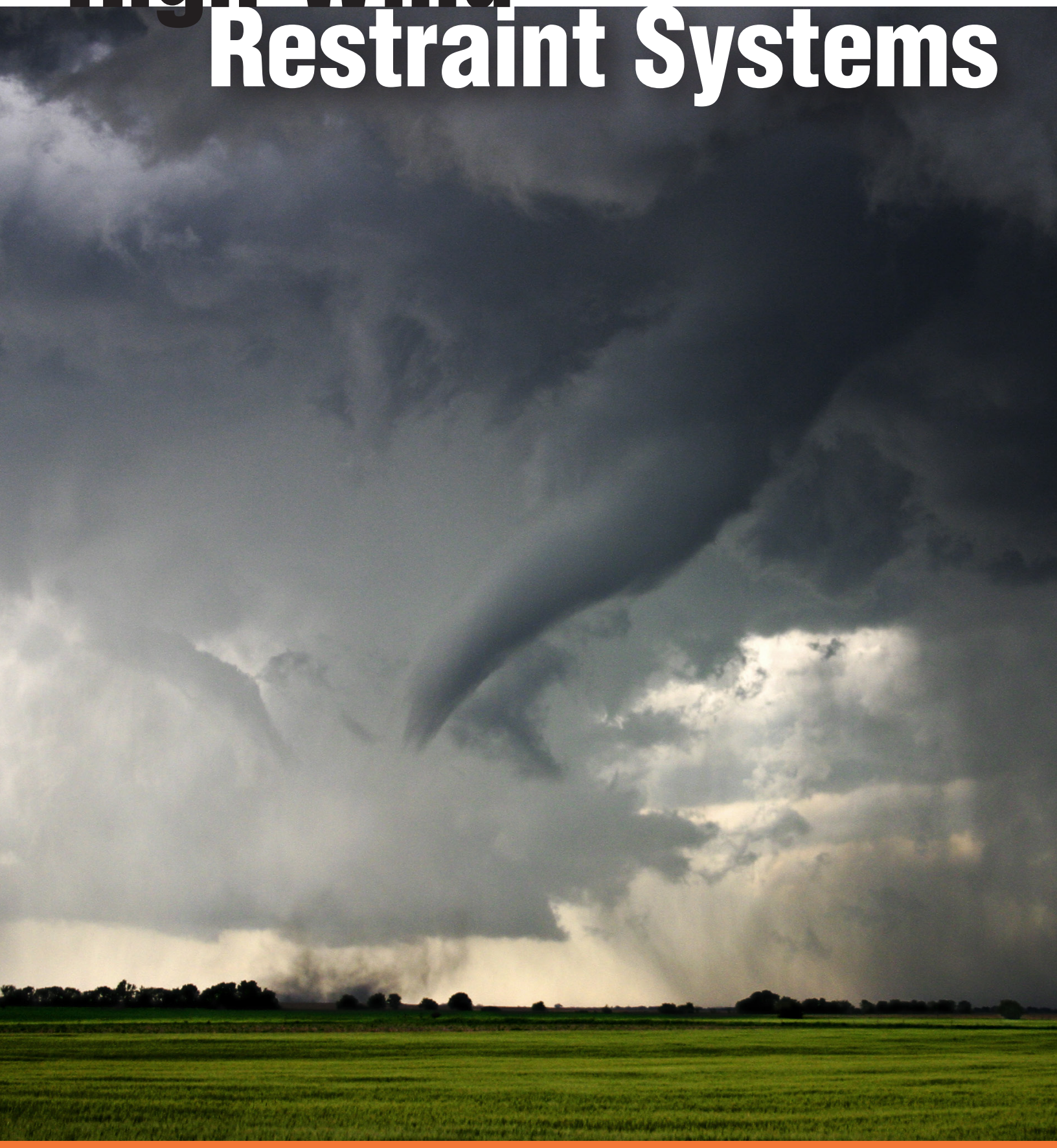
SIMPSON Strong-Tie®

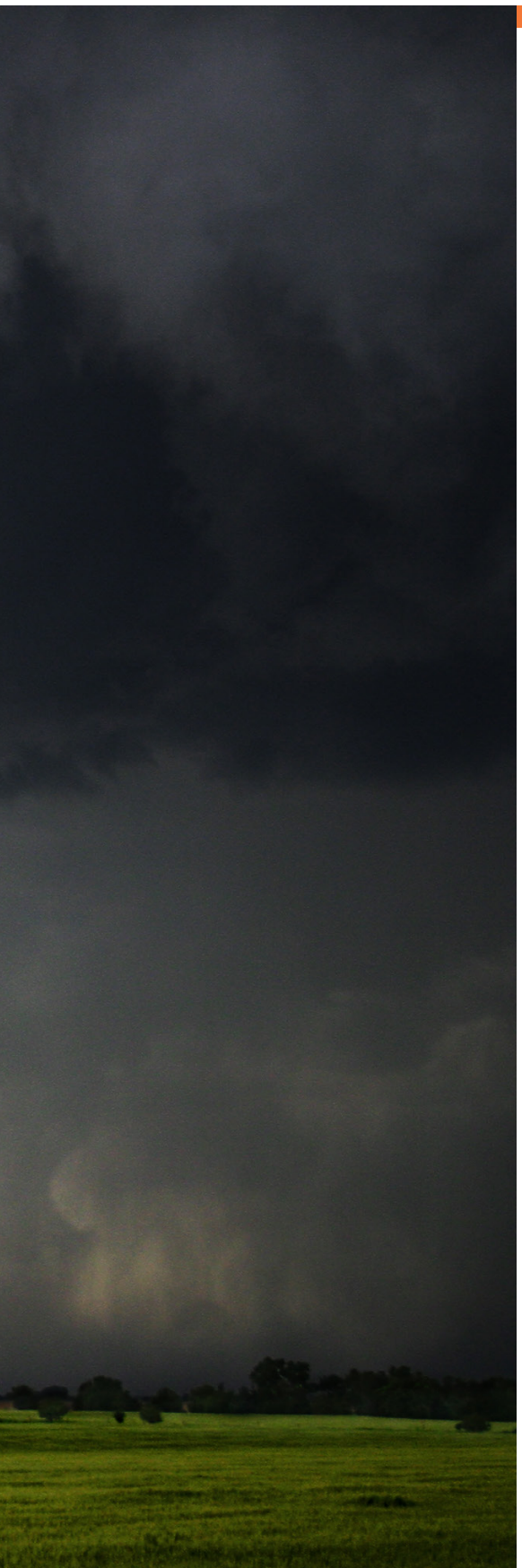
High Wind–Resistant Construction

HIGH WIND–RESISTANT CONSTRUCTION APPLICATION GUIDE

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

High-Wind Restraint Systems





Respecting Conditions, Building for Strength

Time and again, we see the havoc that high winds can wreak upon structures in the form of tornadoes or hurricanes. Some forces can be too great for human engineering to counter. Fortunately, however, there are precautions we can take to limit the damage caused by high-wind events.

Through nearly 60 years of field experience and countless hours of research, Simpson Strong-Tie has developed the industry's most comprehensive line of wood construction connectors and fasteners specifically designed to resist uplift and lateral forces caused by high winds. Our state-of-the-art manufacturing facilities and processes help ensure that Simpson Strong-Tie connectors and fasteners are consistently the most reliable in the industry.

This guide is designed to help you easily locate the specific connector you need for building in high-wind areas. Whether you search by product or application, Simpson Strong-Tie has the right connector to help you build safe, strong structures. To learn more, visit **strongtie.com** or call (800) 999-5099.

Subject Index

For an individual product index, please see page 70.

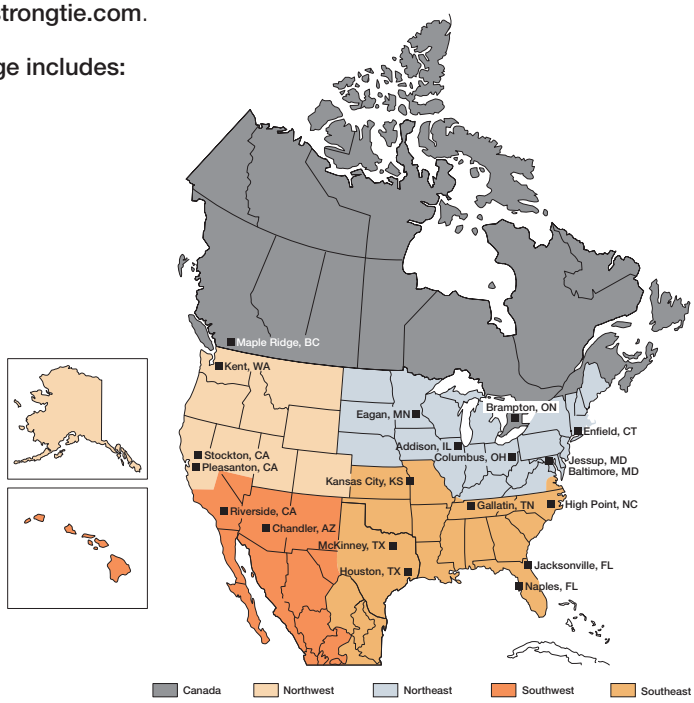
Company Profile

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

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

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

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



The Simpson Strong-Tie Quality Policy

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

Karen Colonias
Chief Executive Officer

Getting Fast Technical Support

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

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

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Limited Warranty

