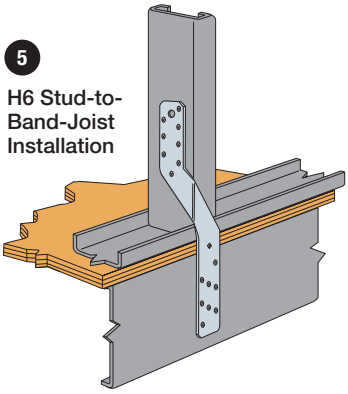
2 Typical H2A Installation

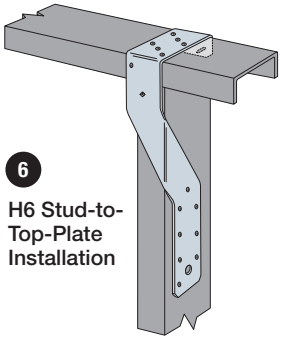


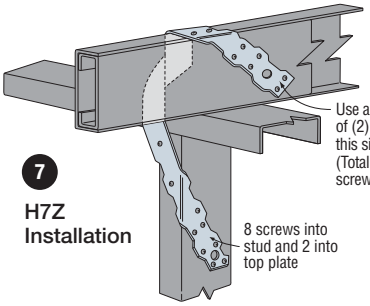
3 Typical S/H2.5 Installation



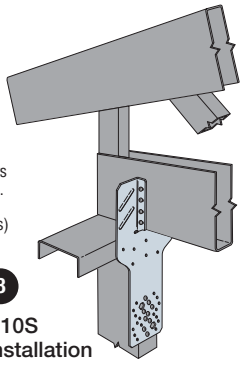
4 Typical S/H3 Installation


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 and 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.

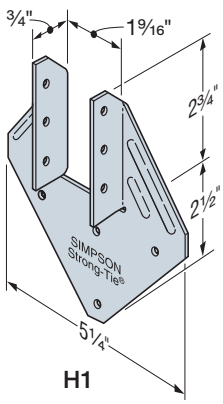
**Material:** See table

**Finish:** Galvanized. Selected products available in stainless steel or ZMAX® coating. See Corrosion Information, pp. 18–21.

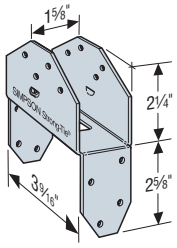
**Installation:** • Use all specified fasteners; see General Notes

- 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

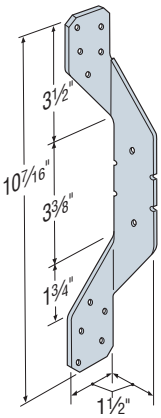
**Codes:** See p. 11 for Code Reference Key Chart



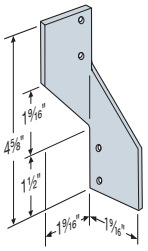

H1



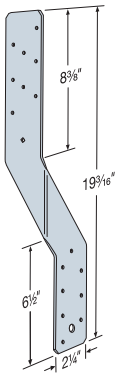

HS24
U.S. Patent 5,603,580



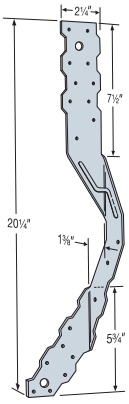

H2A



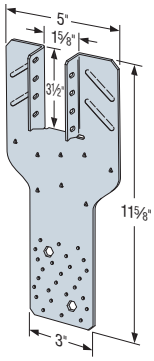

H3




H6




H7Z

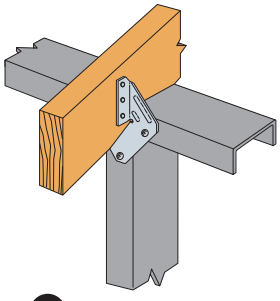



H10S

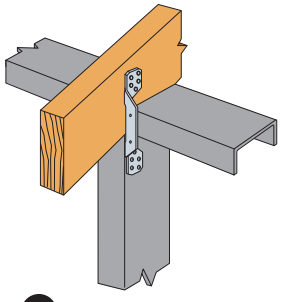
| Model No. | Connector Material Thickness mil (ga.) | Fasteners[5] | | | Allowable Uplift Load 33 mil (20 ga.) (160) (lb.) | | Code Ref. |
|---|---|---|---|---|---|---|---|
| | | To Rafters/ Truss | To Top Track | To Stud | DF/SP | SPF/HF | |
| H1 | 43 (18) | (6) 8d x 1½" | (3) #10 | (1) #10 | 600 | 500 | 170 |
| H2A | 43 (18) | (5) 8d x 1½" | (1) #10 | (5) #10 | 550 | 460 | |
| H3 | 43 (18) | (4) 8d x 1½" | (4) #10 | — | 365 | 305 | |
| H6 | 54 (16) | — | (8) 8d | (8) #10 | 950 | 820 | |
| H7Z | 54 (16) | (4) 8d x 1½" | (2) #10 | (8) #10 | 985 | 845 | |
| HS24 | 43 (18) | (8) 8d x 1½" | (4) #10 | (4) #10 | 625 | 520 | |
| H10S[5] | 43 (18) | (8) 8d x 1½" | — | (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.

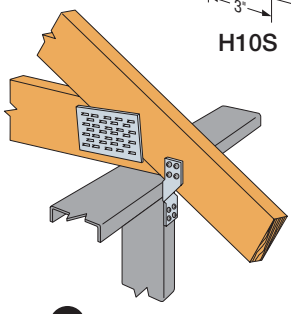
1. Allowable loads on wood have been increased 60% for wind or earthquake loading with no further increase allowed; reduce where other load duration factors govern.
2. Hurricane Ties are shown installed on the outside of wall for clarity. Installation inside of wall is acceptable. For Continuous Load Path, connections must be on same side of wall.
3. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such force should be considered.
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 lb., provided that the screw edges are met.
5. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



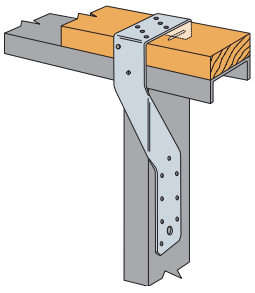
1 H1 Installation



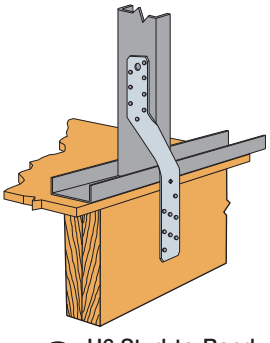
2 H2A Installation



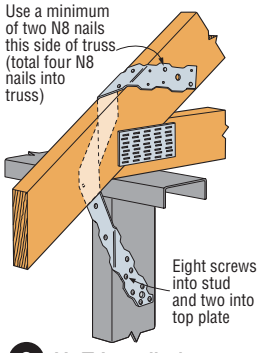
3 H3 Installation



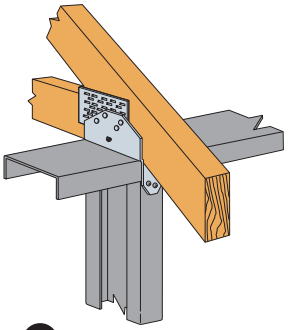
4 H6 Stud-to-Top-Plate Installation



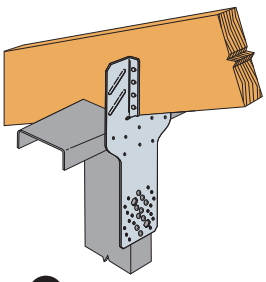
5 H6 Stud-to-Band-Joist Installation




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.

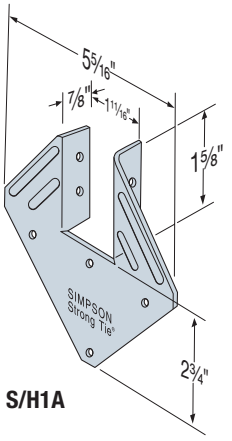
**Material:** 43 mil (18 ga.)

**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.

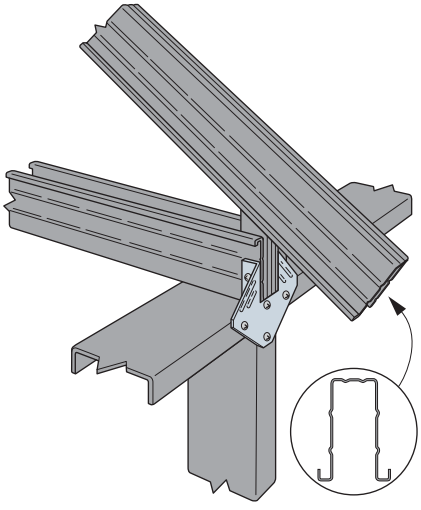
**Codes:** See p. 11 for Code Reference Key Chart



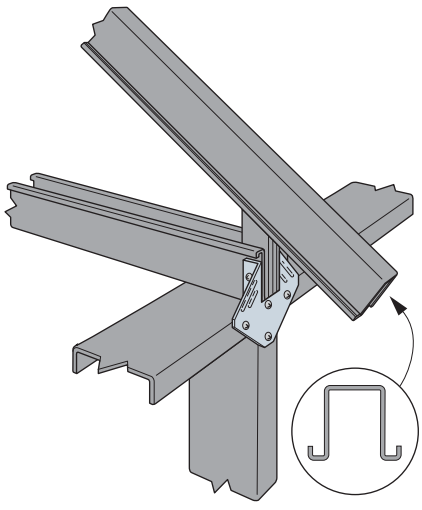

**S/H1A**

| Model No. | Fasteners[2] | | | Truss Thickness mil (ga.) | Allowable Uplift Load (lb.) | | | 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) | 470 | 470 | 470 | IP1, FL, L2 |
| | (4) #10 | (3) #10 | (1) #10 | 33 (20) | 510 | 550 | 690 | |
| | (4) #10 | (3) #10 | (1) #10 | 43 (18) | 510 | 550 | 690 | |
| | (4) #10 | (3) #10 | (1) #10 | 54 (16) | 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 lb. x minimum [33/ 50 or 45/ 60] = 363 lb.
2. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



Typical S/H1A Installation



Typical S/H1A Installation



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# MTSM/HTSM Twist Straps

The MTSM and HTSM offer high-strength truss-to-masonry connections.

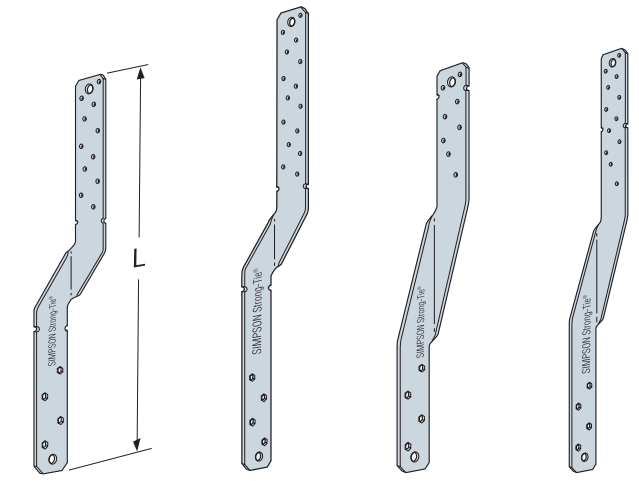
**Material:** See table.

**Finish:** Galvanized. Some products available in stainless steel and ZMAX®; see Corrosion Information, pp. 18–21.

**Installation:**

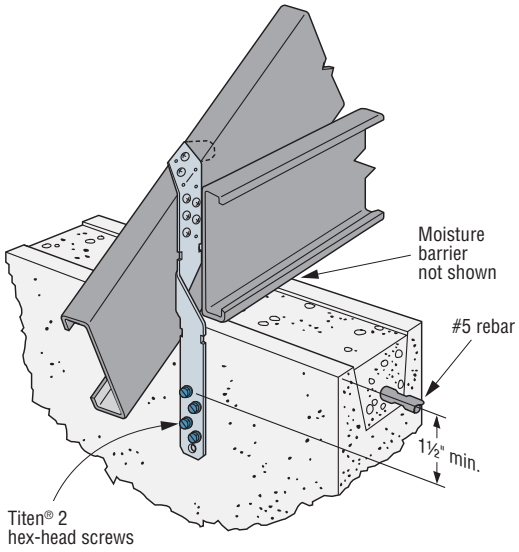
- Use all specified fasteners; see General Notes.
- May be attached to either side of a grouted block wall. A minimum of one #5 horizontal rebar shall be installed in the top course of this wall.

**Codes:** See p. 11 for Code Reference Key Chart




| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Fasteners[6] | | | | | Allowable Load 33 mil (20 ga.) (lb.) | 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) | 16 | (5) #10 | (4) #10 | (3) #10 | (4) ¼" x 2¼" Titen 2 | (4) ¼" x 1¼" Titen 2 | 860 | 170 |
| MTSM20 | | 20 | (5) #10 | (4) #10 | (3) #10 | (4) ¼" x 2¼" Titen 2 | (4) ¼" x 1¼" Titen 2 | 860 | |
| HTSM16 | 68 (14) | 16 | (7) #10 | (5) #10 | (3) #10 | (4) ¼" x 2¼" Titen 2 | (4) ¼" x 1¼" Titen 2 | 1,175 | |
| HTSM20 | | 20 | (7) #10 | (5) #10 | (3) #10 | (4) ¼" x 2¼" Titen 2 | (4) ¼" x 1¼" Titen 2 | 1,175 | |

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® 2 screws is 1½".
4. Straps can be installed on the inside face of the wall.
5. Min. $f'_m$ = 1,500 psi and $f'_c$ = 2,500 psi.
6. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical MTSM20 Installation



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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.

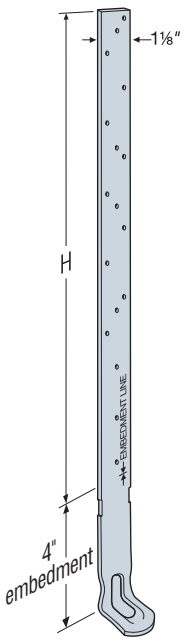
**Material:** HHETA — 14 gauge; HETA — 16 gauge; META — 18 gauge

**Finish:** Galvanized. Some products available in ZMAX® coating; see Corrosion Information on pp. 18–21

**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 retrofit anchors.
- In double embedded anchor installations, do not install fasteners where the straps overlap when wrapped over the truss heel.

**Codes:** See p. 11 for Code Reference Key Chart




**HETA20**
*(META/HHETA similar)*

## Single Embedded Anchor Installation

| Model No. | H (in.) | Fastener[9] | Allowable Uplift Load (lb.) | | | Lateral Load[8] | | Code Ref. |
|---|---|---|---|---|---|---|---|---|
| | | Rafter/Stud/Truss Thickness | Rafter/Stud/Truss Thickness | | | $F_1$ | $F_2$ | |
| | | 33 mil, 43 mil and 54 mil (20 ga., 18 ga. and 16 ga.) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 54 mil (16 ga.) | | |
| META12 | 8 | (7) #10 | 1,240 | 1,450 | 1,450 | | | |
| META16 | 12 | (9) #10 | 1,450 | 1,450 | 1,450 | | | |
| META18 | 14 | (9) #10 | 1,450 | 1,450 | 1,450 | | | |
| META20 | 16 | (9) #10 | 1,450 | 1,450 | 1,450 | 340 | 725 | |
| META22 | 18 | (9) #10 | 1,450 | 1,450 | 1,450 | | | |
| META24 | 20 | (9) #10 | 1,450 | 1,450 | 1,450 | | | |
| META40 | 36 | (9) #10 | 1,450 | 1,450 | 1,450 | | | |
| HETA12 | 8 | (7) #10 | 1,240 | 1,780 | 1,780 | | | |
| HETA16 | 12 | (9) #10 | 1,595 | 1,810 | 1,810 | | | 170 |
| HETA20 | 16 | (9) #10 | 1,595 | 1,810 | 1,810 | 340 | 725 | |
| HETA24 | 20 | (9) #10 | 1,595 | 1,810 | 1,810 | | | |
| HETA40 | 36 | (9) #10 | 1,595 | 1,810 | 1,810 | | | |
| HHETA12 | 8 | (7) #10 | 1,240 | 1,820 | 1,820 | | | |
| HHETA16 | 12 | (10) #10 | 1,770 | 2,235 | 2,235 | | | |
| HHETA20 | 16 | (10) #10 | 1,770 | 2,235 | 2,235 | 340[5] | 815 | |
| HHETA24 | 20 | (10) #10 | 1,770 | 2,235 | 2,235 | | | |
| HHETA40 | 36 | (10) #10 | 1,770 | 2,235 | 2,235 | | | |

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 $f'_c$ = 2,500 psi. Minimum $f'_m$ = 1,500 psi.
3. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note d, p. 14 under Instructions 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 can be increased to 435 lb. if the strap is wrapped over the truss and a minimum of 12 fasteners are installed.
6. Minimum spacing for multiple anchor installation is two times the embedment depth for full load. See Double Embedded Anchor Installation table on p. 267 for loads on closer spaced anchors.
7. Minimum edge distance is 1½" for concrete and 2" masonry.
8. Lateral loads are limited to 54 mil (16 ga.) CFS members.
9. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



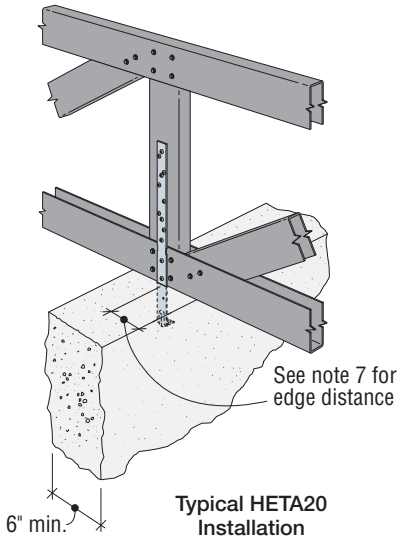
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# **META/HETA/HHETA** Embedded Truss Anchors

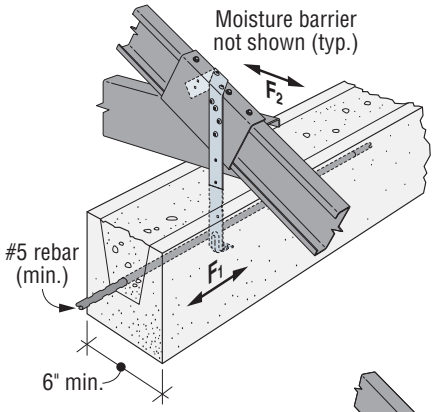
## Double Embedded Anchor Installation

| Model No. | Qty. | Application | Fasteners[8] Rafter/Stud/Truss Thickness | Allowable Uplift Load (lb.) | | | Lateral Load[7] | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | $F_1$ | $F_2$ |
| | | | 33 mil, 43 mil and 54 mil (20 ga., 18 ga. and 16 ga.) | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 54 mil (16 ga.) | |
| 1½" Width Minimum of Rafter/Stud/Truss | | | | | | | | |
| META | 2 | CMU | (10) #10 | 1,770 | 1,985 | 1,985 | 340 | 725 |
| | | Concrete | (10) #10 | 1,770 | 1,985 | 1,985 | | |
| HETA | 2 | CMU | (10) #10 | 1,770 | 2,035 | 2,035 | 340 | 725 |
| | | Concrete | (10) #10 | 1,770 | 2,035 | 2,035 | | |
| HHETA | 2 | CMU | (10) #10 | 1,770 | 2,035 | 2,035 | 340 | 815 |
| | | Concrete | (10) #10 | 1,770 | 2,235 | 2,235 | | |
| 3" Width Minimum of Rafter/Stud/Truss | | | | | | | | |
| META | 2 | CMU | (14) #10 | 1,900 | 1,900 | 1,900 | 1,210 | 1,160 |
| | | Concrete | (14) #10 | 2,480 | 2,565 | 2,565 | | |
| HETA | 2 | CMU | (12) #10 | 2,480 | 2,500 | 2,500 | 1,225 | 1,520 |
| | | Concrete | (12) #10 | 2,480 | 2,700 | 2,700 | | |
| HHETA | 2 | CMU | (12) #10 | 2,480 | 2,500 | 2,500 | 1,225 | 1,520 |
| | | Concrete | (12) #10 | 2,480 | 3,050 | 3,050 | | |
| | | Concrete | (14) #10 | 2,480 | 3,350 | 3,350 | | |

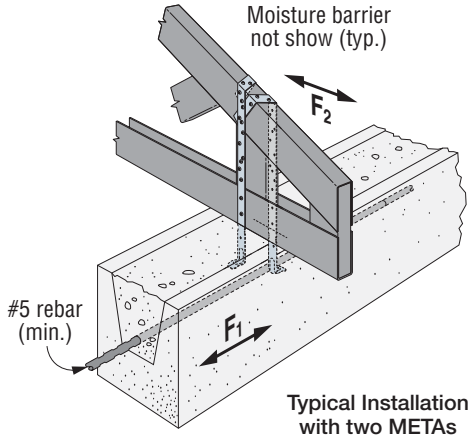
1. Allowable loads may not be increased for wind or seismic load.
2. Minimum $f'_c$ = 2,500 psi. Minimum $f'_m$ = 1,500 psi.
3. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note d, p. 14 under Instructions to the Designer.
4. Minimum spacing for multiple anchor installation is two 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 cause 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 54 mil (16 ga.) CFS members.
8. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical HETA20 Installation




Typical META Installation




Typical Installation with two METAs

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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.