Simpson Strong-Tie Company Inc. warrants 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 application guide 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 application guide, 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 application guide. Properly installed Simpson Strong-Tie products will perform in accordance with the specifications set forth in the applicable Simpson Strong-Tie catalog. Additional performance limitations for specific products may be listed on the applicable catalog pages.

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

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

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

Terms and Conditions of Sale

Product Use

Products in this guide 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.

We Are ISO 9001-2008 Registered

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

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. Stainless-steel connector loads may be reduced when installed with smooth-shank, stainless-steel nails. Simpson Strong-Tie recommends using ring-shank, stainless-steel nails with stainless-steel connectors.
5. Only bend products that are specifically designed to be bent. For those products that require bending, do not bend more than once.
6. Cut joists to the correct length, do not "short-cut." The gap between the end of the joist and the header material should be no greater than ⅛" unless otherwise noted.

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

- Instructional builder/contractor training kits containing an instructional video, an instructor guide and a student guide in both English and Spanish;
- *Installer's Pocket Guide*, 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;
- Master format specifications;
- Material safety data sheets;
- Corrosion information;
- Connector selection guides for engineered wood products (by manufacturer);
- Simpson Strong-Tie® Connector Selector™ software;
- Simpson Strong-Tie® AutoCAD® menu;
- Simpson Strong-Tie® CFS Designer™ software;
- Simpson Strong-Tie® Anchor Designer software
- Simpson Strong-Tie® Strong-Wall® Selector software;
- Simpson Strong-Tie® Strong Frame® Selector;
- Simpson Strong-Tie® Fastener Finder; and
- Answers to frequently asked questions and technical topics.

Failure to 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 application guide.

General Notes

1. Refer to the current Simpson Strong-Tie® *Wood Construction Connectors* catalog for connector load values, installation, fastener schedules and other important information including Terms and Conditions of Sale and Building Code Evaluation listings.
2. Throughout the guide there are installation drawings showing the load transfer from one element in the structure to another. Additional connections may be required to safely transfer the loads through the structure. It is the Designer's responsibility to specify and detail all necessary connections to ensure that a continuous load path is provided as required by the building code.
3. U.N.O. allowable connector loads are provided with a 160% load duration increase (for wind) on the calculated capacity of the nails. No further load duration increase is allowed by the building code.
4. Unless otherwise noted, the allowable loads published in this guide are limited to the lowest of the following: average recorded test load at ⅛" deflection; lowest ultimate recorded test load of 3 test specimens divided by 3 (or the average of 6 specimens divided by 3); or the calculated value based on steel, wood bearing, and/or fastener capacity.
5. When multiple connectors are used, they must be installed so fastener locations do not overlap.
6. When a connector is loaded simultaneously in more than one direction, the allowable load must be evaluated as shown here.

   For all connectors use the following equation:

   Design Uplift/Allowable Uplift + Design Lateral Parallel to Plate / Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate / Allowable Lateral Perpendicular to Plate < 1.0

   The three terms in the unity equation are due to the 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 Designers and is dependent on their method of calculating wind forces and the utilization of the connector within the structural system.

   As an alternative, certain roof-to-wall connectors (embedded truss anchors, pages 18–20, seismic and hurricane ties and twist straps, page 16 – excluding HGA10KT) can be evaluated using the following: the design load in each direction shall not exceed the published allowable load in that direction multiplied by 0.75.
7. 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.
8. Unless otherwise noted, all nails are common nails (refer to page 54).
9. Refer to the Connector-Anchor Selector at **www.strongtie.com** for anchorage to concrete design.
10. Illustrations showing hurricane ties installed on the outside of the wall are for clarity and assume a minimum overhang of 3½". Installation on the inside of the wall is acceptable (see General Note 12 below). For uplift continuous load path, connections in the same area (e.g., truss-to-plate connector and plate-to-stud connector) must be on same side of the wall.
11. When using wood structural panel sheathing for wind uplift continuous load path, refer to Simpson Strong-Tie technical bulletins T-WLSHEATH and T-HTIECONPATH for further information.
12. When installing hurricane ties on the inside of the wall, special care must be taken to prevent condensation on the inside of the completed structure in cold climates.
13. Unless otherwise noted, loads are in pounds; dimensions are in inches.
14. Truss plates shown may not be manufactured by Simpson Strong-Tie.
15. 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.
16. When connecting DF/SP members to SPF lumber, use SPF allowable loads.
17. Concrete anchorage solutions provided in this catalog are based on applications in uncracked concrete resisting wind and low seismic loads (any structure in Seismic Design Categories A and B and detached one- and two-family dwellings in Seismic Design Category C).
18. Some hurricane ties can be used for bearing enhancement, see T-HTIEBEARING.
19. Twist straps do not have to be wrapped over the truss to achieve the load.

Simpson Strong-Tie General Recommendations

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

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

Outdoor environments are generally more corrosive to steel either because the moisture exposure is elevated (greater than 19%) and/or the treatment chemical retention level is higher than for interior service. The AWPA classifies exterior above-ground treatments as Use Categories UC3 (A and B) depending on moisture run-off; and for ground-contact levels of protection, it has Use Categories UC4 (A-C). ICC-ES considers the exterior exposure to be limited by the type of chemicals and retention level of the chemicals in the qualification testing and whether the exposure includes salt exposure. In general, 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. Using a barrier membrane can provide additional corrosion protection; see technical bulletin T-PTBARRIER. If you choose to use hot-dip galvanized (Class-D), mechanically galvanized (C3, N2000, or Class 55), double-barrier or Quik Guard® coated fasteners on outdoor projects (e.g., a deck), you should periodically inspect the fasteners or have a professional inspection performed, and regular maintenance is a good practice. See the Corrosion Resistance Classifications Table for the Simpson Strong-Tie assessment of the corrosion resistance associated with materials and coatings and an appropriate level of corrosion resistance for various environments.

Due to the many variables involved, Simpson Strong-Tie cannot provide estimates of service life of connectors and fasteners. We suggest that all users and specifiers obtain recommendations on corrosion from the treated wood supplier or for the type of wood used. As long as Simpson Strong-Tie recommendations are followed, Simpson Strong-Tie stands behind its product performance and our standard warranty applies (page 6).

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 the corrosion resistance of stainless steel.

Guidelines for Selecting Corrosion-Resistant Connectors and Fasteners

Evaluate the Application

Consider the importance of the connection.

Evaluate the Exposure

Consider these moisture and treatment chemical exposure conditions:

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

Use the Simpson Strong-Tie® Corrosion Classification Table

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

Corrosion Information

Corrosion Resistance Recommendations

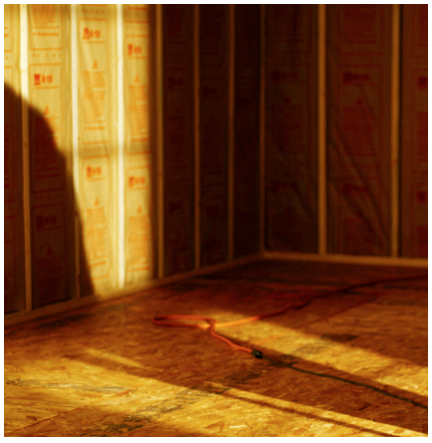
Low	Medium	High	Severe
FASTENERS			
Phosphate (gray, black), Clear (bright) zinc (ASTM F1941), Heavy electro-galvanized (ASTM A641-Class 1), Yellow zinc (ASTM F1941), Electrocoat (E-coat), Type-410 stainless steel	Mechanically galvanized (AS 3566.2-C3, N2000, ASTM B695-Class 55), Quik Guard® coating,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

Corrosion Resistance Classifications

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

1. These are general guidelines that may not consider all application criteria. Refer to product specific information for additional guidance.
2. Type-316/305/304 stainless-steel products are recommended where preservative-treated wood used in ground contact has a chemical retention level 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.