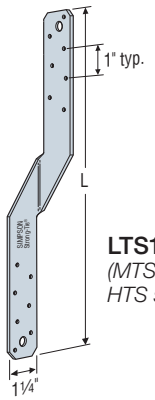
**Material:** See table

**Finish:** Galvanized. Some products available in stainless steel and ZMAX®; see Corrosion Information, pp. 18–21

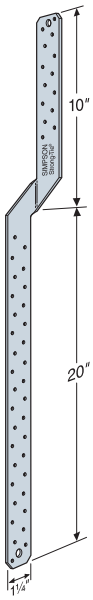
**Installation:**

- 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.

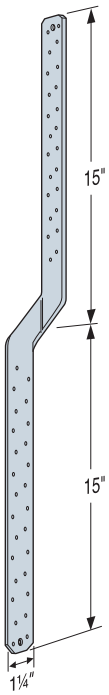
**Codes:** See p. 11 for Code Reference Key Chart




**LTS12**
*(MTS and HTS similar)*

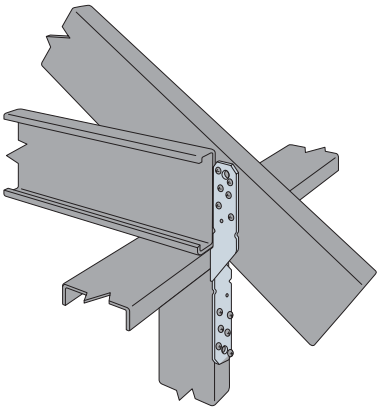



**MTS30**
*(HTS30 similar)*




**MTS30C**
*(HTS30C similar)*

| Model No. | Connector Material Thickness mil (ga.) | L (in.) | Fasteners[6] (Total) | | | Allowable Tension Load (lb.) | Code Ref. |
|---|---|---|---|---|---|---|---|
| | | | Rafter/Stud/Joist Thickness | | | 33 mil (20 ga.) | |
| | | | | | | 43 mil (18 ga.) | |
| | | | 33 mil (20 ga.) | 43 mil (18 ga.) | 54 mil (16 ga.) | 54 mil (16 ga.) | |
| LTS12 | 43 (18) | 12 | (10) #10 | (6) #10 | (6) #10 | 775 | IP1, FL, 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) | 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) | 16 | (16) #10 | (12) #10 | (6) #10 | 1,415 | |
| HTS20 | | 20 | (18) #10 | (12) #10 | (6) #10 | 1,450 | |
| HTS24 | | 24 | (18) #10 | (12) #10 | (6) #10 | 1,450 | |
| HTS30 | | 30 | (18) #10 | (12) #10 | (6) #10 | 1,450 | |
| HTS30C | | 30 | (18) #10 | (12) #10 | (6) #10 | 1,450 | |



**Typical MTS Installation**
**Truss to Steel Studs**

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



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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.

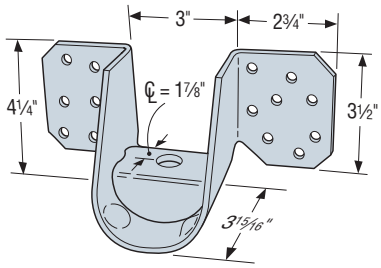
**Material:** 171 mil (7 ga.)

**Finish:** Galvanized

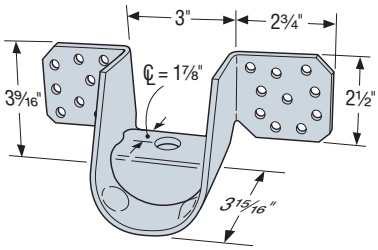
**Installation:**

- 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

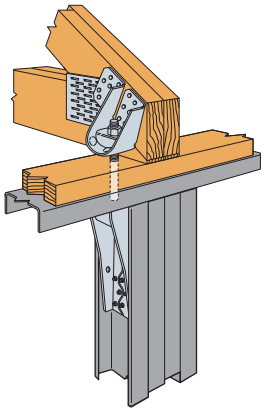
**Codes:** See p. 11 for Code Reference Key Chart



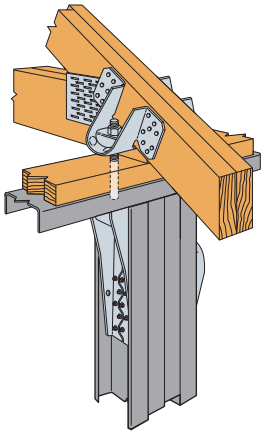

**VGT**
U.S. Patent 7,707,785



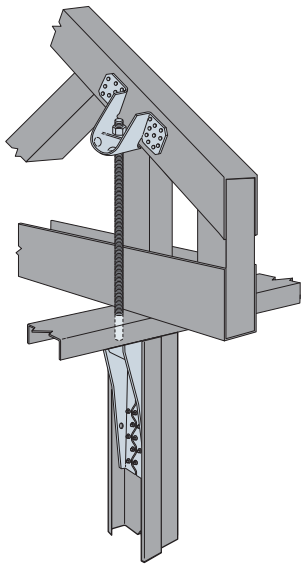

**S/VGT2.5**
U.S. Patent 7,707,785



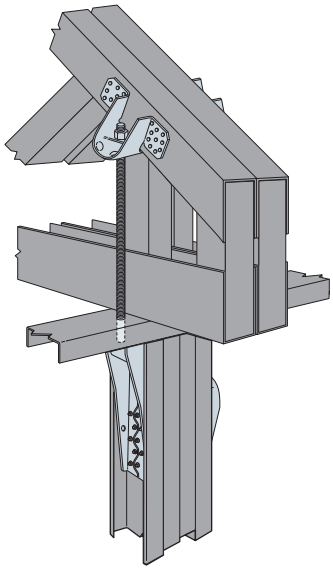
**Typical Hybrid VGTR Single Installation with S/HDU4**



**Typical Hybrid VGT Double Installation with S/HDU6**



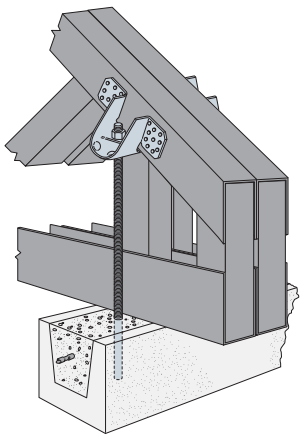
**Typical S/VGT2.5 Single Installation with HDU6**



**Typical S/VGT2.5 Double Installation with S/HDU6**

| Model No. | Quantity | No. of Truss Plies | Fasteners[5] | | Allowable Uplift Load[2] (lb.) | | Code Ref. |
|---|---|---|---|---|---|---|---|
| | | | Anchor Dia. | Girder Truss | 3/12 | 8/12 | |
| **Cold-Formed Steel Connection** | | | | | **54 mil (16 ga.)** | | |
| S/VGT2.5 (min.)[4] | 1 | 1 | (1) ⅝ | (16) #14 | 3,050 | 2,620 | 170 |
| | 2 | 2 | (2) ⅝ | (32) #14 | 6,100 | 5,240 | |
| S/VGT2.5 (max.) | 1 | 1 | (1) ⅝ | (20) #14 | 3,860 | 3,130 | |
| | 2 | 2 | (2) ⅝ | (40) #14 | 7,720 | 6,260 | |
| **Hybrid Connection** | | | | | **Allowable Uplift Load[3] up to 8/12 (lb.)** | | **Code Ref.** |
| | | | | | **DF/SP (160)** | **SPF/HF (160)** | |
| VGT | 1 | 2 | (1) ⅝ | (16) ¼" x 3" SDS | 4,940 | 3,555 | FL |
| | 2 | 2 | (2) ⅝ | (32) ¼" x 3" SDS | 7,185 | 5,175 | |
| | 2 | 3 | (2) ⅝ | (32) ¼" x 3" SDS | 8,890 | 6,400 | |
| VGTR/L | 1 | 2 | (1) ⅝ | (16) ¼" x 3" SDS | 2,230 | 1,605 | |
| | 2 | 2 | (2) ⅝ | (32) ¼" x 3" SDS | 5,545 | 3,990 | |

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 pp. 138 through 171 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

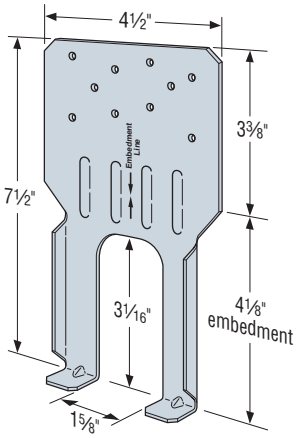
**Installation:**

- Use all specified fasteners; see General Notes.
- S/HGAM10 can be installed into grouted concrete block
- Titen® 2 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

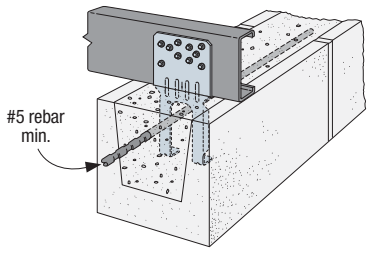
**Codes:** See p. 11 for Code Reference Key Chart

**Ordering Information:**

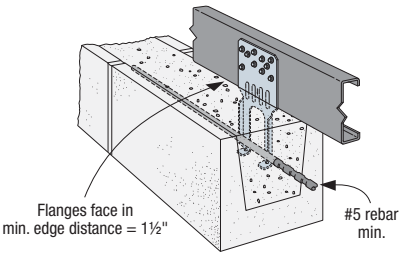
- The HGAM10KT is a kit of (10) connectors with (40) ¼" x 2¾" Titen 2 screws.




**LTA2**
U.S. Patent 6,560,943



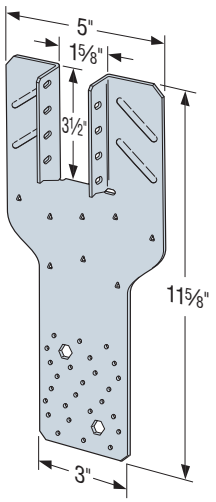

**Typical LTA2 Installation**
*(perpendicular to wall)*



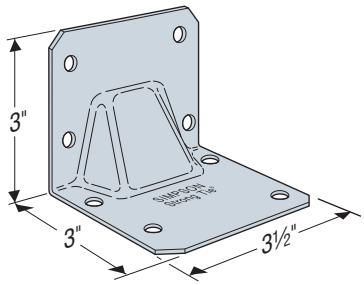

**Typical LTA2 Installation**
*(parallel to wall)*

| Model No. | Connector Material Thickness mil (ga.) | Fasteners | | | Allowable Uplift Load (lb.) | | 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) | (10) #10 | Embed | Embed | 1,295 | 1,425 | 170 |
| LTA2 parallel-to-wall installation | 43 (18) | (10) #10 | Embed | Embed | 1,295 | 1,390 | |
| S/HGAM10KT | 68 (14) | (4) #14 | (4) ¼" x 2¾" Titen 2 | (4) ¼" x 1¾" Titen 2 | 810 | 850 | IP1, L2, FL |
| H10S | 43 (18) | (8) #10 | (2) ⅜" x 4" Titen HD | (2) ⅜" x 4" Titen HD | 915 | 1,245 | |

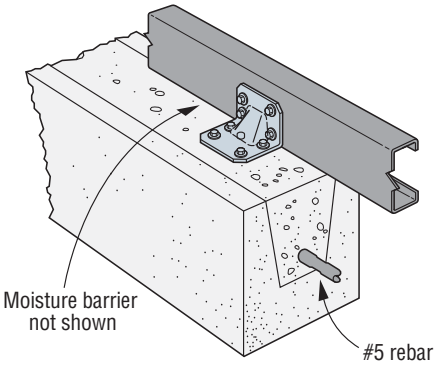
1. Min. $f'_m$ = 1,500 psi and $f'_c$ = 2,500 psi.
2. Minimum edge distance is 1½" for Titen® 2 screws.
3. The products shall be installed such that the Titen 2 screws and Titen HD® anchors are not exposed to the weather.
4. See p. 204 for Titen 2 screw information and p. 189 for Titen HD information.
5. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



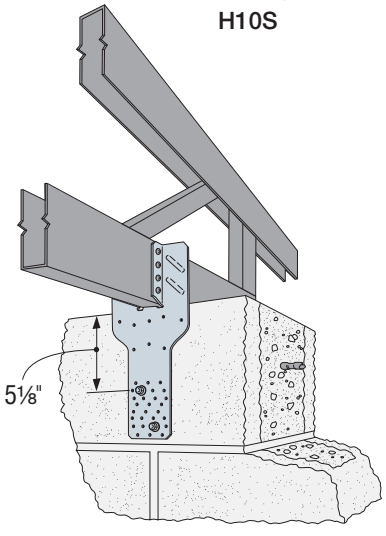

**H10S**




**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° (shipped with 67.5° bend). Screw hole locations allow for easy installation.

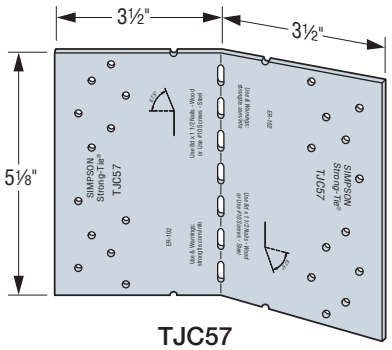
**Material:** 54 mil (16 ga.)

**Finish:** Galvanized

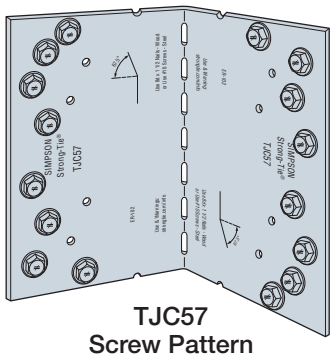
**Installation:**

- 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)

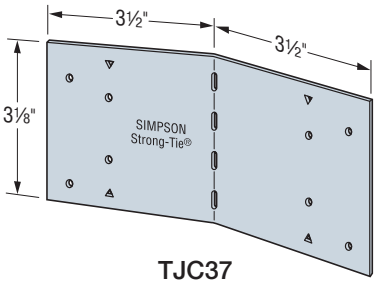
**Codes:** See p. 11 for Code Reference Key Chart




TJC57



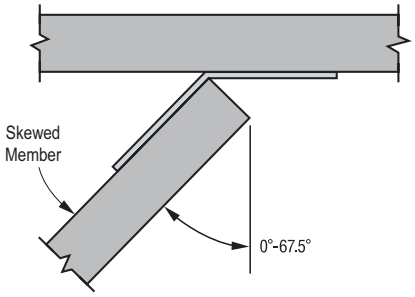
TJC57
Screw Pattern



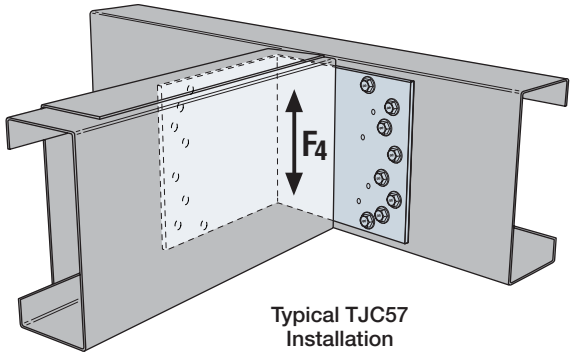

TJC37

| Model No. | Fasteners[2] | | Member Thickness mil (ga.) | Allowable Load $F_4$ (lb.) | | | Code Ref. |
|---|---|---|---|---|---|---|---|
| | Carrying Member | Carried Member | | 0° | 1°–60° | 61°–67.5° | |
| TJC37 (min.) | (4) #10 | (4) #10 | 43 (18) | 660 | 565 | 475 | IP1, L2, FL |
| TJC37 (max.) | (6) #10 | (6) #10 | 43 (18) | 680 | 630 | 530 | |
| TJC57 (min.) | (8) #10 | (8) #10 | 43 (18) | 1,295 | 1,215 | 1,235 | 170 |
| TJC57 (max.) | (8) #10 | (8) #10 | 54 (16) | 1,790 | 1,790 | 1,790 | |

1. Reference the illustration for the required screw pattern of the TJC57.
2. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Top View Installation




Typical TJC57 Installation

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# **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)

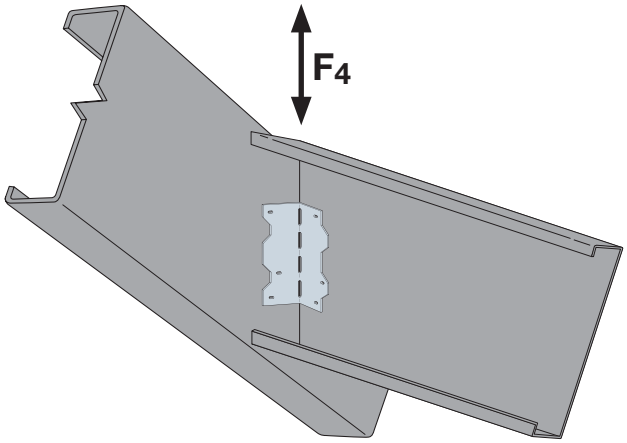
**Installation:**

- Use all specified fasteners
- Field-skewable; bend one time only

**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Length (in.) | Fasteners[2] | Allowable Load (lb.) | | | 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical Installation Between Roof Rafter and Hip Rafter

# **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.

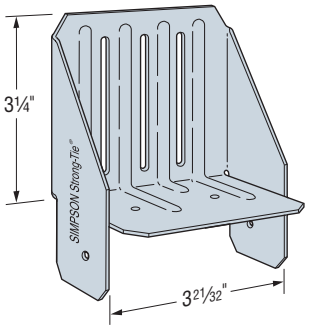
**Material:** 43 mil (18 ga.)