Interior Dry



Exterior

Severe

Understanding the Corrosion Issue

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

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

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

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

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

Treatment Use Categories and Exposure Conditions

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

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

The International Code Council – Evaluation Service (ICC-ES) implemented AC257 as a method to evaluate alternative 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.

Coatings Available

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

Finish/Material	Description	Level of Corrosion Resistance
Gray Paint	Water-based paint intended to protect the product while it is warehoused and in transit to the jobsite.	Low
Powder Coating	Baked-on paint finish that is more durable than our standard paint and produces a better-looking finished product.	Low
Standard G90 Zinc Coating	Zinc galvanized coating containing 0.90 oz. of zinc per square foot of surface area (total both sides).	Low
Electrocoating (E-Coat™)	Electrocoating utilizes electrical current to deposit the coating material on the fastener. After application, the coating is cured in an oven. Electrocoating provides a minimum amount of corrosion protection and is recommended for dry, non-corrosive applications only.	Low
ZMAX G185	Galvanized (G185) 1.85 oz. of zinc per square foot of surface area (hot-dip galvanized per ASTM A653 total both sides). These products require hot-dip galvanized fasteners (fasteners which meet the specifications of ASTM A153).	Medium
HDG Hot Dip Galvanized	Products are hot-dip galvanized after fabrication (14 ga. and thicker). The coating weight increases with material thickness. The minimum average coating weight is 2.0 oz./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
Type-410 Stainless Steel with Protective Top Coat	Carbon martensitic grade of stainless steel which is inherently magnetic, with an added protective top coat. This material can be used in mild atmospheres and many mild chemical environments.	Medium
Mechanically Galvanized Coating, Class 55	Simpson Strong-Tie® Strong-Drive® SD Connector screws are manufactured with a mechanically applied zinc coating in accordance with ASTM B695, Class 55 with a supplemental overcoat. These fasteners are compatible with painted and zinc-coated (G90 and ZMAX) connectors.	Medium
Double-Barrier Coating	Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws are manufactured with two different finishes that together provide a level of corrosion protection that equals that provided by the previous HDG coating.	Medium
SST300 Stainless Steel	Connectors are manufactured from Type-316L stainless steel and provide greater durability against corrosion. Stainless-steel nails are required with stainless-steel products, and are available from Simpson Strong-Tie.	High/Severe
HDG Hot Dip Galvanized 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 2006 and 2012 International Residential Code (R319.3) and the 2006 International Building Code.	High/Severe

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

Using This Guide

The *High Wind–Resistant Construction Application Guide* was created to assist Designers with selecting the most appropriate connectors for challenging, high-wind regions. This guide uses technical data from the *Wood Construction Connectors* catalog to offer design solutions as well as installation details that create a load path resistant to increased uplift and lateral forces common to high-wind regions.

These solutions and details are organized by framing condition rather than by metal connector group, and products are listed in order of increasing capacity. Unique to this guide are condition-specific installation details; details showing multiple metal connectors in a single connection; and connectors used in nontraditional applications to satisfy challenging design conditions.

This edition of the *High Wind–Resistant Construction Application Guide* includes navigational features to help reference individual illustrations. These detail illustrations are in numerical order to help you more quickly locate the optimal connection for your application scenario.

Using the Tables

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

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

Allowable Design Loads: The maximum load that a connection is designed to provide. There may be multiple design loads acting in different directions (uplift and lateral, F_1 or F_2) imposed on a connection.

Uplift

Lateral

Model No.	Fasteners (Total)	DF/SP Allowable Loads		
		Uplift	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
		(160)	(160)	(160)
MAB15	(6) 10dx1½"	565	500	500
MAB23	(6) 10dx1½"	565	500	500
MA4	(4) 10dx1½"	830	575	430
LMA4Z	(6) 10dx1½"	905	675	520
MASA	(9) 10dx1½"	920	1,515	1,095
THD50600H	—	1,375[3]	1,005	500

Products are listed in order of increasing allowable uplift.

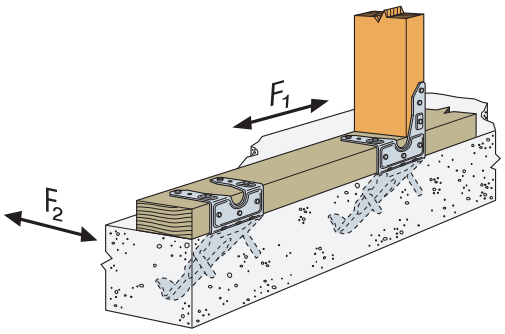
Nails: 10dx1½" = 0.148" dia. x 1½" long.
See page 54 for other fastener sizes and information.

All installations should be designed only in accordance with the allowable load values set forth in this guide.

D
1

Detail illustrations are placed in numerical order for easy identification when referencing connections, and are available to download from **www.strongtie.com/hw**.

For an individual product index, please see page 70.



Icon Legend

Extra Corrosion Protection

These icons identify products that are available with additional corrosion protection (ZMAX®, hot-dip galvanized, stainless steel or double-barrier coating). 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, SS = stainless steel). See pages 9–12 for information on corrosion, and visit our website **www.strongtie.com/info** for more technical information on this topic.

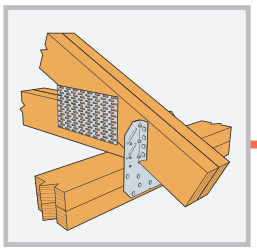
Strong-Drive® SD Connector Screw Compatible

This icon identifies products approved for installation with the Simpson Strong-Tie® Strong-Drive® SD Connector screw. Products installed with SD Connector screws may achieve higher load capacity. See page 56 or visit **www.strongtie.com/sd** for more information.