**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

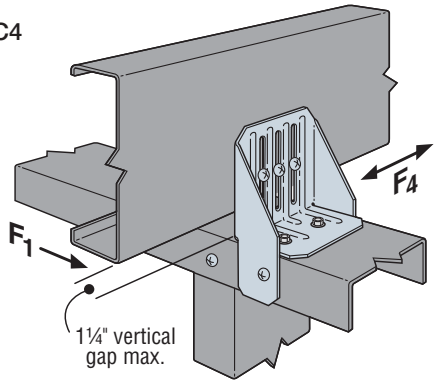
**Codes:** See p. 11 for Code Reference Key Chart




S/HTC4

| Model No. | Fasteners[3] | | Allowable Load 43 mil (18 ga.) (lb.) | | | | 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.




Typical S/HTC4 Installation



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# **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.

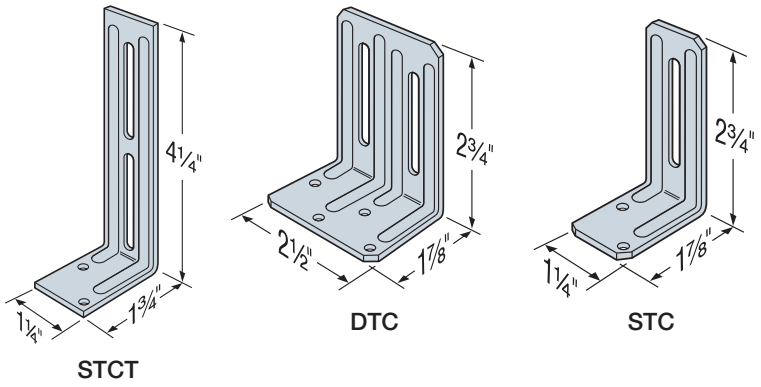
**Material:** 43 mil (18 ga.)

**Finish:** Galvanized

**Installation:**

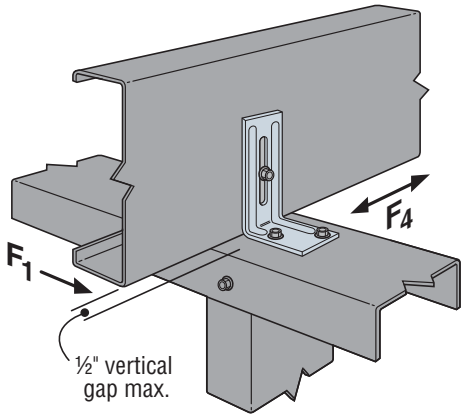
- Use all specified fasteners; see General Notes
- Use STC or DTC depending on required loads
- STC / STCT / DTC may be used with proprietary material sections. Contact material supplier for specific installation details
- Use STCT where truss or rafter is separated from the top plate of the nonbearing wall
- Install slot screws in the middle of the slot

**Codes:** See p. 11 for Code Reference Key Chart




| Model No. | Fasteners[3] | | Allowable Load 33 mil (20 ga.) (lb.) | | | | | | 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, FL |
| STCT | (2) #8 | (1) #8 | — | — | — | — | — | — | 180 |
| DTC | (4) #8 | (2) #8 | 200 | 160 | 200 | 160 | 145 | 160 | IP1, L2, FL |

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 pp. 138 through 171 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.*



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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.

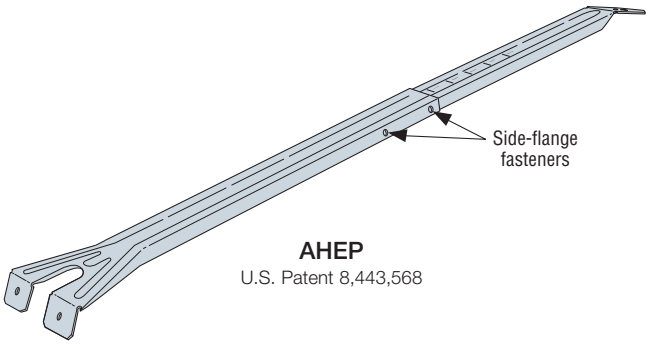
**Material:** 33 mil (20 ga.)

**Finish:** Galvanized

**Installation:**

- Use all specified fasteners; see General Notes

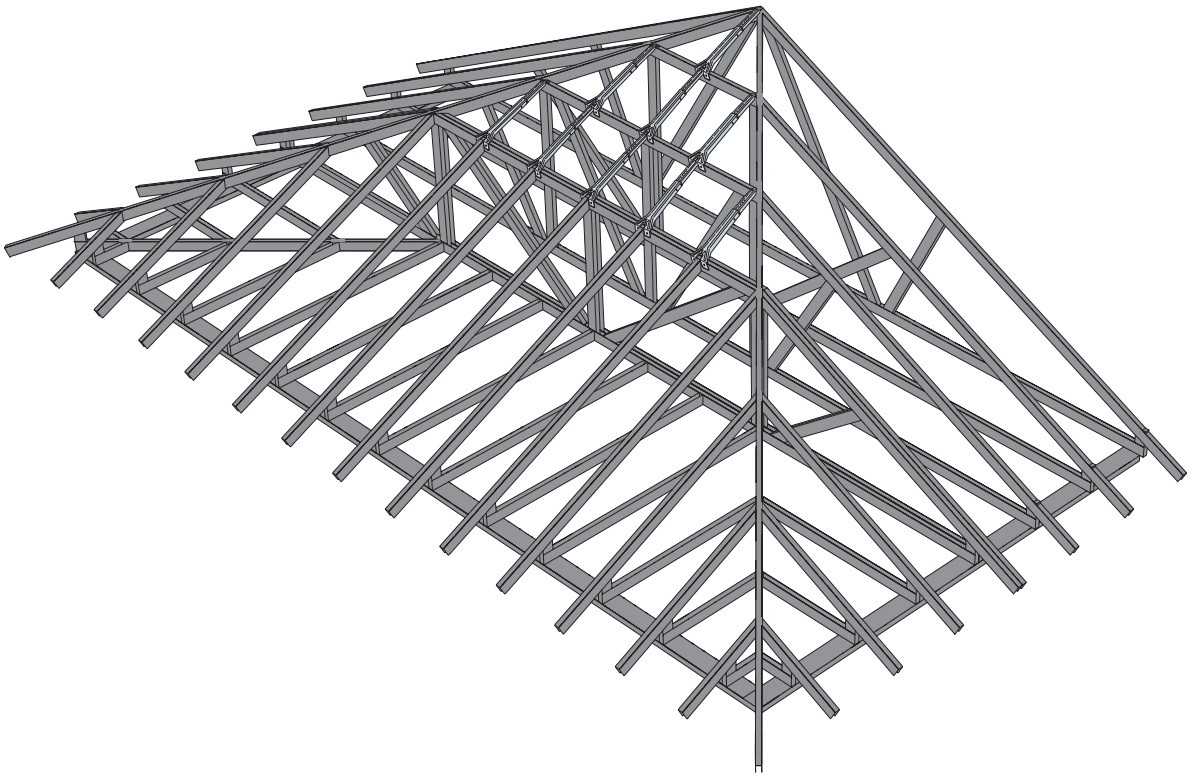
**Codes:** See p. 11 for Code Reference Key Chart




**AHEP**
U.S. Patent 8,443,568

| Model No. | Fasteners[3] | | Sheathing Option | Allowable Down Load 33 mil (20 ga.) (lb.) | | | | 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 between 3/12 and 9/12.
3. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.





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# **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.

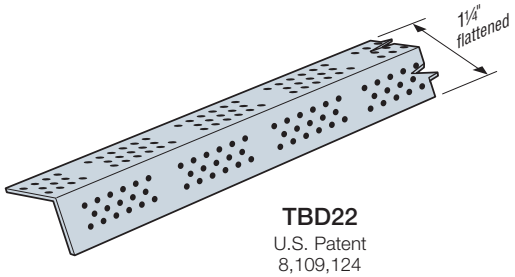
**Material:** 27 mil (22 ga.)

**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°.
- 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 ten 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.

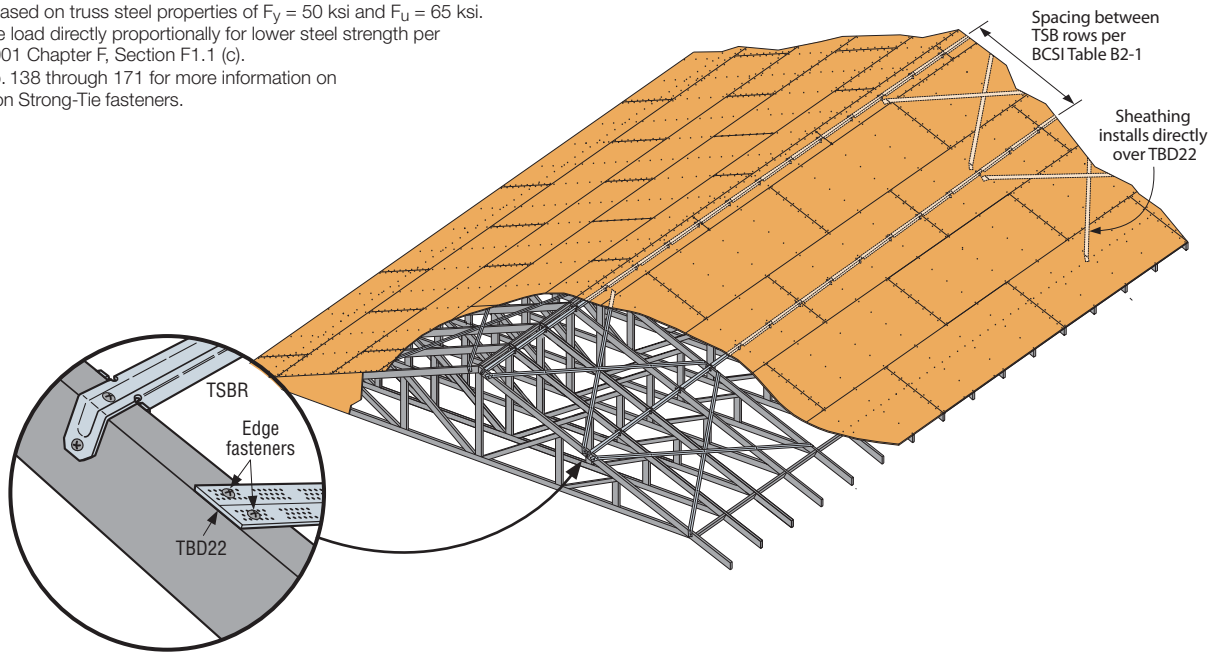
**Codes:** See p. 11 for Code Reference Key Chart




**TBD22**
U.S. Patent
8,109,124

| Model No. | Fasteners[2] | | Allowable Tension Load (lb.) | | 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, FL |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

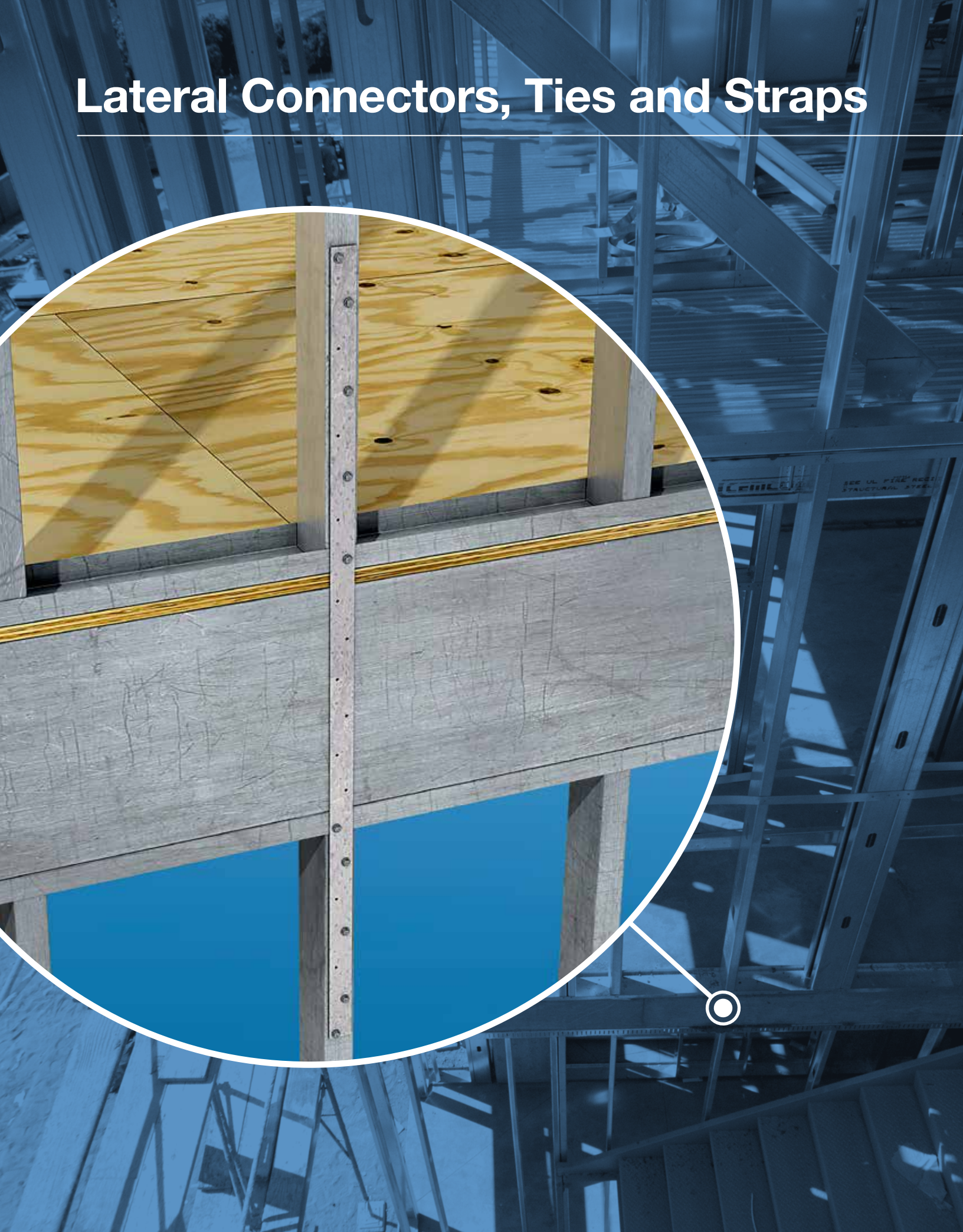



**Typical TBD22 Top Chord Installation**



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# Lateral Connectors, Ties and Straps



# **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.

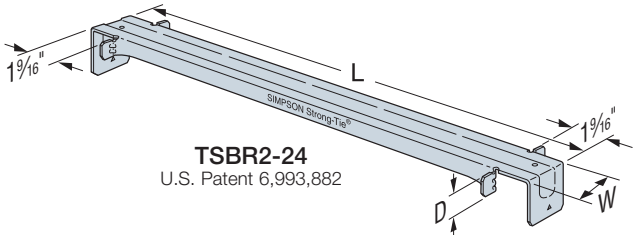
**Material:** 27 mil (22 ga.)

**Finish:** Galvanized

**Installation:**

- Use all specified fasteners; see General Notes

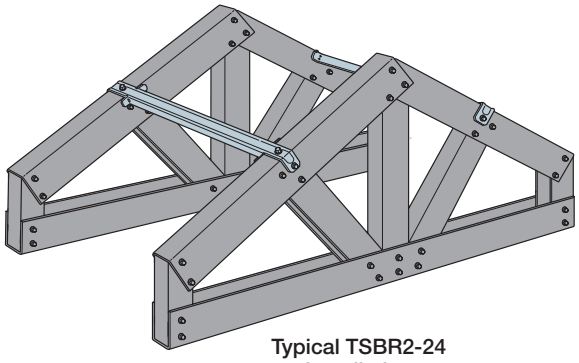
**Codes:** See p. 11 for Code Reference Key Chart




**TSBR2-24**
U.S. Patent 6,993,882

| Model No. | Dimensions (in.) | | | | Fasteners[3] | | Allowable Load (lb.) | | 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 pp. 138 through 171 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.

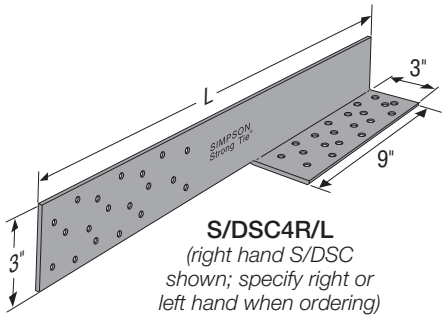
**Material:** 229 mil (3 ga.)

**Finish:** Simpson Strong-Tie® gray paint

**Installation:**

- Use all specified fasteners; see General Notes

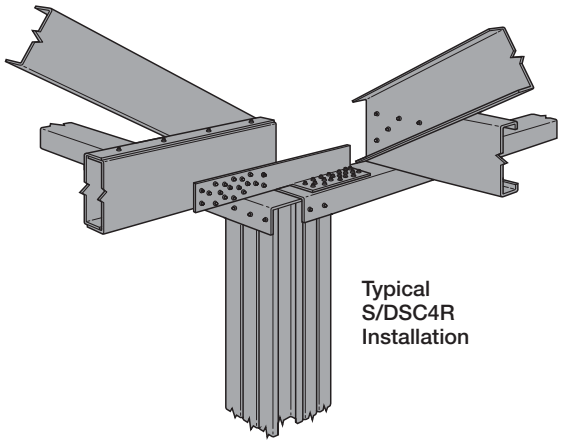
**Codes:** See p. 11 for Code Reference Key Chart




**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 Load (lb.) | | Code Ref. |
|---|---|---|---|---|---|
| | | | 43 mil (18 ga.) | | |
| | | | Compression | Tension | |
| S/DSC4R/L | 22 | (40) #10 | 3,220 | 4,025 | 170 |

1. See pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.



Typical S/DSC4R Installation



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# HRS/ST/FHA/PS/LSTA/LSTI/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.

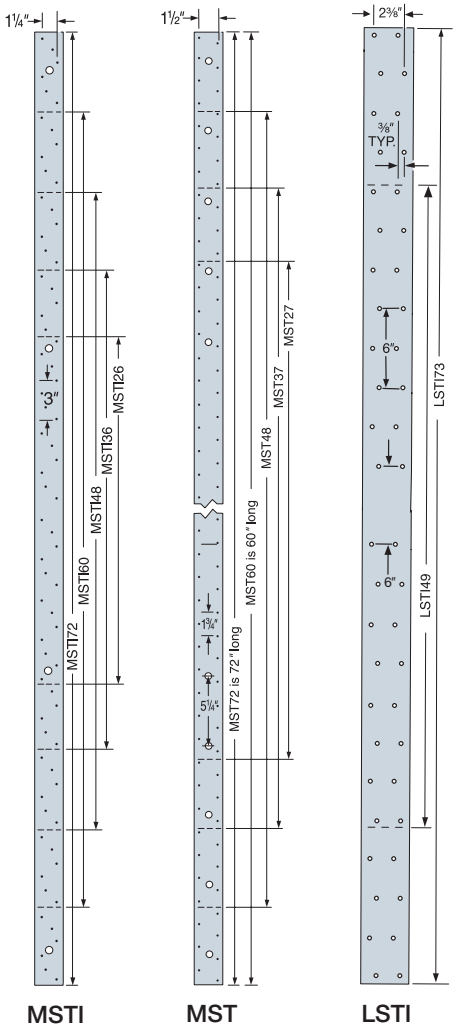
Install strap ties where top or bottom plates are cut, at wall intersections, and as ridge ties. Reduce the allowable load based on the size and quantity of fasteners used.

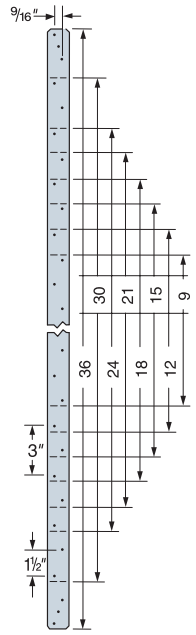
Refer to applicable code for minimum edge and end distances.

**Finish:** PS — hot-dip galvanized (HDG); all others — galvanized. Some products are available in stainless steel or ZMAX®; see Corrosion Information, pp. 18–21.

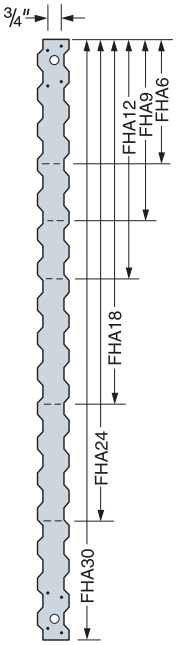
**Installation:** Use all specified fasteners; see General Notes

**Codes:** See p. 11 for Code Reference Key Chart

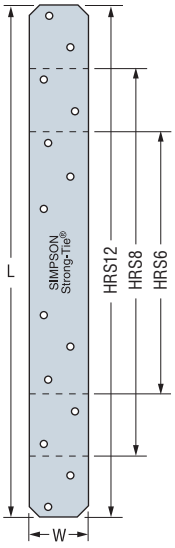


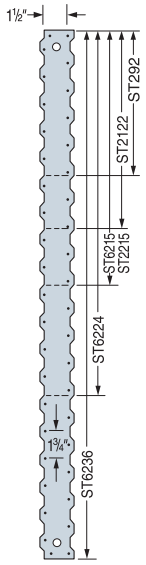

**LSTA and MSTA**
*(pilot holes not shown)*



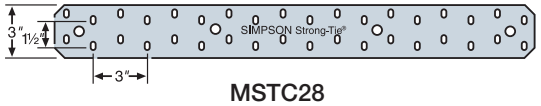

**FHA**



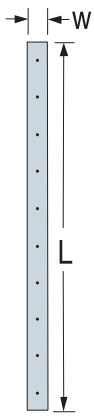

**HRS**



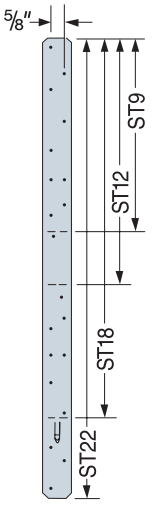

**ST**




**MSTC28**



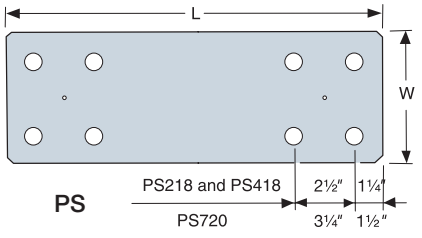

**ST2115**




**ST9, ST12, ST18, ST22**

| Model No. | Connector Material Thickness mil (ga.) | Dimensions (in.) | | Bolts | | Code Ref. |
|---|---|---|---|---|---|---|
| | | W | L | Qty. | Dia. (in.) | |
| PS218 | 171 (7) | 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/MST/MSTA/MSTC/MSTI Strap Ties

SIMPSON Strong-Tie®

**Codes:** See p. 11 for Code Reference Key Chart

| Model No. | Connector Material Thick. mil (ga.) | Dimensions (in.) | | Fasteners[4] (Total) | | | Allowable ASD Tension Load (lb.) | | | 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) | 1¼ | 9 | (8) #10 | (8) #10 | (8) #10 | 705 | 1,120 | 1,190 | IP1, L2, FL |
| LSTA12 | | 1¼ | 12 | (10) #10 | (10) #10 | (8) #10 | 885 | 1,190 | 1,190 | |
| LSTA15 | | 1¼ | 15 | (12) #10 | (12) #10 | (10) #10 | 1,060 | 1,190 | 1,190 | |
| LSTA18 | | 1¼ | 18 | (14) #10 | (12) #10 | (10) #10 | 1,190 | 1,190 | 1,190 | |
| LSTA21 | | 1¼ | 21 | (14) #10 | (12) #10 | (10) #10 | 1,190 | 1,190 | 1,190 | |
| LSTA24 | | 1¼ | 24 | (14) #10 | (12) #10 | (10) #10 | 1,190 | 1,190 | 1,190 | |
| ST292 | | 2 1/16 | 9 5/16 | (12) #10 | (10) #10 | (10) #10 | 1,060 | 1,240 | 1,240 | |
| ST2122 | | 2 1/16 | 12 13/16 | (16) #10 | (12) #10 | (10) #10 | 1,415 | 1,502 | 1,502 | |
| 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 | 1,765 | 1,825 | 1,825 | |
| LSTA30 | 43 (18) | 1¼ | 30 | (18) #10 | (12) #10 | (10) #10 | 1,555 | 1,555 | 1,555 | |
| LSTA36 | | 1¼ | 36 | (18) #10 | (16) #10 | (14) #10 | 1,555 | 1,555 | 1,555 | |
| LSTI49 | | 3¾ | 49 | (32) #10 | (32) #10 | (20) #10 | 2,830 | 4,050 | 4,050 | |
| LSTI73 | | 3¾ | 73 | (46) #10 | (32) #10 | (20) #10 | 4,050 | 4,050 | 4,050 | |
| MSTA9 | | 1¼ | 9 | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 1,555 | |
| MSTA12 | | 1¼ | 12 | (10) #10 | (10) #10 | (8) #10 | 885 | 1,315 | 1,555 | |
| MSTA15 | | 1¼ | 15 | (12) #10 | (12) #10 | (10) #10 | 1,060 | 1,555 | 1,555 | |
| MSTA18 | | 1¼ | 18 | (14) #10 | (12) #10 | (10) #10 | 1,235 | 1,555 | 1,555 | |
| MSTA21 | | 1¼ | 21 | (16) #10 | (12) #10 | (10) #10 | 1,415 | 1,555 | 1,555 | |
| MSTA24 | | 1¼ | 24 | (18) #10 | (12) #10 | (10) #10 | 1,555 | 1,555 | 1,555 | |
| MSTA30 | 54 (16) | 1¼ | 30 | (22) #10 | (16) #10 | (12) #10 | 1,945 | 1,950 | 1,950 | |
| MSTA36 | | 1¼ | 36 | (24) #10 | (18) #10 | (16) #10 | 1,950 | 1,950 | 1,950 | |
| ST6215 | | 2 1/16 | 16 5/16 | (20) #10 | (16) #10 | (10) #10 | 1,765 | 2,025 | 2,025 | |
| ST6224 | | 2 1/16 | 23 5/16 | (28) #10 | (20) #10 | (12) #10 | 2,455 | 2,455 | 2,455 | |
| ST9 | | 1¼ | 9 | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 1,350 | |
| ST12 | | 1¼ | 11⅝ | (10) #10 | (10) #10 | (8) #10 | 885 | 1,315 | 1,350 | |
| ST18 | | 1¼ | 17¾ | (14) #10 | (12) #10 | (12) #10 | 1,235 | 1,350 | 1,350 | |
| ST22 | | 1¼ | 21⅝ | (20) #10 | (20) #10 | (20) #10 | 1,350 | 1,350 | 1,350 | |
| MSTC28 | | 3 | 28¼ | (36) #10 | (36) #10 | (30) #10 | 3,180 | 4,600 | 4,600 | |
| MSTC40 | | 3 | 40¼ | (52) #10 | (46) #10 | (46) #10 | 4,595 | 4,600 | 4,600 | |
| MSTC52 | | 3 | 52¼ | (54) #10 | (42) #10 | (42) #10 | 4,600 | 4,600 | 4,600 | |
| MSTC66 | 68 (14) | 3 | 65¾ | (66) #10 | (46) #10 | (30) #10 | 5,795 | 5,795 | 5,795 | |
| MSTC78 | | 3 | 77¾ | (66) #10 | (46) #10 | (30) #10 | 5,795 | 5,795 | 5,795 | |
| ST6236 | | 2 1/16 | 33 13/16 | (40) #10 | (30) #10 | (18) #10 | 3,535 | 3,760 | 3,760 | |
| HRS6 | 97 (12) | 1⅜ | 6 | (6) #10 | (6) #10 | (6) #10 | 530 | 790 | 1,600 | |
| HRS8 | | 1⅜ | 8 | (10) #10 | (10) #10 | (10) #10 | 885 | 1,315 | 2,670 | |
| HRS12 | | 1⅜ | 12 | (14) #10 | (14) #10 | (12) #10 | 1,235 | 1,840 | 2,710 | |
| FHA6 | | 1 7/16 | 6⅜ | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 2,045 | |
| FHA12 | | 1 7/16 | 11⅝ | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 2,045 | |
| FHA18 | | 1 7/16 | 17¾ | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 2,045 | |
| FHA24 | | 1 7/16 | 23⅞ | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 2,045 | |
| FHA30 | | 1 7/16 | 30 | (8) #10 | (8) #10 | (8) #10 | 705 | 1,050 | 2,045 | |
| MSTI26 | | 2 1/16 | 26 | (26) #10 | (26) #10 | (22) #10 | 2,300 | 3,420 | 5,025 | |
| MSTI36 | | 2 1/16 | 36 | (36) #10 | (36) #10 | (22) #10 | 3,180 | 4,735 | 5,025 | |
| MSTI48 | | 2 1/16 | 48 | (48) #10 | (40) #10 | (22) #10 | 4,240 | 5,025 | 5,025 | |
| MSTI60 | | 2 1/16 | 60 | (58) #10 | (40) #10 | (22) #10 | 5,025 | 5,025 | 5,025 | |
| MST27 | | 2 1/16 | 27 | (30) #10 | (30) #10 | (22) #10 | 2,650 | 3,945 | 5,025 | 170 |
| MST37 | | 2 1/16 | 37 | (42) #10 | (40) #10 | (34) #10 | 3,710 | 5,025 | 5,025 | |
| MST48 | | 2 1/16 | 48 | (54) #10 | (54) #10 | (46) #10 | 4,770 | 5,155 | 5,155 | |
| MST60 | 118 (10) | 2 1/16 | 60 | (68) #10 | (68) #10 | (62) #10 | 5,820 | 6,420 | 6,650 | |
| MST72 | | 2 1/16 | 72 | (80) #10 | (72) #10 | (64) #10 | 6,650 | 6,650 | 6,650 | |

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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

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# **CS/CMST** Coiled Straps

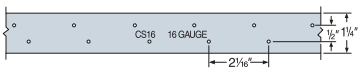
CMSTC provides countersunk fastener slots that provide a lower screw head profile. CS, CMST and CMSTC are continuous utility straps which can be cut to length on the job site. Packaged in lightweight cartons (about 40 lb.).

**Finish:** Galvanized. Some products available in ZMAX® coating; see Corrosion Information, pp. 18–21.

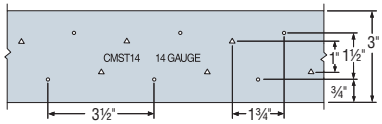
**Installation:**

- 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.

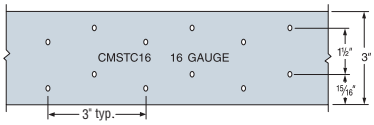
**Codes:** See p. 11 for Code Reference Key Chart




**CS16 Hole Pattern**
*(all other CS straps similar)*

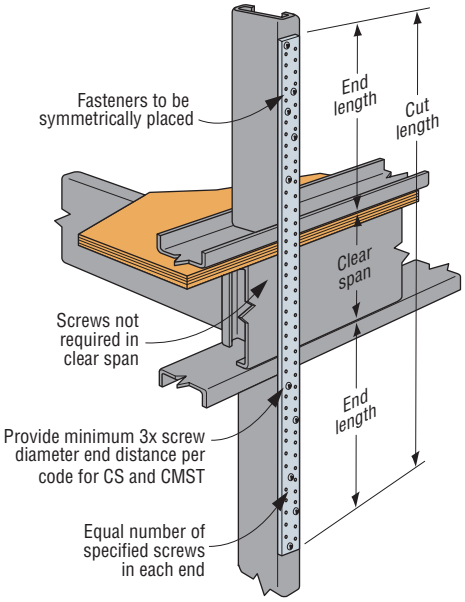



**CMST14 Hole Pattern**
*(CMST12 similar)*




**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 Load (lb.) | 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) | 3 | (104) #10 | (70) #10 | (40) #10 | 9,080 | IP1, L2, FL |
| CMST14[2] | 52'–6" | 68 (14) | 3 | (72) #10 | (50) #10 | (28) #10 | 6,365 | |
| CMSTC16[3] | 54' | 54 (16) | 3 | (54) #10 | (36) #10 | (30) #10 | 4,600 | |
| CS14 | 100' | 68 (14) | 1¼ | (28) #10 | (18) #10 | (12) #10 | 2,305 | |
| CS16 | 150' | 54 (16) | 1¼ | (18) #10 | (12) #10 | (8) #10 | 1,550 | |
| CS18S | 100' | 43 (18) | 1¼ | (14) #10 | (10) #10 | (6) #10 | 1,235 | |
| CS18 | 200' | | 1¼ | (14) #10 | (10) #10 | (6) #10 | 1,235 | |
| CS20 | 250' | 33 (20) | 1¼ | (12) #10 | (8) #10 | (6) #10 | 945 | |
| CS22 | 300' | 27 (22) | 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: $\frac{24 \text{ Screws (Used)}}{30 \text{ Screws (Table)}}$ x 4,600 lb. = 3,680 lb.
7. Loads are based on lesser of steel strap capacity and AISI S100 fastener calculation.
8. See pp. 138 through 171 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.

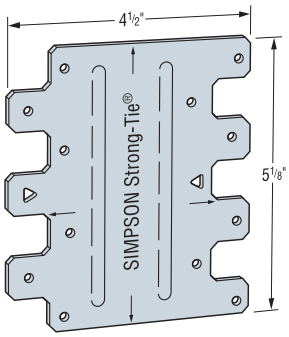
**Material:** 33 mil (20 ga.)

**Finish:** Galvanized

**Installation:**

- Use all specified fasteners; see General Notes

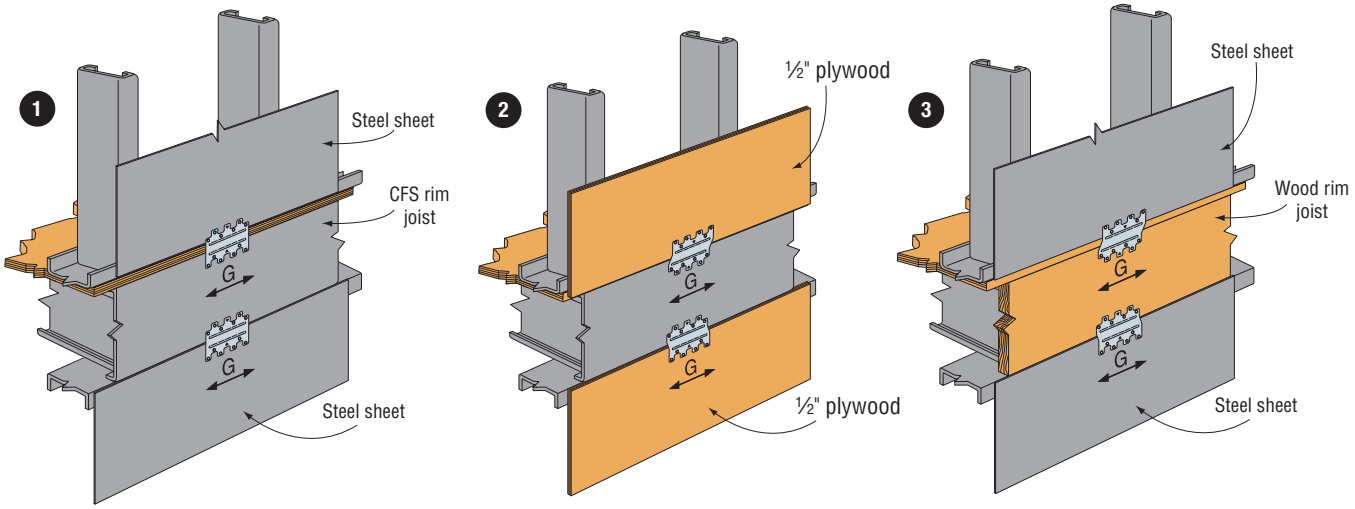
**Codes:** See p. 11 for Code Reference Key Chart




LTP5

| Model No. | Type of Connection | Direction of Load | Fasteners[4] | | Allowable Load 43 mil (18 ga.) (lb.) | Code Ref. |
|---|---|---|---|---|---|---|
| | | | To Rim Joist | To Sheathing and Track | | |
| LTP5 | 1 | G | (7) #10 | (7) #10 | 1,045 | IP1, L2, FL |
| | 2 | | (7) #10 | (7) #10 | 1,110 | |
| | 3 | | (7) 8d x 1½" | (7) #10 | 730 | |

1. Allowable loads are for one anchor.
2. Allowable loads are based on steel (stud and sheet) of 43 mil (18 ga.) minimum.
3. Allowable load for Type 3 connection assumes $C_D$ = 1.60.
4. See pp. 138 through 171 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 three threads shall penetrate past the steel.