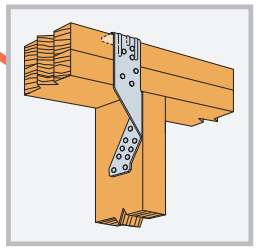
Uplift Load Path

Uplift refers to the forces which can lift a structure. The forces are generated when high winds blow over the top of the structure, creating suction that can lift the roof. These uplift forces must be transferred down to the foundation to prevent damage. Several connections are required to create a continuous load path.

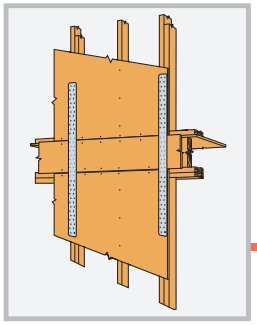
Although homes are built from the bottom up, they are designed from the top down. Product and load selection for the roof, for example, will affect the products and loads for the rest of the house. The tables in this application guide also begin at the top of the structure and continue to the foundation. A series of connectors in this guide must be used to complete the uplift and lateral load paths.



Truss/Rafter-to-Top Plate Connections:
Transfer forces from the roof to the top plate

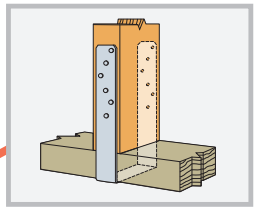


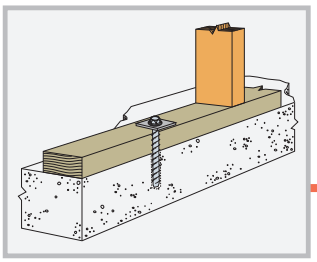
Top Plate-to-Stud Connections:
Transfer forces from the top plate to the stud



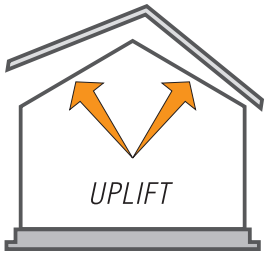
Floor-to-Floor Connections:
Transfer forces from the story above to the story below

Stud-to-Sill Plate Connections:
Transfer forces from wall studs to the mudsill





Sill Plate-to-Foundation Connections:
Transfer forces from the mudsill into the foundation



When wind flows over the roof of the structure, creating a strong lifting force on the roof that can cause it to break away.

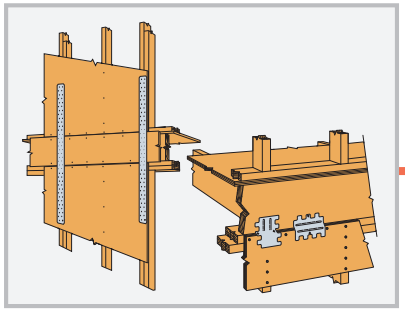
When wind blows against the side of the structure, exerting a lateral force that causes it to lean over (rack) to one side.

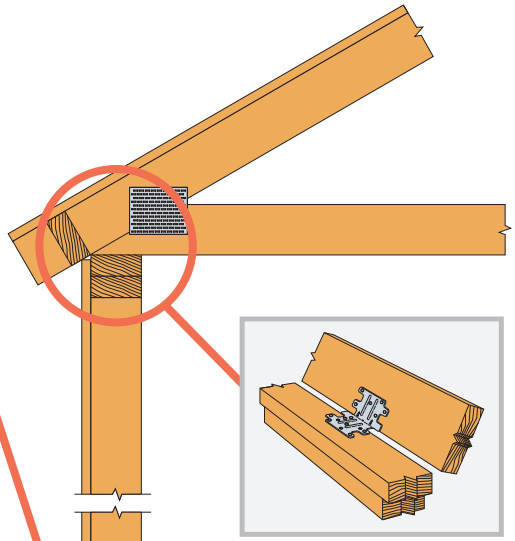
Lateral Load Path

Wind not only affects a structure with uplift forces, it also imposes shear forces that can make a structure rack, slide, or overturn. Additional steps must be taken to resist these loads and ensure that the structure will remain strong. This is done by adding bracing, connectors and shearwalls.

Large openings along wall lines (such as windows and doors) create structural challenges in resisting these lateral loads. This is especially true at garage fronts. Such openings often do not leave a large enough wall section to provide sufficient strength. These applications will require the use of prefabricated panels to meet the load requirements.

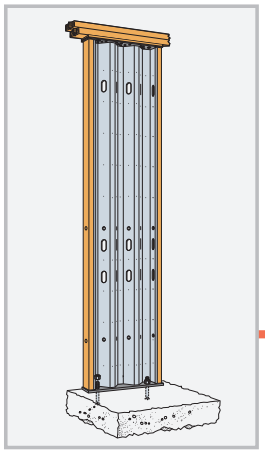
Uplift/Lateral Connectors:
Resist overturning and shear forces

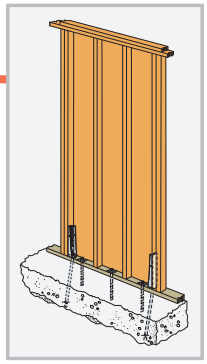




Roof Boundary Clip:
Transfers shear loads between roof and top plates

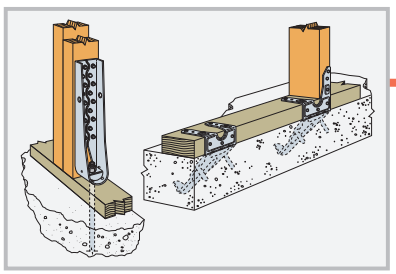
Prefabricated Shearwall:
An alternative to site-built shearwalls when wall space is limited



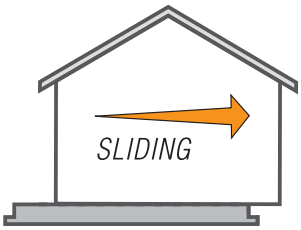


Site-Built Shearwall:
Supports horizontal diaphragms and resists lateral forces

Holdown Anchor:
Anchors shearwall ends to framing or foundation below



Mudsill Anchor:
Transfers shear loads between wall framing and the foundation



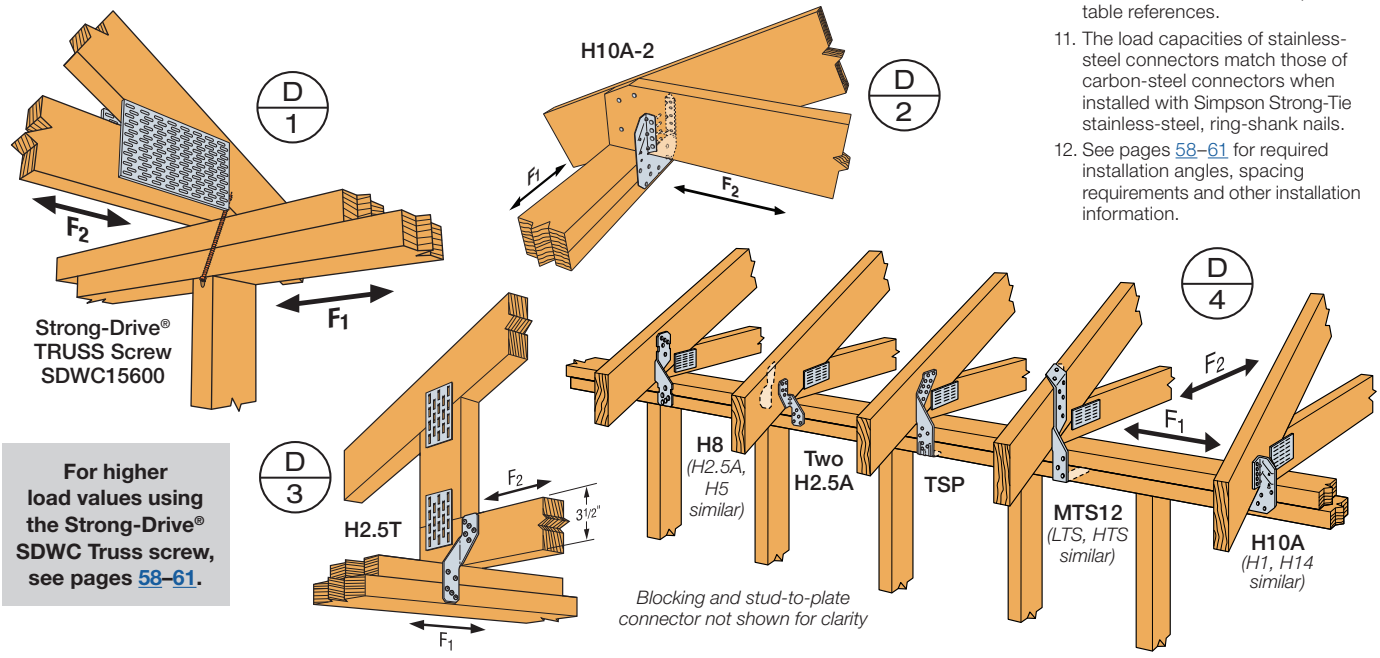
When wind blows against the side of the structure, exerting a lateral force that causes the structure to slide off its foundation.

When the structure is anchored in place to limit racking or sliding, the lateral force of the wind causes the structure to rotate or overturn.