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# Lateral Systems



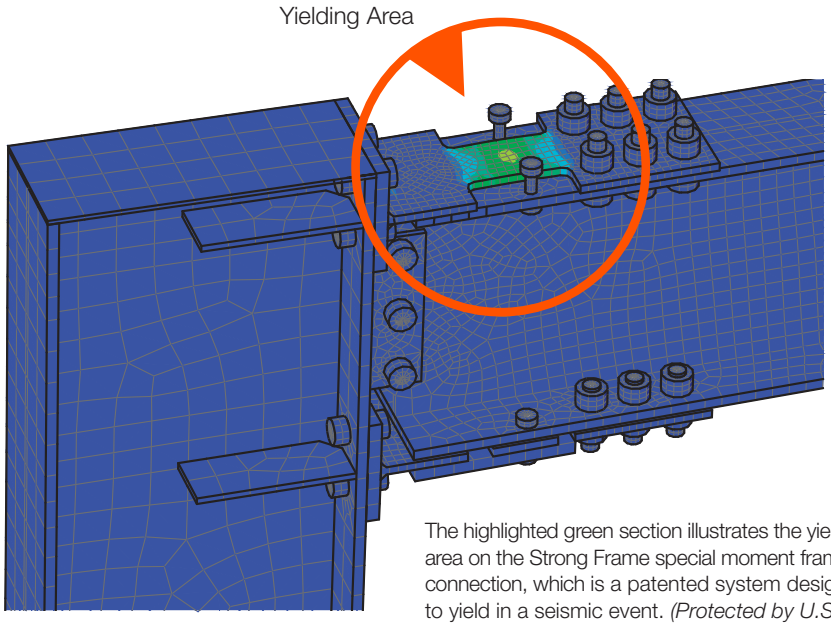
# **Strong Frame®** Moment Frames

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. and other pending and granted foreign patents.)*

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# **Strong Frame®** Moment Frames

## Features:

- **100% Bolted Connections**
  Install frames faster with no field welding required. No need to have a welder on site, or a welding inspector.
- **Most 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.
- **Preassembled Anchor-Bolt Assemblies**
  Anchor bolts are preassembled 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.
- **Multi-Story, Multi-Bay, and Retrofit Solutions Are Available**
  Contact Simpson Strong-Tie for more information.
- **Code Listed**
  SMF — ICC-ES ESR-2802; AISC-ANSI 358-16, Chapter 12







## Strong Frame® Design Guide

All of the information you need on our latest lateral force-resisting solution is contained in the *Strong Frame Design Guide* (F-L-SF). Frame and anchorage design information, installation instructions, prescriptive wall bracing requirements and installation details are all included in this useful tool. Visit **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 **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 2015 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 three exposed threads minimum. Fill all screw holes.

**Codes:** ICC-ES ESR-1679; City of L.A. RR 25625; State of Florida FL5113

**Naming Scheme:**

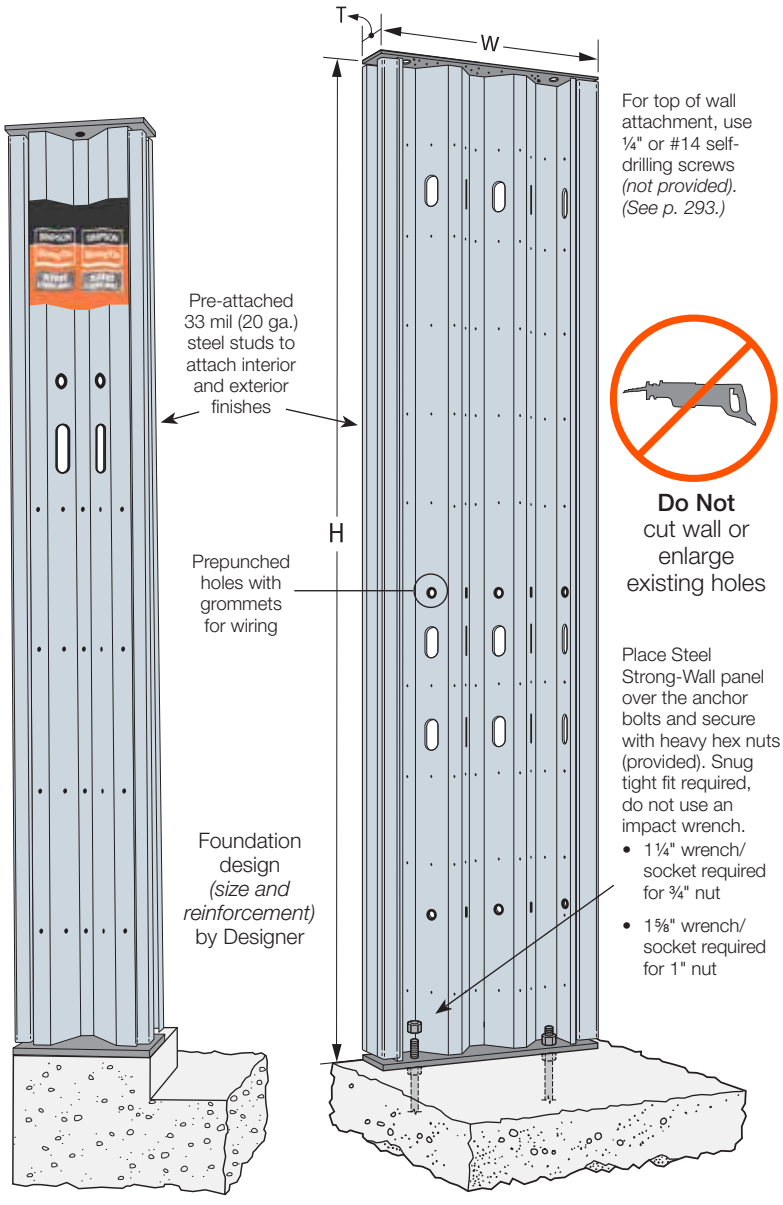
**S/SSW24x8X**

- **S/SSW** — Steel Strong-Wall for Cold-Formed Steel
- **24** — Width (in.)
- **8** — Nominal Height (ft.)
- **X** — Height Modification Option (in.)

## Steel Strong-Wall® for Cold-Formed Steel Product Data

| Model No. | Dimensions (in.) | | | Anchor Bolts | | Number of Screws in Top of Wall |
|---|---|---|---|---|---|---|
| | W | H | T | 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 |

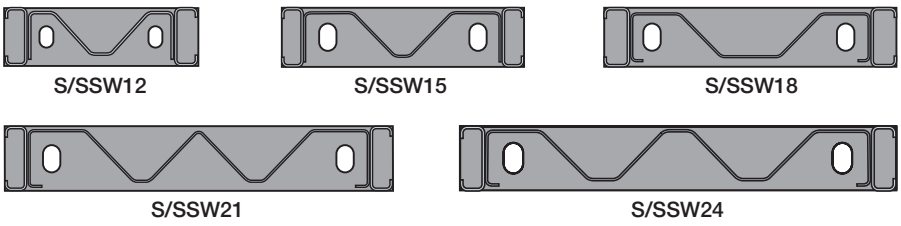
1. S/SSW models may be ordered in custom heights. To order, add "X" to model and specify height (example: S/SSW12x8X, H = 95").




**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




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# **Steel Strong-Wall®** Cold-Formed Steel on Concrete Foundations

## 2015 International Building Code®

| S/SSW Model | Max. H (in.) | Allowable Axial Load (lb.) | Seismic[2] | | | Wind | | |
|---|---|---|---|---|---|---|---|---|
| | | | Allowable ASD Shear Load V (lb.) | Drift at Allowable Shear (in.) | Anchor Tension at Allowable Shear[6] (lb.) | Allowable ASD Shear Load V (lb.) | Drift at Allowable Shear (in.) | Anchor Tension at Allowable Shear[6] (lb.) |
| S/SSW12x8 | 96⅝ | 1,000 | 645 | 0.42 | 7,710 | 820 | 0.54 | 10,360 |
| | | 4,000 | 645 | 0.42 | 7,710 | 775 | 0.51 | 9,640 |
| | | 7,500 | 610 | 0.40 | 7,220 | 610 | 0.40 | 7,220 |
| S/SSW15x8 | 96⅝ | 1,000 | 1,280 | 0.42 | 12,390 | 1,415 | 0.47 | 14,090 |
| | | 4,000 | 1,250 | 0.41 | 12,025 | 1,250 | 0.41 | 12,025 |
| | | 7,500 | 1,070 | 0.35 | 9,955 | 1,070 | 0.35 | 9,955 |
| S/SSW18x8 | 96⅝ | 1,000 | 2,140 | 0.41 | 16,895 | 2,785 | 0.54 | 24,565 |
| | | 4,000 | 2,140 | 0.41 | 16,895 | 2,680 | 0.52 | 23,130 |
| | | 7,500 | 2,140 | 0.41 | 16,895 | 2,460 | 0.48 | 20,400 |
| S/SSW21x8 | 96⅝ | 1,000 | 3,265 | 0.41 | 21,905 | 3,870 | 0.48 | 27,930 |
| | | 4,000 | 3,265 | 0.41 | 21,905 | 3,765 | 0.47 | 26,790 |
| | | 7,500 | 3,265 | 0.41 | 21,905 | 3,460 | 0.43 | 23,715 |
| S/SSW24x8 | 96⅝ | 1,000 | 4,540 | 0.39 | 26,335 | 4,985 | 0.43 | 30,045 |
| | | 4,000 | 4,540 | 0.39 | 26,335 | 4,890 | 0.42 | 29,220 |
| | | 7,500 | 4,540 | 0.39 | 26,335 | 4,555 | 0.39 | 26,455 |
| S/SSW12x9 | 108⅝ | 1,000 | 545 | 0.48 | 7,255 | 695 | 0.61 | 9,735 |
| | | 4,000 | 545 | 0.48 | 7,255 | 605 | 0.53 | 8,210 |
| | | 7,500 | 445 | 0.39 | 5,755 | 445 | 0.39 | 5,755 |
| S/SSW15x9 | 108⅝ | 1,000 | 1,090 | 0.48 | 11,725 | 1,180 | 0.52 | 12,955 |
| | | 4,000 | 1,025 | 0.45 | 10,875 | 1,025 | 0.45 | 10,875 |
| | | 7,500 | 850 | 0.37 | 8,720 | 850 | 0.37 | 8,720 |
| S/SSW18x9 | 108⅝ | 1,000 | 1,835 | 0.47 | 16,105 | 2,365 | 0.61 | 22,835 |
| | | 4,000 | 1,835 | 0.47 | 16,105 | 2,365 | 0.61 | 22,835 |
| | | 7,500 | 1,835 | 0.47 | 16,105 | 2,150 | 0.55 | 19,890 |
| S/SSW21x9 | 108⅝ | 1,000 | 2,800 | 0.46 | 20,855 | 3,275 | 0.54 | 25,900 |
| | | 4,000 | 2,800 | 0.46 | 20,855 | 3,025 | 0.50 | 23,140 |
| | | 7,500 | 2,735 | 0.45 | 20,220 | 2,735 | 0.45 | 20,220 |
| S/SSW24x9 | 108⅝ | 1,000 | 4,005 | 0.46 | 26,025 | 4,220 | 0.48 | 27,970 |
| | | 4,000 | 3,950 | 0.45 | 25,540 | 3,950 | 0.45 | 25,540 |
| | | 7,500 | 3,630 | 0.41 | 22,855 | 3,630 | 0.41 | 22855 |
| S/SSW15x10 | 120⅝ | 1,000 | 945 | 0.53 | 11,185 | 990 | 0.56 | 11,845 |
| | | 4,000 | 835 | 0.47 | 9,645 | 835 | 0.47 | 9,645 |
| | | 7,500 | 665 | 0.37 | 7,425 | 665 | 0.37 | 7,425 |
| S/SSW18x10 | 120⅝ | 1,000 | 1,605 | 0.53 | 15,515 | 2,045 | 0.67 | 21490 |
| | | 4,000 | 1,605 | 0.53 | 15,515 | 1,960 | 0.64 | 20,225 |
| | | 7,500 | 1,605 | 0.53 | 15,515 | 1,715 | 0.56 | 16,890 |
| S/SSW21x10 | 120⅝ | 1,000 | 2,440 | 0.52 | 19,970 | 2,650 | 0.56 | 22,275 |
| | | 4,000 | 2,405 | 0.51 | 19,600 | 2,405 | 0.51 | 19,600 |
| | | 7,500 | 2,120 | 0.45 | 16,730 | 2,120 | 0.45 | 16,730 |
| S/SSW24x10 | 120⅝ | 1,000 | 3,425 | 0.50 | 24,275 | 3,425 | 0.50 | 24,275 |
| | | 4,000 | 3,160 | 0.46 | 21,875 | 3,160 | 0.46 | 21,875 |
| | | 7,500 | 2,855 | 0.42 | 19,275 | 2,855 | 0.42 | 19,275 |

**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 $f'_c$ = 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 bearing stresses.
2. For seismic designs based on the 2015 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 p. 142) with a minimum nominal shear strength ($P_{ss}$) of 2,000 lb. 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 2,720 lb. for S/SSW18, 3,625 lb. for S/SSW21, and 4,230 lb. for S/SSW24.
4. Allowable shear, drift and anchor tension values may be interpolated for intermediate height or axial loads. See example on p. 288.
5. High-strength anchor bolts are required for anchor tension forces exceeding the allowable load for standard-strength bolts tabulated on pp. 296–297. High-strength anchor bolts are required for S/SSW12 when seismic shear X panel height exceeds 61.6k-in. See pp. 296–303. 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 p. 289. Drifts at lower design shear may be linearly reduced.
7. See p. 288 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 (lb.)[2,4] | Nominal Height of Panel (ft.) | | |
|---|---|---|---|---|
| | | 8 | 9 | 10 |
| 12" wide | 1,000 | 195 | 140 | 100 |
| | 4,000 | 145 | 100 | 70 |
| | 7,500 | 85 | 50 | 25 |
| 15" wide | 1,000 | 160 | 125 | 100 |
| | 4,000 | 130 | 95 | 70 |
| | 7,500 | 90 | 65 | 45 |
| 18" wide | 7,500 | 300 | 210 | 155 |
| 21" wide | 7,500 | 255 | 180 | 130 |
| 24" wide | 7,500 | 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 (lb.) with No Lateral Load[1,2,3] | | | |
|---|---|---|---|---|
| | Nominal Height of Panel (ft.) | | | |
| | 7 | 8 | 9 | 10 |
| 12" wide | 20,200 | 16,300 | 13,700 | 11,100 |
| 15" wide | 25,300 | 21,800 | 19,200 | 16,600 |
| 18" wide | 42,500 | 36,000 | 31,400 | 27,000 |
| 21" wide | 43,700 | 35,800 | 30,300 | 25,100 |
| 24" wide | 51,600 | 42,900 | 36,900 | 31,100 |

1. Allowable compression is lesser of wall-buckling capacity or 2,500 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, 2,500 psi Concrete

Shear Load = 2,000 lb.

Axial = 4,000 lb.

S/SSW Wall Height Required: 8'–6" = 102"

**Interpolate (See table on p. 287):**

S/SSW18x8 $V_1$ = 2,140 lb., $h_1$ = 96⅝"

S/SSW18x9 $V_2$ = 1,835 lb., $h_2$ = 108⅝"

Equation: $V_{allow} = \left(\frac{V_1 - V_2}{h_1 - h_2}\right)(h_{required} - h_1) + V_1$

$V_{allow}$ $\left(\frac{2{,}140 \text{ lb.} - 1{,}835 \text{ lb.}}{96⅝" - 108⅝"}\right)$ (102" − 96⅝") + 2,140 lb. = 2,003 lb. @ 102"

$V_{allow}$ = 2,003 lb. > 2,000 lb. 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 pp. 296–300.

12 in. wall $$T = \left[11.2f_c' - \sqrt{126f_c'^2 - 2.38f_c'(3.44P + Vh)}\right] - P$$

15 in. wall $$T = \left[14.4f_c' - \sqrt{208f_c'^2 - 2.38f_c'(4.63P + Vh)}\right] - P$$

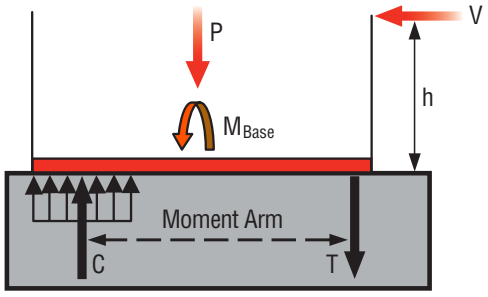
18 in. wall $$T = \left[18.0f_c' - \sqrt{324f_c'^2 - 2.38f_c'(6.13P + Vh)}\right] - P$$

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 $V_h$:

$$Vh = M_{base}\left(\frac{12}{1{,}000}\right) \text{ kip-in}$$

Where $M_{base}$ = Design moment at base of wall (ft.-lb.)

### 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 p. 295
- S/SSW18x9X-STK wall on 2.5 ksi concrete
- Wind
- $M_{base}$ = 17,550 ft.-lb. (Moment at base of two-story stacked wall)
- Vh = 17,550 x $\left(\frac{12}{1{,}000}\right)$ 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 and Finish:** See p. 286

**For product data and naming scheme information, see p. 286.**



**For a complete set of wall profile drawings, see p. 286.**

## CFS First-Floor Wall Connection Kit

| Wall Width (in.) | Model No. | Contents |
|---|---|---|
| 12 | SSW12-1KT | (1) Shear-transfer plate (with #14 self-drilling screws)<br>(2) ¾" or 1" x 18" threaded rods F1554 Grade 36<br>(2) Coupler nuts<br>(2) Heavy hex nuts<br>Installation instructions |
| 15 | SSW15-1KT | |
| 18 | SSW18-1KT | |
| 21 | SSW21-1KT | |
| 24 | SSW24-1KT | |

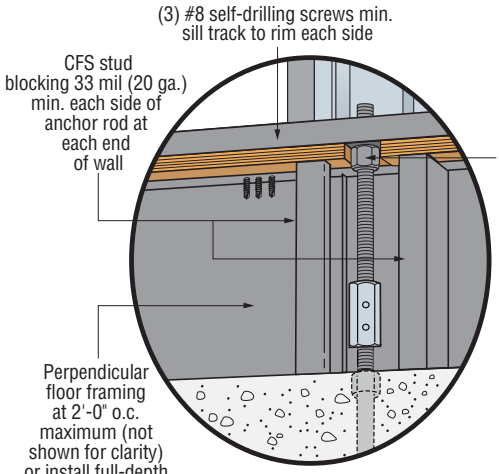
1. Two heavy hex nuts included with each wall.