Truss/Rafter to Wood Double Top Plates

	Model No.	Qty. Req.[10]	Fasteners (Total)		DF/SP Allowable Loads			SPF Allowable Loads		
			To Truss/Rafter	To Plates	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)
	H2.5T	1	(5) 8dx1½"	(5) 8dx1½"	425	135	145	425	135	145
SS	H2.5ASS[11]	1	(5) SS8d	(5) SS8d	440	75	70	380	75	70
SS	H5	1	(4) 8dx1½"	(4) 8dx1½"	455	115	200	265	100	170
SS	H5	1	(4) 8d	(4) 8d	465	115	200	265	100	170
	H2.5T	1	(5) 8d	(5) 8d	545	135	145	545	135	145
	H2.5A	1	(5) 8dx1½"	(5) 8dx1½"	575	110	110	495	110	110
	H1	1	(6) 8dx1½"	(4) 8d	585	485	165	400	415	140
	H2.5A	1	(5) 8d	(5) 8d	600	110	110	535	110	110
	SDWC15600[12]	1	—	—	615	130	225	485	115	190
	HGA10KT	1	(4) ¼"x1½" SDS	(4) ¼"x3" SDS	695	1165	940	500	840	675
	LTS12	1	(6) 10dx1½"	(6) 10dx1½"	720	75	125	620	75	125
	TSP[9]	1	(9) 10dx1½"	(6) 10dx1½"	740	310	190	635	265	160
SS	H8	1	(5) 10dx1½"	(5) 10dx1½"	745	75	—	565	75	—
	H10-2	1	(6) 10d	(6) 10d	760	455	395	655	390	340
	H11Z	1	(6) 16dx2½"	(6) 16dx 2½"	830	525	760	715	450	655
	H2.5T	2	(10) 8dx1½"	(10) 8dx1½"	850	270	290	850	270	290
	H10A sloped	1	(9) 10dx1½"	(9) 10dx1½"	855	590	285	760	505	285
	TSP[9]	1	(9) 10dx1½"	(6) 10d	890	310	190	765	265	160
	SDWC15600[12]	2	—	—	905	130	225	850	115	190
SS	H5	2	(8) 8dx1½"	(8) 8dx1½"	910	230	400	530	200	340
SS	H5	2	(8) 8d	(8) 8d	930	230	400	530	200	340
	H10ASS[11]	1	(9) SSN10	(9) SSN10	970	565	170	835	485	170
SS	MTS12	1	(7) 10dx1½"	(7) 10dx1½"	1,000	75[5]	125[5]	860	75[5]	125[5]
	H10AR	1	(9) 10dx1½"	(9) 10dx1½"	1,050	490	285	905	420	285
	H2.5T	2	(10) 8d	(10) 8d	1,090	270	290	1,090	270	290
	H2.5A	2	(10) 8dx1½"	(10) 8dx1½"	1,150	220	220	990	220	220
	H1	2	(12) 8dx1½"	(8) 8d	1,170	970	330	800	830	280
	H2.5A	2	(10) 8d	(10) 8d	1,200	220	220	1,070	220	220
	H10A-2	1	(9) 10dx3"	(9) 10dx3"	1,245	815	260	1,070	700	225
	H10A	1	(9) 10dx1½"	(9) 10dx1½"	1,140	590	285	1,015	505	285
SS	LTS12	2	(12) 10dx1½"	(12) 10dx1½"	1,440	150[5]	250[5]	1,240	150	250
	HTS20	1	(12) 10dx1½"	(12) 10dx1½"	1,450	75[5]	125[5]	1,245	75[5]	125[5]
	H14	1	(12) 8dx1½"	(13) 8d	1,465[2]	515	265	1,050	480	245
	H16S	1	(2) 10dx1½"	(10) 10dx1½"	1,470	—	—	1,265	—	—
	H16	1	(2) 10dx1½"	(10) 10dx1½"	1,470	—	—	1,265	—	—
SS	MTS12	2	(14) 10dx 1½"	(14) 10dx1½"	1,815	150[5]	250[5]	1,560	150[5]	250[5]

1. For connections to single top plates, see page 25.
2. Douglas Fir allowable uplift loads for H14 = 1,350 lb. (160) and H10A = 1,140 lb. (160).
3. H16/H16-2 factory sloped to 5:12, but 3:12-7:12 roof slope is acceptable.
4. Hurricane ties are shown installed on the outside of the wall for clarity and assume a minimum overhang of 3½". Installation on the inside of the wall is acceptable. For uplift Continuous Load Path, connections in the same area (i.e., truss to plate connector and plate to stud connector) must be on same side of the wall.
5. When installing MTS and HTS connectors, the following installation instructions are required for the lateral loads to apply: the first 7 nail holes after the bend area must be filled with 10dx1½" nails. This applies to straps on either side of bend area. All additional fasteners may be installed in any remaining strap holes. Twist straps do not have to be wrapped over the truss to achieve the load.
6. Refer to page 51 for installation details of two connectors on a single truss.
7. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross-grain bending of the truss or rafter members.
8. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note 6, page 8 under General Notes.
9. If installed on outside of wall, TSP must be installed to either a min. 2x6 top chord/rafter, or 2x4 at 9:12 pitch.
10. Installations using multiple connectors are limited to specific table references.
11. The load capacities of stainless-steel connectors match those of carbon-steel connectors when installed with Simpson Strong-Tie stainless-steel, ring-shank nails.
12. See pages 58–61 for required installation angles, spacing requirements and other installation information.

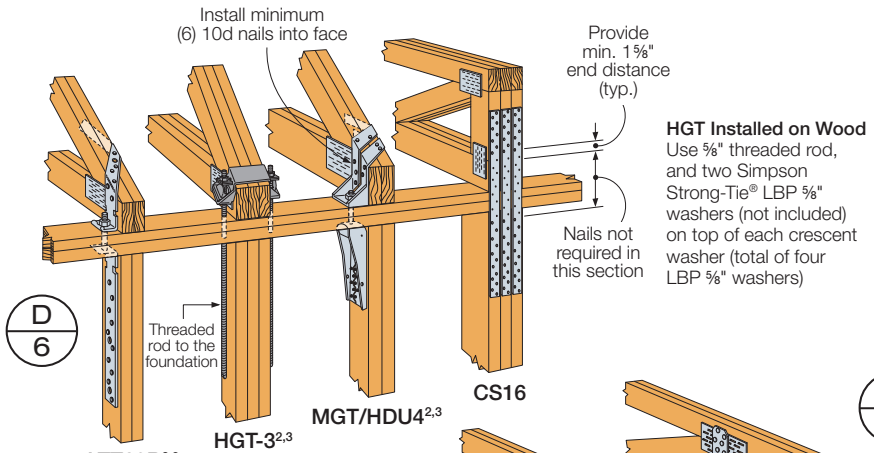


For higher load values using the Strong-Drive® SDWC Truss screw, see pages 58–61.