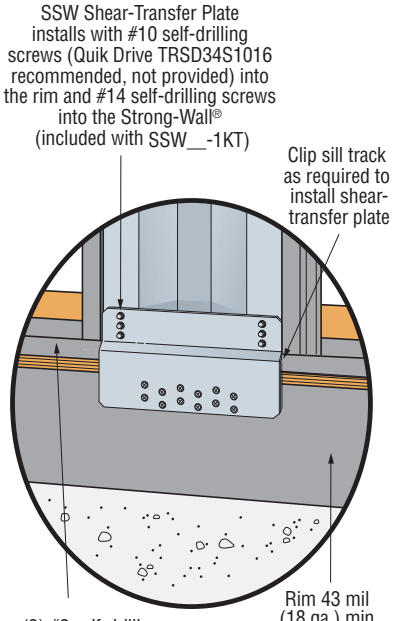
**DO NOT** cut wall or enlarge existing holes

## Shear-Transfer Plate Fasteners for Raised-Floor Applications

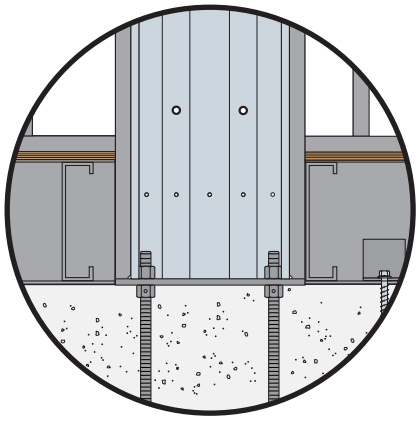
| Strong-Wall Width | Fastener #14 Screws | Quantity #10 Screws |
|---|---|---|
| 12" wall | 4 | 6 |
| 15" wall | 4 | 10 |
| 18" wall | 6 | 12 |
| 21" wall | 6 | 16 |
| 24" wall | 7 | 18 |



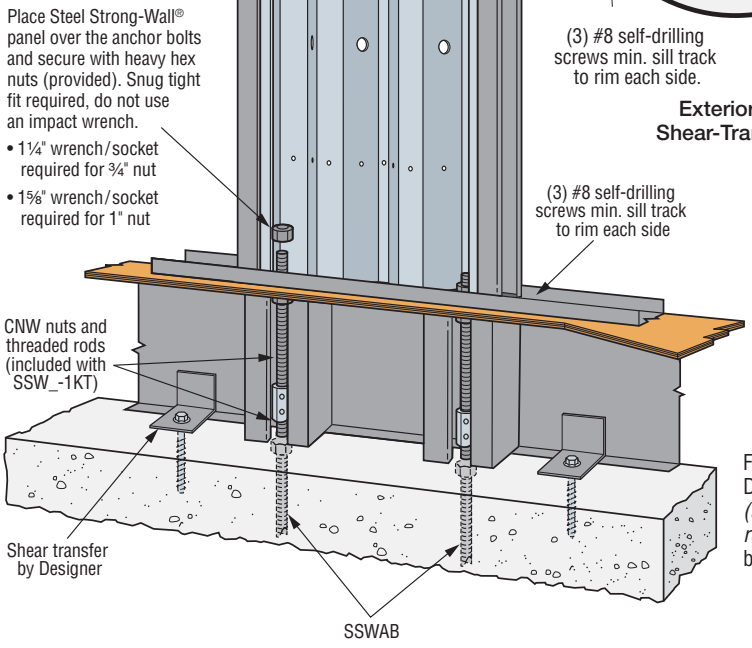

**Blocking/ Connection Detail**




**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 pp. 286–287.




**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

## 2015 International Building Code®

| S/SSW Model | Seismic[2] | | | Wind | | |
|---|---|---|---|---|---|---|
| | Allowable ASD Shear Load V (lb.) | Drift at Allowable Shear (in.) | Anchor Tension at Allowable Shear[4] (lb.) | Allowable ASD Shear Load V (lb.) | Drift at Allowable Shear (in.) | Anchor Tension at Allowable Shear[4] (lb.) |
| S/SSW12x8 | 435 | 0.40 | 6,135 | 435 | 0.40 | 6,135 |
| S/SSW15x8 | 1,050 | 0.42 | 11,010 | 1,150 | 0.46 | 12,060 |
| S/SSW18x8 | 1,525 | 0.36 | 12,075 | 1,525 | 0.36 | 12,075 |
| S/SSW21x8 | 1,900 | 0.29 | 12,085 | 1,900 | 0.29 | 12,085 |
| S/SSW24x8 | 2,270 | 0.24 | 12,065 | 2,270 | 0.24 | 12,065 |
| S/SSW12x9 | 390 | 0.47 | 6,185 | 390 | 0.47 | 6,185 |
| S/SSW15x9 | 900 | 0.48 | 10,605 | 1,025 | 0.54 | 12,080 |
| S/SSW18x9 | 1,355 | 0.42 | 12,055 | 1,355 | 0.42 | 12,055 |
| S/SSW21x9 | 1,690 | 0.34 | 12,080 | 1,690 | 0.34 | 12,080 |
| S/SSW24x9 | 2,020 | 0.28 | 12,065 | 2,020 | 0.28 | 12,065 |
| S/SSW15x10 | 785 | 0.53 | 10,270 | 925 | 0.63 | 12,100 |
| S/SSW18x10 | 1,220 | 0.48 | 12,050 | 1,220 | 0.48 | 12,050 |
| S/SSW21x10 | 1,520 | 0.39 | 12,060 | 1,520 | 0.39 | 12,060 |
| S/SSW24x10 | 1,820 | 0.32 | 12,065 | 1,820 | 0.32 | 12,065 |

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 2015 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 pp. 296–303 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 (lb.)
   V = design shear load (lb.)
   h = Strong-Wall® height per page 146 (in.)
   P = applied axial load (lb.)
   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 1,000 lb. total uniformly distributed axial load acting on the entire panel in combination with the shear load. For allowable shear loads at 2,000 lb. 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 2,000 lb. 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 and Finish:** See p. 286



**For a complete set of wall profile drawings, see p. 286.**

## Naming Scheme:

**Top Wall:** **S/SSW18x8**

- S/SSW: Steel Strong-Wall for Cold-Formed Steel
- 18: Width (in.)
- 8: Nominal Height (ft.)

**Bottom Wall:** **S/SSW18x10-STK**

- S/SSW: Steel Strong-Wall for Cold-Formed Steel
- 18: Width (in.)
- 10: Nominal Height (ft.)
- STK: Stacked Wall (For bottom walls only)

## Cold-Formed Steel Two-Story Stacked-Wall Product Data — Bottom Wall

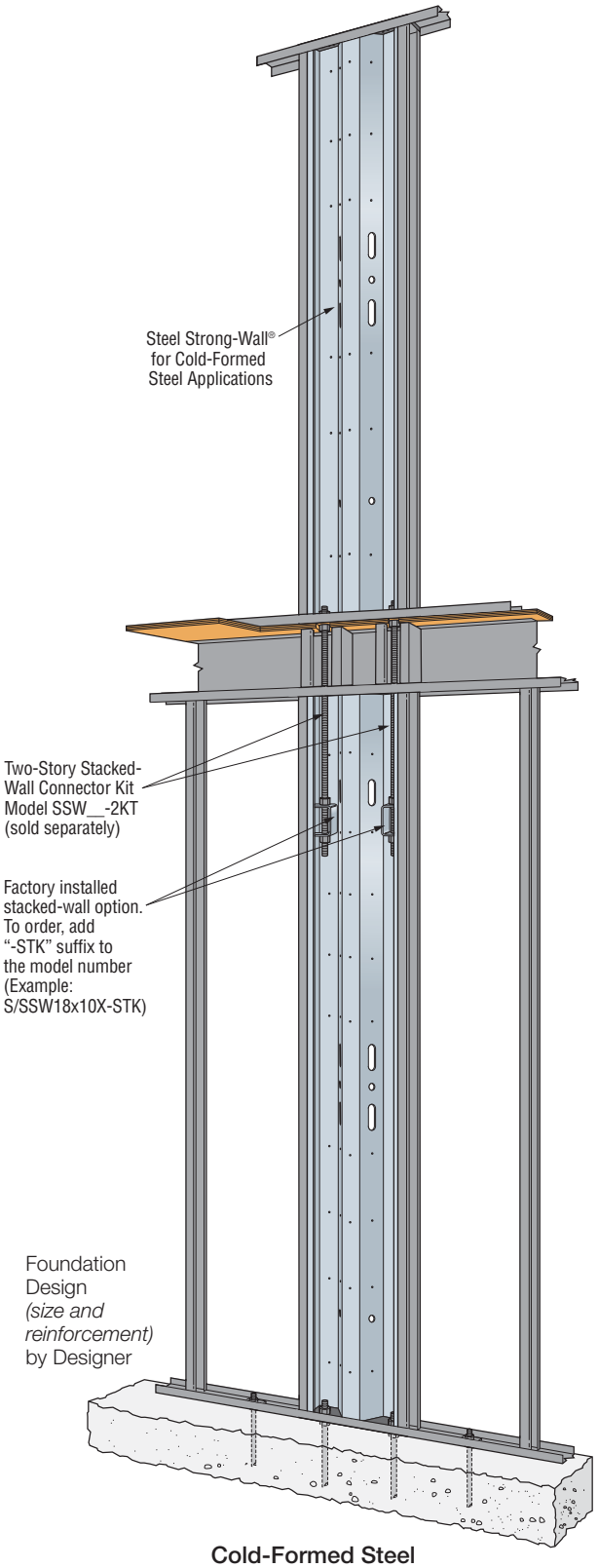
| Model No. | Dimensions (in.) | | | Anchor Bolts | | Number of Screws in Top of Wall |
|---|---|---|---|---|---|---|
| | W | H | T | Qty. | Dia. | |
| S/SSW15x8-STK | 15 | 96⅝ | 3½ | 2 | 1" | 6 |
| S/SSW18x8-STK | 18 | 96⅝ | 3½ | 2 | 1" | 9 |
| S/SSW21x8-STK | 21 | 96⅝ | 3½ | 2 | 1" | 12 |
| S/SSW24x8-STK | 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 p. 286 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)<br>(2) 1" x 48" threaded rods F1554 Grade 36<br>(6) Heavy hex nuts<br>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

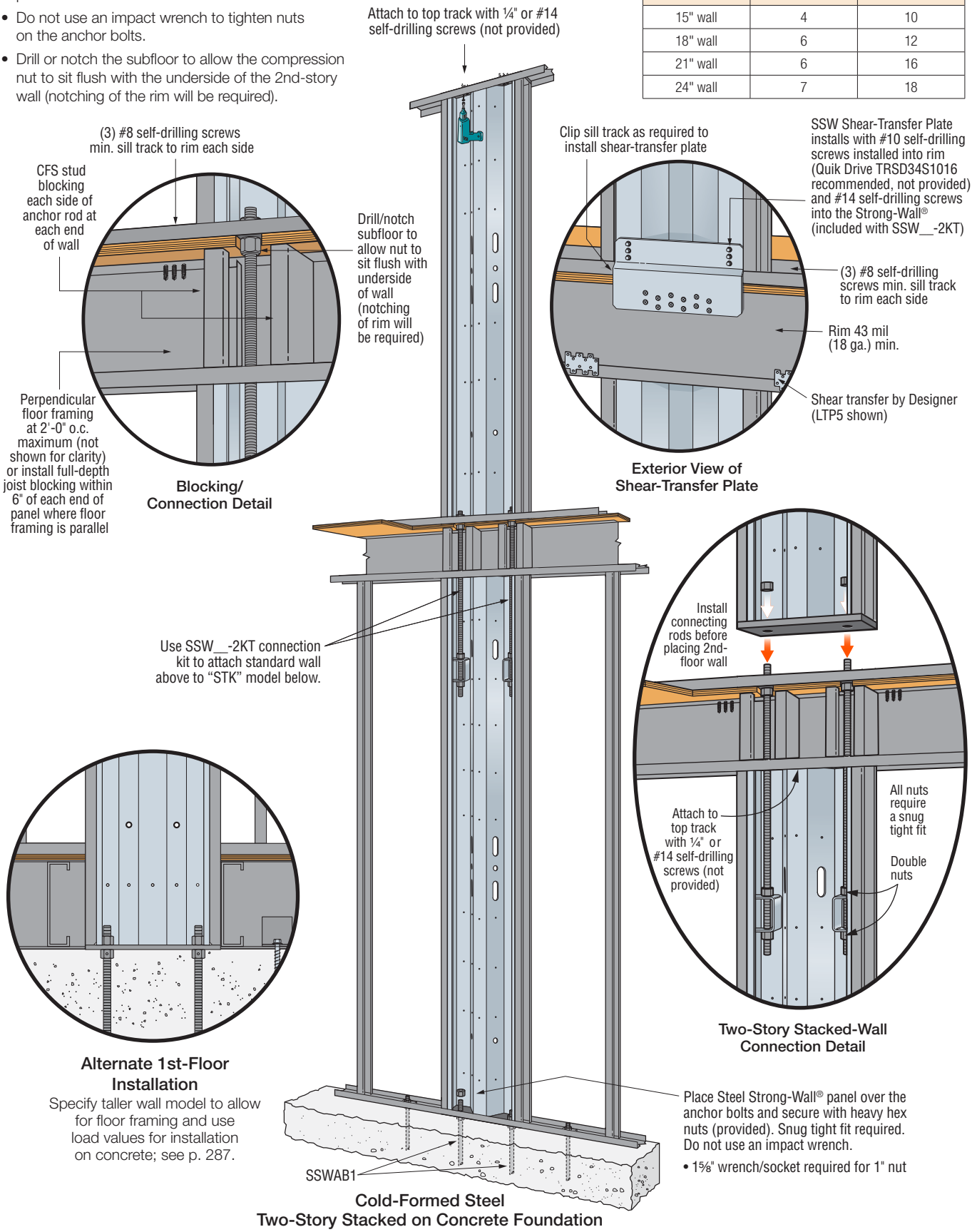
SIMPSON Strong-Tie®

### 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 |




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 (lb.) | Drift at Allowable Shear (in.) | Allowable ASD Shear Load V (lb.) | Drift at Allowable Shear (in.) |
| S/SSW15x8 | 550 | 0.29 | 550 | 0.29 |
| S/SSW18x8 | 995 | 0.31 | 1,275 | 0.39 |
| S/SSW21x8 | 1,515 | 0.30 | 1,650 | 0.33 |
| S/SSW24x8 | 1,970 | 0.27 | 1,970 | 0.27 |
| S/SSW15x9 | 510 | 0.35 | 510 | 0.35 |
| S/SSW18x9 | 940 | 0.38 | 1,180 | 0.47 |
| S/SSW21x9 | 1,435 | 0.37 | 1,465 | 0.38 |
| S/SSW24x9 | 1,755 | 0.31 | 1,755 | 0.31 |
| S/SSW15x10 | 475 | 0.41 | 475 | 0.41 |
| S/SSW18x10 | 890 | 0.45 | 1,060 | 0.54 |
| S/SSW21x10 | 1,300 | 0.42 | 1,300 | 0.42 |
| S/SSW24x10 | 1,580 | 0.36 | 1,580 | 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 2015 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 1,000 lb. maximum uniformly distributed total axial load acting on the second-story panel and a 2,000 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 p. 295 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 pp. 296–297. See pp. 296–303 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 p. 289. 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 2,000 lb. 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 4,230 lb.

## First-Story Walls on Concrete Foundations [5,9,11]

| First-Story Wall Models | Seismic [2] | | | Wind | | |
|---|---|---|---|---|---|---|
| | Allowable ASD Base Moment (ft.-lb.) | Drift at Allowable Base Moment (in.) | Anchor Tension at Allowable Base Moment [10] (lb.) | Allowable ASD Base Moment (ft.-lb.) | Drift at Allowable Base Moment (in.) | Anchor Tension at Allowable Base Moment [10] (lb.) |
| S/SSW15x8-STK | 10,130 | 0.41 | 12,065 | 10,130 | 0.41 | 12,065 |
| S/SSW18x8-STK | 17,300 | 0.41 | 16,895 | 22,230 | 0.53 | 24,075 |
| S/SSW21x8-STK | 26,390 | 0.41 | 21,905 | 31,000 | 0.48 | 27,545 |
| S/SSW24x8-STK | 36,700 | 0.39 | 26,335 | 40,040 | 0.43 | 29,770 |
| S/SSW15x9-STK | 9,705 | 0.47 | 11,440 | 9,945 | 0.48 | 11,790 |
| S/SSW18x9-STK | 16,670 | 0.47 | 16,110 | 21,480 | 0.61 | 22,835 |
| S/SSW21x9-STK | 25,435 | 0.46 | 20,855 | 28,990 | 0.53 | 24,950 |
| S/SSW24x9-STK | 36,210 | 0.45 | 25,860 | 37,515 | 0.47 | 27,145 |
| S/SSW15x10-STK | 9,160 | 0.51 | 10,665 | 9,460 | 0.53 | 11,090 |
| S/SSW18x10-STK | 16,185 | 0.53 | 15,515 | 20,335 | 0.66 | 21,060 |
| S/SSW21x10-STK | 24,485 | 0.52 | 19,845 | 25,895 | 0.55 | 21,355 |
| S/SSW24x10-STK | 33,645 | 0.49 | 23,460 | 33,645 | 0.49 | 23,460 |



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# Steel Strong-Wall Two-Story Design Example

## Example: Cold-Formed Steel Two-Story Wall Design

**Given:**

Wind, $f'_c$ = 2,500 psi

$V_{2nd\text{-}story\ wall}$ = 650 lb.

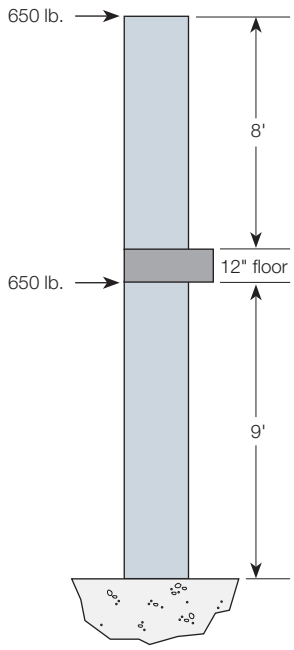
$V_{1st\text{-}story\ wall}$ = 650 lb.

$V_{total}$ = 650 lb. + 650 lb. = 1,300 lb.

$M_{allow}$ = Allowable ASD Base Moment (ft.-lb.)
(See Cold-Formed Steel Two-Story Stacked tables)

$V_{allow}$ = Allowable ASD Shear Load V (lb.)
(See Cold-Formed Steel Two-Story Stacked tables)

**Applied Loads**




**Step 1 — Select First-Story Wall (See tables on p. 294)**

$M_{base}$ = (650 lb. x 18 ft.) + (650 lb. x 9 ft.) = 17,550 ft.-lb.

Using First-Story Wall table, select a 9' wall with $M_{allow} \geq M_{base}$

Select S/SSW18x9-STK

$M_{allow}$ = 21,480 ft.-lb. > 17,550 ft.-lb. **OK**

**Step 2 — Check Second-Story Wall**

Using the Second-Story Wall Table on p. 294, check the capacity of an 8' wall with the same width as the First-Story Wall selected in Step 1:

Select S/SSW18x8

$V_{allow}$ = 1,275 lb. > 650 lb. **OK**

➡ **Use S/SSW18x8 over S/SSW18x9-STK**

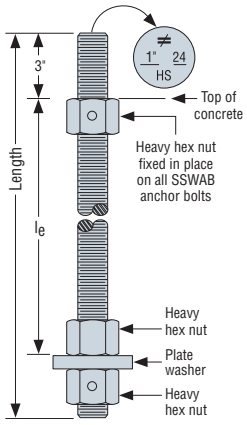
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# SSWAB Anchor Bolts

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.*

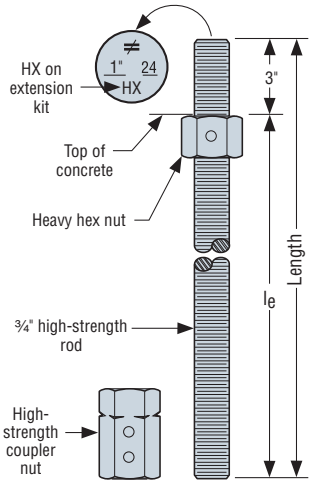



**SSWAB**

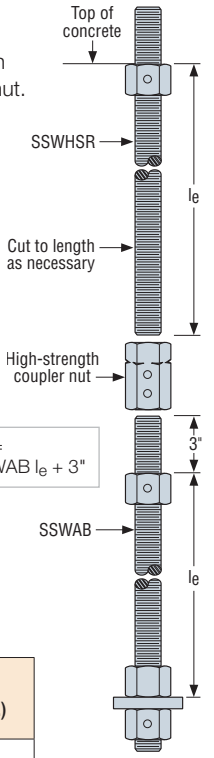
| Steel Strong-Wall Width (in.) | Model No. | Dia. (in.) | Total Length (in.) | le (in.) |
|---|---|---|---|---|
| 12" model | SSWAB¾x24 | ¾ | 24 | 19 |
| | SSWAB¾x24HS | ¾ | 24 | 19 |
| | SSWAB¾x30 | ¾ | 30 | 25 |
| | SSWAB¾x30HS | ¾ | 30 | 25 |
| | SSWAB¾x36HS | ¾ | 36 | 31 |
| 15", 18", 21", 24" models | 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 — 2,500 psi Concrete[1,2,6]

| Design Criteria | Concrete Condition | Anchor Strength[3] | SSWAB ¾" Anchor Bolt | | | SSWAB 1" Anchor Bolt | | |
|---|---|---|---|---|---|---|---|---|
| | | | ASD Allowable Tension (lb.) | W (in.) | $d_e$ (in.) | ASD Allowable Tension (lb.) | 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 pp. 299–300 for foundation illustrations showing W and $d_e$ dimensions.
2. Anchorage designs conform to ACI 318-14 with no supplement edge 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 one- and two-family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-14 Section 17.2.3.4.3.
5. Wind includes Seismic Design Category A&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 — 3,500 psi Concrete[1,2,6]

| Design Criteria | Concrete Condition | Anchor Strength[3] | SSWAB ¾" Anchor Bolt | | | SSWAB 1" Anchor Bolt | | |
|---|---|---|---|---|---|---|---|---|
| | | | ASD Allowable Tension (lb.) | W (in.) | $d_e$ (in.) | ASD Allowable Tension (lb.) | 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 pp. 299–300 for foundation illustrations showing W and $d_e$ dimensions.
2. Anchorage designs conform to ACI 318-14 with no supplement edge 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 one- and two-family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-14 Section 17.2.3.4.3.
5. Wind includes Seismic Design Category A&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 — 4,500 psi Concrete[1,2,6]

| Design Criteria | Concrete Condition | Anchor Strength[3] | SSWAB ¾" Anchor Bolt | | | SSWAB 1" Anchor Bolt | | |
|---|---|---|---|---|---|---|---|---|
| | | | ASD Allowable Tension (lb.) | W (in.) | $d_e$ (in.) | ASD Allowable Tension (lb.) | 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 pp. 299–300 for foundation illustrations showing W and $d_e$ dimensions.
2. Anchorage designs conform to ACI 318-14 with no supplement edge 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 one- and two-family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-14 Section 17.2.3.4.3.
5. Wind includes Seismic Design Category A&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.

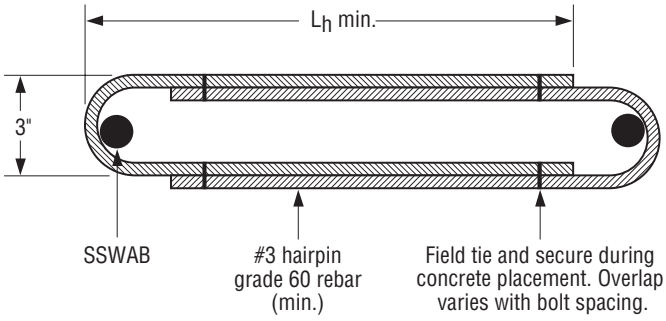
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# Steel Strong-Wall Shear Anchorage

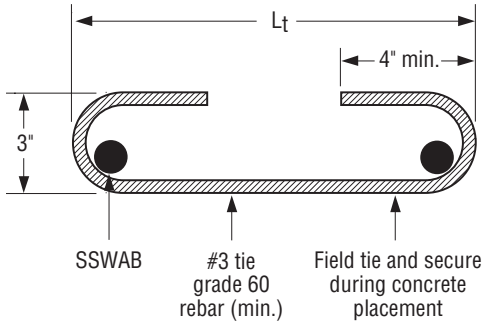
Foundation shear reinforcement to resist shear forces from Strong-Wall® panels located at the edge of concrete is shown in the table below. The S/SSW12 and S/SSW15 used in wind applications do not require shear reinforcement when the panel design shear force is less than the anchorage allowable shear load shown in the table below.

| Model No. | $L_t$ 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] (lb.) | | | |
| | | | | | | 6" Minimum Curb/Stemwall | | 8" Minimum Curb/Stemwall | |
| | | | | | | Uncracked | Cracked | Uncracked | Cracked |
| S/SSW12 | 9 | (1) #3 tie | 6 | See note 6 | — | 1,230 | 880 | 1,440 | 1,030 |
| S/SSW15 | 12 | (2) #3 ties | 6 | See note 6 | — | 1,590 | 1,135 | 1,810 | 1,295 |
| 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 | | | | |

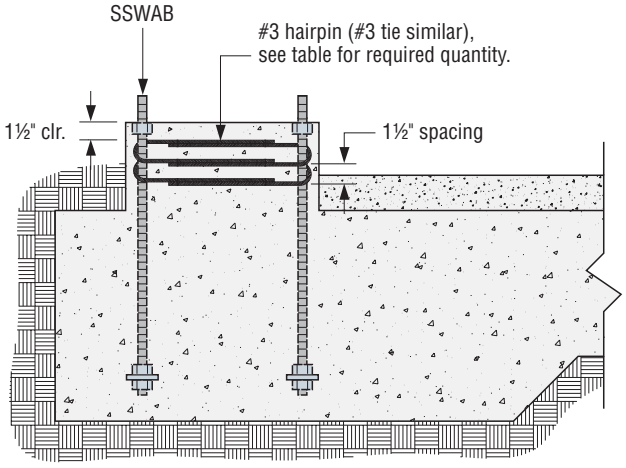
1. Shear anchorage designs conform to ACI 318-14 and assume minimum $f'_c$ = 2,500 psi concrete. See pp. 296–297 for tension anchorage.
2. Shear reinforcement is not required for panels installed on a cold-formed steel floor, interior foundation applications (panel installed away from edge of concrete) 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 318-14 Section 17.2.3.5.3.
4. Wind includes Seismic Design Category A&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**

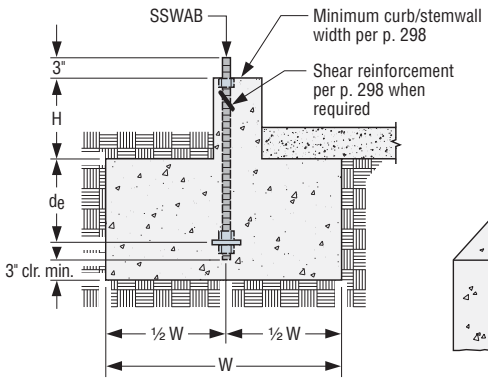



**Hairpin Installation**
*(garage curb shown, other footing types similar)*

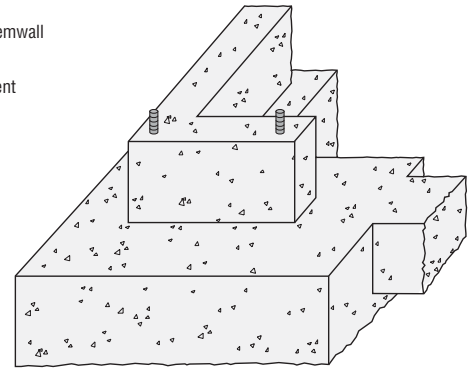
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# Steel Strong-Wall® Anchorage Solutions

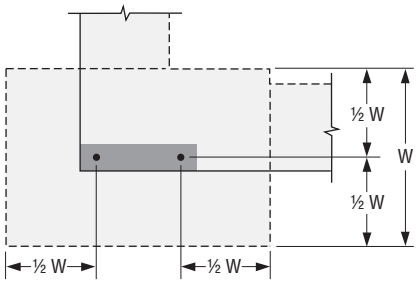
## Curb or Stemwall Installation




Curb or Stemwall Section View

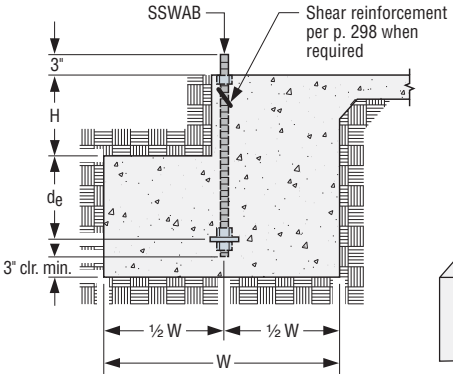


Perspective View
*(slab not shown for clarity)*

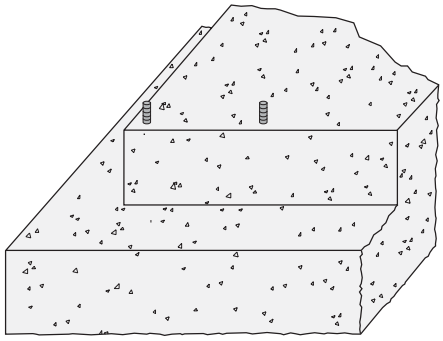



Footing Plan

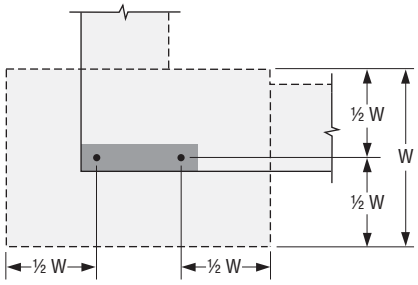
## Slab-On-Grade Installation




Slab-on-Grade Section View

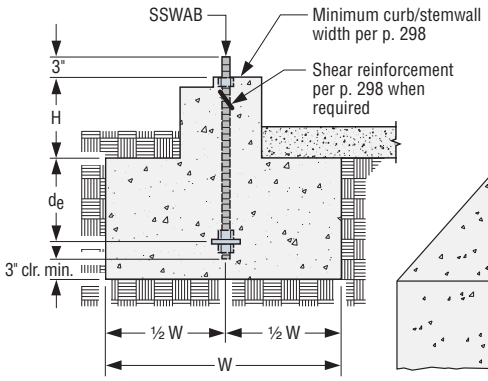


Perspective View

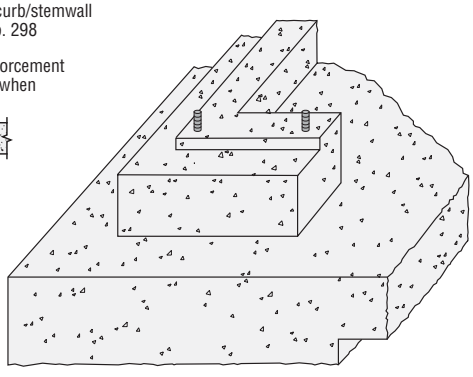



Footing Plan

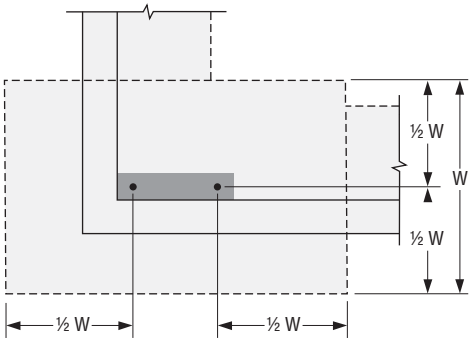
## Brick Ledge Installation




Brick Ledge Section View



Perspective View




Footing Plan

**Anchorage Solutions General Notes**

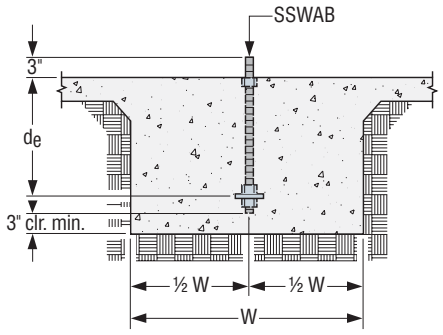
1. The Designer may specify alternate embedment, footing size or bolt grade.
2. Footing dimensions and rebar requirements are for anchorage only.

Foundation design *(size and reinforcement)* by Designer.

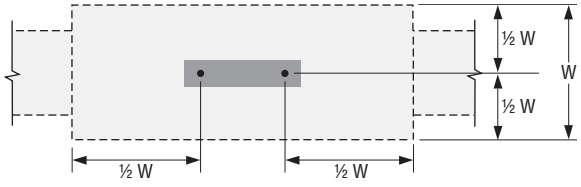
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# Steel Strong-Wall® Anchorage Solutions

## Interior Installation

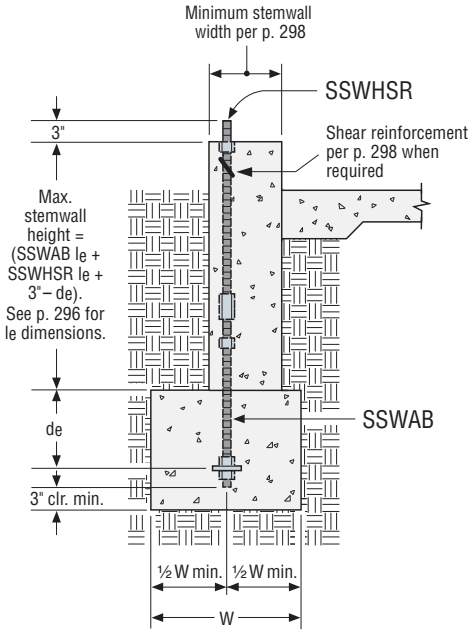



Interior Section View




Footing Plan

## Stemwall Extension Installation



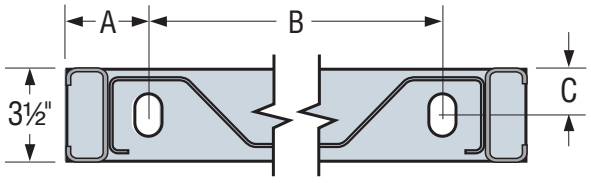

Section at Stemwall SSWAB and SSWHSR Extension Application

**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 SSWABs (A) | Distance From Center to Center of SSWABs (B) | Distance From Exterior Face of Wall to Center of All SSWABs (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 318-14. Through funding from the Structural Engineers Association of Northern California, initial testing at Scientific Construction Laboratories Inc. confirmed the need to comply with ACI 318 requirements to prevent plastic hinging at anchor locations. 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 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.

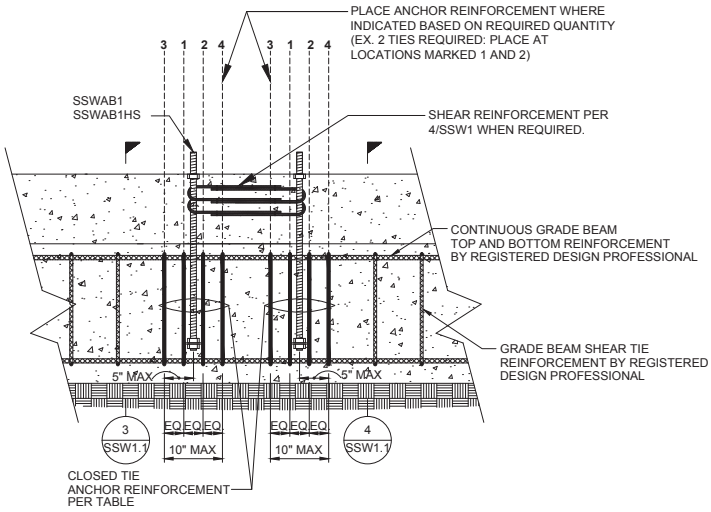


Grade Beam Test

## 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 ACI 318 design methodologies, the concrete member design strength needs to resist the amplified anchor design demand from ACI 318-14 Section 17.2.3.4.3 and ACI 318-11 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 defined in the sections listed above 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.




**S/SSW Grade Beam Anchorage Detail**

See **strongtie.com** for additional grade-beam anchor reinforcement details and requirements.

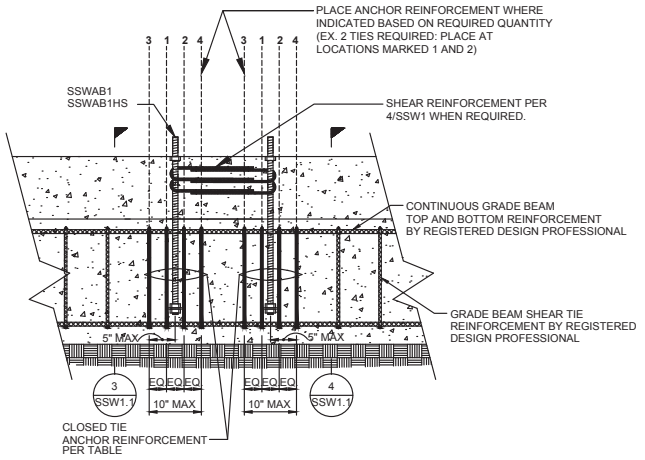
## Steel Strong-Wall Grade Beam Anchorage Solutions

| 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.-lb.) | |
|---|---|---|---|---|---|---|
| | | | 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 | 16,700 | 23,000 |
| S/SSW15 | SSWAB1 | 1 | (4) #4 closed ties / wall | (7) #4 closed ties / wall | 37,000 | 44,000 |
| S/SSW18 | | | (2) #4 closed ties / anchor | (4) #4 closed ties / anchor | 48,700 | 61,000 |
| S/SSW21 | | | | | 60,300 | 77,000 |
| S/SSW24 | | | | | 72,000 | 87,000 |

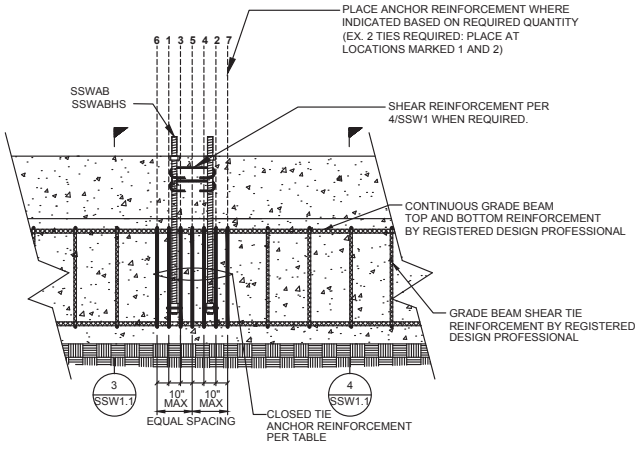
1. Anchor reinforcement conforms to ACI 318-14, Section 17.4.2.9 and ACI 318-11, Section D.5.2.9. Full-scale testing was used to validate anchor reinforcement configuration and placement.
2. Minimum concrete compressive strength, $f'_c$ = 2,500 psi.
3. Closed tie anchor reinforcement to be ASTM A615 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 318-14, Section 17.2.3.4.3 and 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 $\Omega_o$ 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° 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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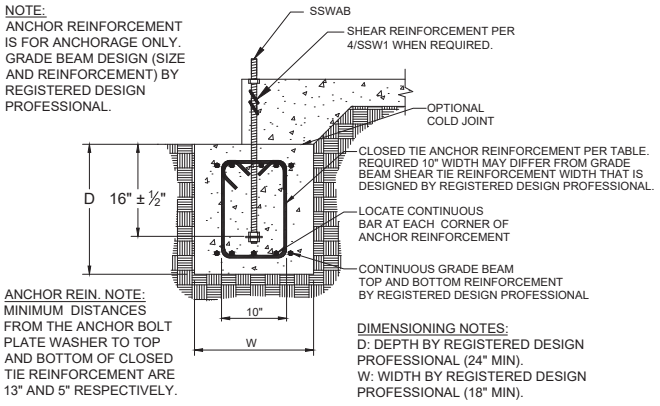
# Steel Strong-Wall® Anchorage Details



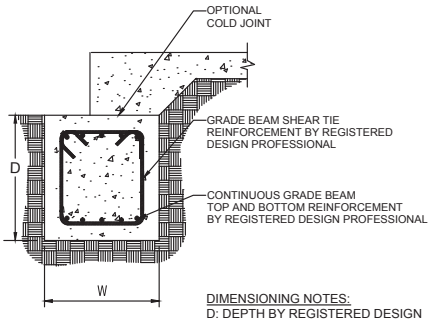

GRADE BEAM ELEVATION AT 18", 21" AND 24" WALL MODELS | 1/SSW1.1




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.-lb.) [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) | 16,700 | 23,000 |
| 15" MODEL | SSWAB1 SSWAB1HS | 1 | 4- #4 CLOSED TIES PER (2 SSW1.1) | 7- #4 CLOSED TIES PER (2 SSW1.1) | 37,000 | 44,000 |
| 18" MODEL | | | 2- #4 CLOSED TIES PER (1 SSW1.1) | 4- #4 CLOSED TIES PER (1 SSW1.1) | 48,700 | 61,000 |
| 21" MODEL | | | | | 60,300 | 77,000 |
| 24" MODEL | | | | | 72,000 | 87,000 |

NOTES:
1. ANCHOR REINFORCEMENT CONFORMS TO ACI 318-14 SECTION 17.4.2.9 AND ACI 318-11 SECTION D.5.2.9 AND PERFORMANCE WAS VALIDATED THROUGH FULL SCALE TESTING.
2. MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'c = 2,500 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 318-14 SECTION 17.2.3.4.3 AND 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 THE 12" 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

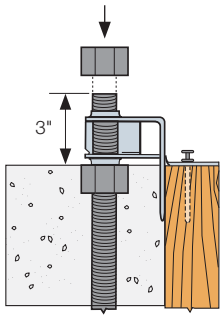


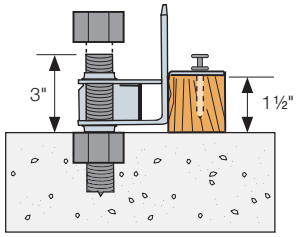
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# **Steel Strong-Wall®** Anchor Bolt Templates

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.

An additional nut for template installation is provided with each SSWAB. It may also be used for SSW installation.



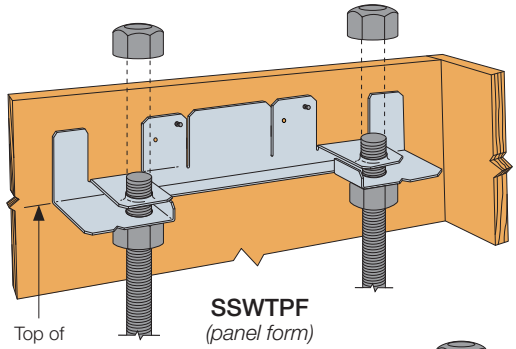

**Anchor Bolt Height**

## Steel Strong-Wall Anchor Bolt Templates

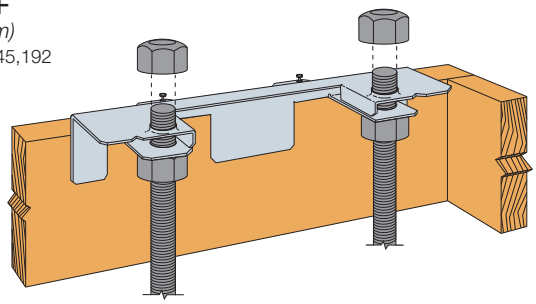
| Steel Strong-Wall Model | Width (in.) | Anchor Bolt Stabilizer Model | Steel Strong-Wall Template Model | | | |
|---|---|---|---|---|---|---|
| | | | Reversible | Panel Form | Brick Ledge | Extended Leg |
| S/SSW12 | 12 | SSWBS12 | SSWT12 | SSWTPF12 | SSWTBL12 | SSWTEL12 |
| S/SSW15 | 15 | SSWBS15 | 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.

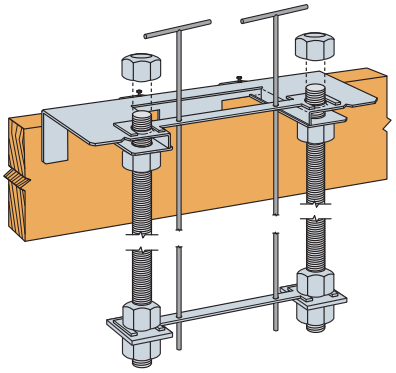
*SSWT templates are reversible. Use the same template for interior or exterior applications.



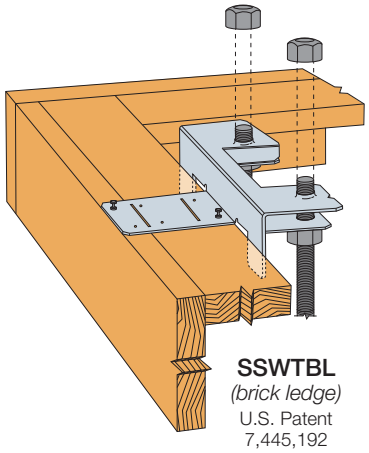

**SSWTPF**
*(panel form)*
U.S. Patent 7,445,192



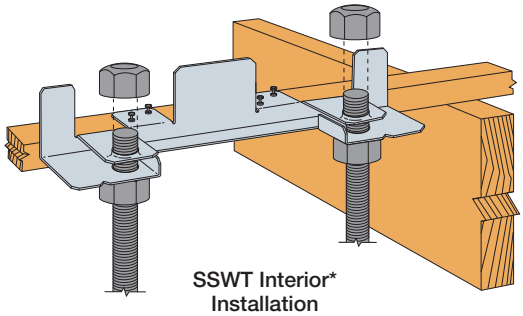
**SSWT Exterior Installation***
*(may be used for steel form systems)*
U.S. Patent 7,445,192



**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



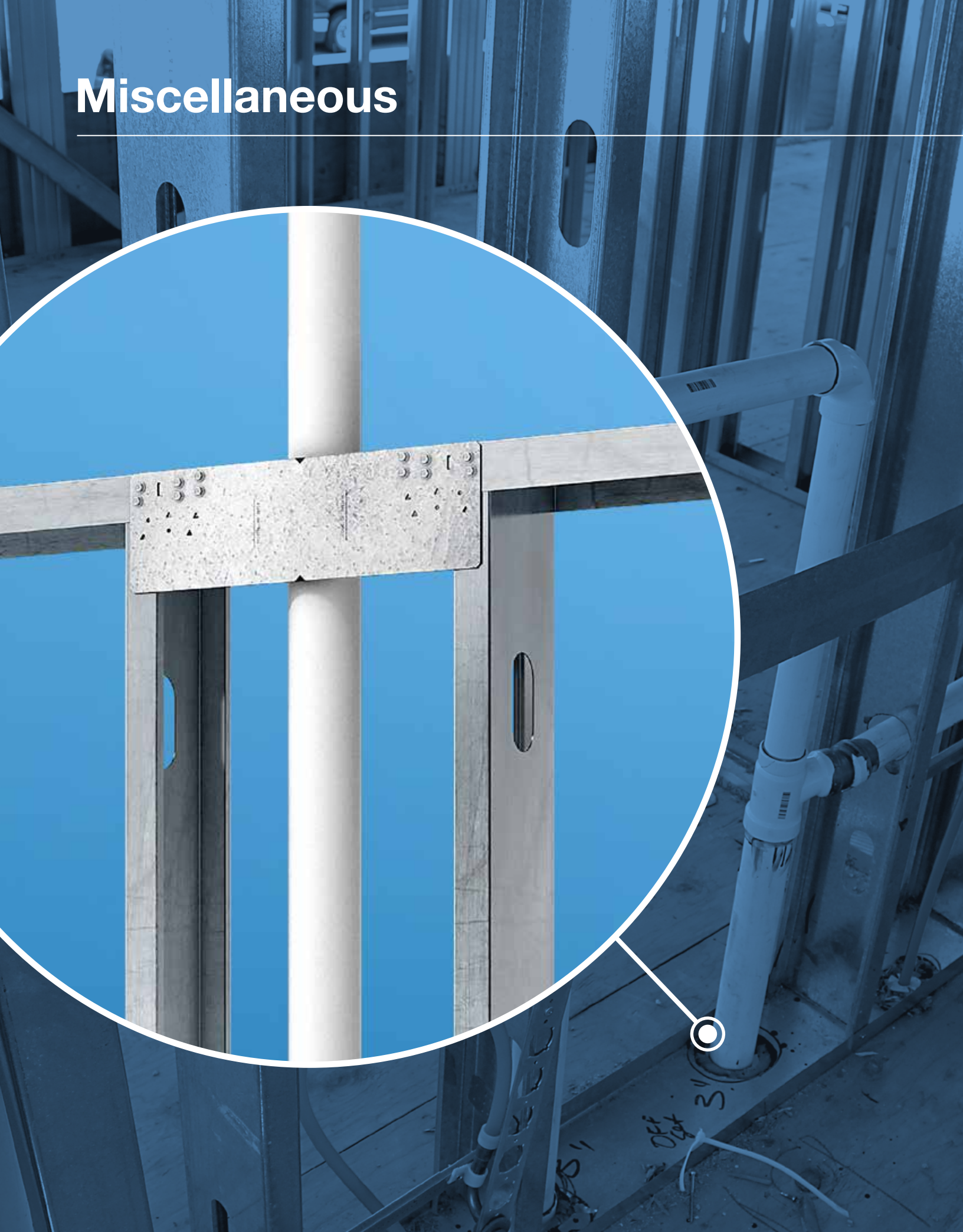
**SSWTBL**
*(brick ledge)*
U.S. Patent 7,445,192



**SSWT Interior* Installation**
U.S. Patent 7,445,192

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# Miscellaneous



# **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.

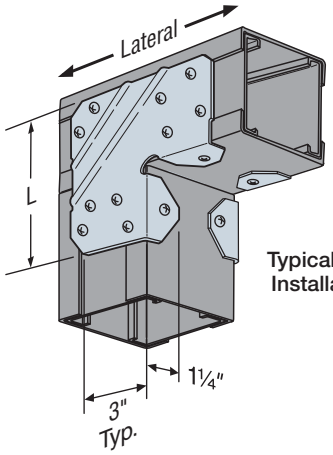
**Material:** LCE4 — 33 mil (20 ga.)

**Finish:** Galvanized, ZMAX® coating or stainless steel: see Corrosion Information, pp. 18–21

**Installation:**

- Use all specified fasteners; see General Notes
- Install in pairs

**Codes:** See p. 11 for Code 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 Load (lb.) | | | | Code Ref. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Uplift | | Lateral | | |
| | W | L | Beam | Post | 33 mil (20 ga.) | 43 mil (18 ga.) | 33 mill (20 ga.) | 43 mil (18 ga.) | |
| LCE4 | — | 5⅜ | (14) #10 | (10) #10 | 1,700 | 2,355 | 1,420 | 2,150 | 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 pp. 138 through 171 for more information on Simpson Strong-Tie fasteners.

# **TP/TPA** Tie Plates

TPs are screw-on tie plates.
TPAs are flanged for added support.

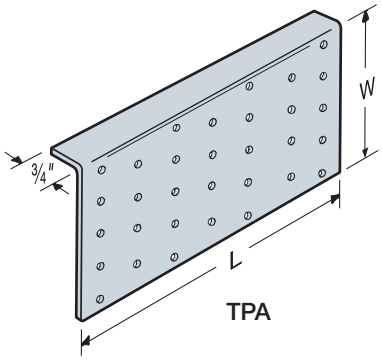
**Material:** 33 mil (20 ga.)

**Finish:** Galvanized

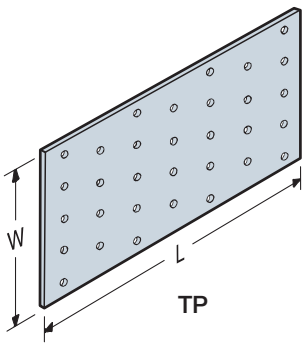
**Installation:**

- Holes are sized for #8 or #10 screw

**Codes:** See p. 11 for Code Reference Key Chart




TPA




TP

| 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.

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# **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® coating

**Installation:**

- Flatten prongs with hammer as needed
- Use #10 screws

**Codes:** See p. 11 for Code Reference Key Chart

PSPN516 at top plates

- International Residential Code® — 2006/2009/2012 P2603.2.1
- International Plumbing Code — 2006/2009/2012 305.8

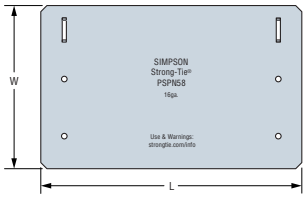
PSPN516 at bottom plate.

- International Plumbing Code — 2006/2009/2012 305.8

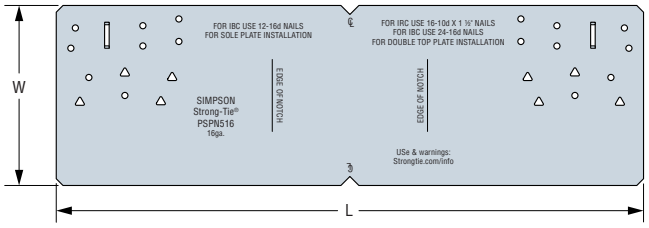
PSPN58 at top plates and bottom plate.

- 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**

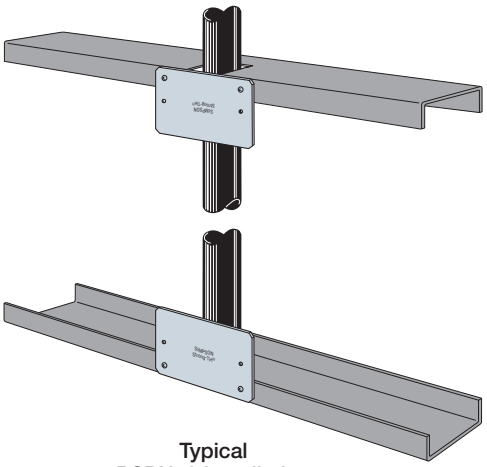



**PSPN516**

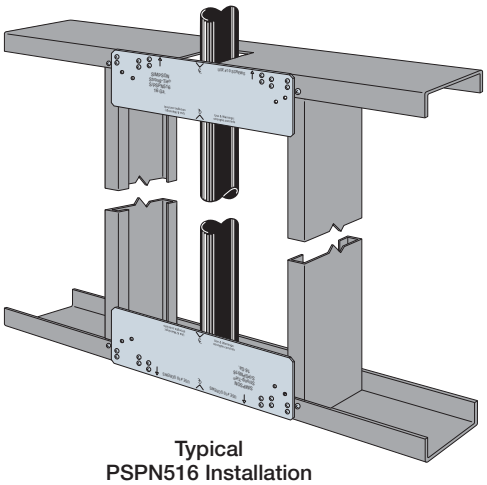
| | Model No. | W (in.) | L (in.) | Code Ref. |
|---|---|---|---|---|
| ● | PSPN58 | 5 | 8 | 190 |
| ● | PSPN516 | 5 | 16 5/16 | |

● 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 1,060 lb. and 1,580 lb. to 33 mil (20 ga.) track and to 43 mil (18 ga.) track, respectively.



Typical
PSPN58 Installation



Typical
PSPN516 Installation

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# **PSCL/PSCA** Panel Sheathing Clips

Simpson Strong-Tie® panel sheathing clips are used to brace unsupported sheathing edges and provide a ⅛" gap to address shrinkage and expansion of roof sheathing.

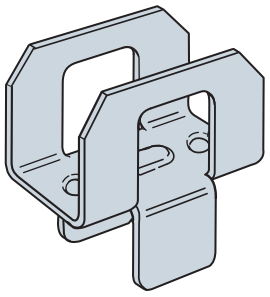
**Material:** 33 mil (20 ga.)

**Finish:** Galvanized

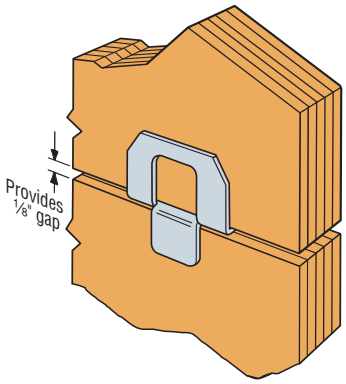
**Installation:**

- Use the same size sheathing clip as the panel thickness
- Maximum spans may be reduced for low slopes or high uniform loads; refer to manufacturer's installation instructions

**Codes:** See p. 11 for Code Reference Key Chart



**PSCL**
*(PSCA similar)*




**Typical PSCL Installation**

| Span Rating | Panel Thickness (in.) | Model No. | Maximum Roof Sheathing Span | | No. of Clips Per Span | Code Ref. |
|---|---|---|---|---|---|---|
| | | | With Clip | Without Clip | | |
| 24/0 | 3/8 | PSCL3/8 | 24 | 20 | 1 | 180 |
| 24/16 | 7/16 | PSCA7/16 | 24 | 24 | 1[2] | |
| 24/16 | 7/16 | PSCL7/16 | 24 | 24 | 1 | |
| 32/16 | 15/32 | PSCA15/32 | 32 | 28 | 1[2] | |
| 32/16 | 15/32 | PSCL15/32 | 32 | 28 | 1 | |
| 32/16 | 1/2 | PSCA1/2 | 32 | 28 | 1[2] | |
| 32/16 | 1/2 | PSCL1/2 | 32 | 28 | 1 | |
| 40/20 | 5/8 | PSCL5/8 | 40 | 32 | 1 | |
| 40/20 | 19/32 | PSCL19/32 | 40 | 32 | 1 | |
| 48/24 | 3/4 | PSCL3/4 | 48 | 36 | 2 | |

1. Span rating and Maximum Roof Sheathing Spans are for reference only, refer to 2015 IBC Table 2304.8 (3) for additional important information.
2. Maximum roof sheathing span with single PSCA is 24". For spans > 24" use two PSCAs.

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# Loads of Anchoring Options

You now have tabulated design values for anchorage. The new SCHA slide-clip connector is designed and tested to accommodate several different methods of anchoring to concrete or steel, which helps you easily account for the buckling capacity of the anchored leg and mitigate risk. The SCHA also features a wider support leg to decrease eccentricity on anchors and provide a variety of anchorage options.

With prepunched holes to accommodate ¼"-diameter Titen HD® concrete screw anchors or 0.157" PDPAT pins for attachment to steel, the SCHA connector is easy to specify and to install. To learn more, call (800) 999-5099 or visit **strongtie.com/scha**.

SIMPSON Strong-Tie®

**C-CF-2017 Effective 6/1/2017 Expires 12/31/2019**

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