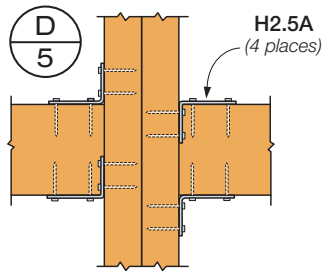
Girder/Truss to Wood Wall Framing

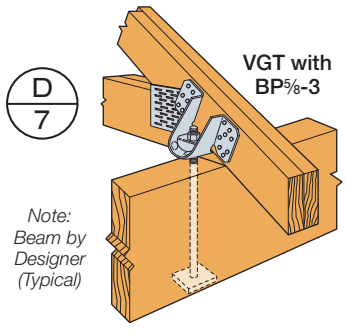
Model No.	Qty. Req.	No. of Plies (Min.)	Fasteners		Allowable Loads	
			To Girder/Truss	To Wall Framing	DF/SP Uplift (160)	SPF Uplift (160)
H16-2[6]	1	2	(2) 10dx1½"	(10) 10dx1½"	1,470	1,265
H16-2S[6]	1	2	(2) 10dx1½"	(10) 10dx1½"	1,470	1,265
LTT20B[2,3,9]	1	2	(10) 10d	(1) ½", ⅝" or ¾" ATR	1,500	1,290
SS H2.5A	4	2	(20) 8dx1½"	(20) 8dx1½"	1,705	1,465
SS DTT2Z[2,3,11]	1	1	(8) ¼x1½" SDS	(1) ½" ATR	1,825	1,800
LGT2	1	2	(16) 16d Sinkers	(14) 16d Sinkers	2,050	1,785
THA222-2[1]	1	2	(6) 16dx2½"	(14) 16d	2,300	2,300
HTT4	1	2	(12) 16dx2½"	(1) ⅝" ATR	2,695	2,315
HDU2-SDS2.5[2,3]	1	2	(6) ¼"x2½" SDS	(1) ⅝" ATR	3,075	2,215
HTT4[2,3]	1	1[8]	(18) 10dx1½"	(1) ⅝" ATR	3,610	3,105
LGT3-SDS2.5	1	3	(12) ¼"x3" SDS	(26) 16d Sinkers	3,685	2,655
MGT[2,3]	1	2	(22) 10d	(1) ⅝" ATR	3,965	3,330
LGT4-SDS3	1	4	(16) ¼"x3" SDS	(30) 16d Sinkers	4,060	2,925
HTT4[2,3]	1	1[8], 2	(18) #10x1½" SD	(1) ⅝" ATR	4,455	3,830
HTT5	1	2	(20) 16dx2½"	(1) ⅝" ATR	4,545	3,910
HDU4-SDS2.5[2,3]	1	2	(10) ¼"x2½" SDS	(1) ⅝" ATR	4,565	3,285
THA222-2[1]	2	2	(12) 16dx2½"	(28) 16d	4,600	4,600
VGT[2,3]	1	2	(16) ¼"x3" SDS	(1) ⅝" ATR	4,940	3,555
HTT5[2,3]	1	2	(26) 16dx2½"	(1) ⅝" ATR	5,090	4,375
CS16	3	3	(33) 10d	(33) 10d	5,115	5,115
HTT5KT[2,3]	1	2	(26) #10x2½" SD	(1) ⅝" ATR	5,445	5,360
HDU5-SDS2.5[2,3]	1	2	(14) ¼"x2½" SDS	(1) ⅝" ATR	5,645	4,065
HDU2-SDS2.5[2,3]	2	2	(12) ¼"x2½" SDS	(1) ⅝" ATR	6,150	4,430
VGT[2,3]	2	2	(32) ¼"x3" SDS	(2) ⅝" ATR	7,185	5,175
HTT5[2,3]	2	2	(52) 10dx1½"	(1) ⅝" ATR	8,700	7,480
VGT[2,3]	2	3	(32) ¼"x3" SDS	(2) ⅝" ATR	8,890	6,400
HGT-4[2,3]	1	4	(16) 10d	(2) ⅝" ATR	9,250	9,250
HGT-3[2,3]	1	3	(16) 10d	(2) ⅝" ATR	10,530	9,035
HGT-2[2,3]	1	2	(16) 10d	(2) ⅝" ATR	10,980	6,485

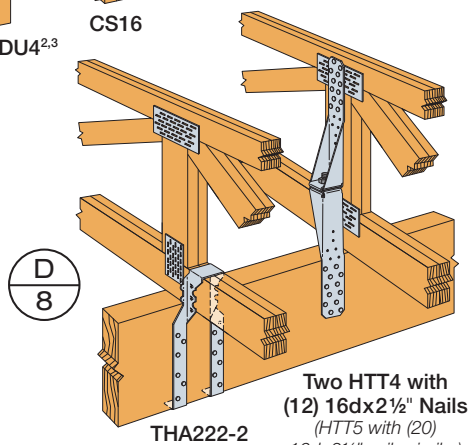
1. Parallel to Plate—THA222-2 is 350 lbs. Perpendicular to Plate—THA222-2 is 280 lb.
2. Rod must connect directly to foundation or to adequately sized connectors to framing below as determined by the Designer.
3. ATR—All-Thread Rod.
4. For multiple holdowns, verify the allowable tension capacity of the wood member.
5. Where noted, 10dx1½" nails may be substituted for same load.
6. H16-2/H16-2S factory sloped to 5:12, but 3:12 - 7:12 roof slope is acceptable.
7. LGT4—Uplift for DF/SP girder and SPF studs is 3,860 lbs.
8. HTT4-Tabulated loads are based on a min. nominal 2x6 framing member.
9. A standard cut washer is required under anchor nut for LTT20B when using ½" or ⅝" anchor bolts. No additional washer is required when using a ¾" anchor bolt.
10. LGT2 – F_1: 700 lbs.; F_2: 170 lbs.
LGT3 – F_1: 795 lbs.; F_2: 410 lbs.
LGT4 – F_1: 2,000 lbs.; F_2: 675 lbs.
MGT – F_1: 775 lbs.; F_2: 525 lbs.
VGT – F_1: 1,185 lbs.; F_2: 590 lbs.
LGT2 and LGT4 require 4- and 7-16d sinkers, respectively, in optional nail holes.
11. For stainless steel, order DTT2SS.
12. Installations using multiple connectors are limited to specific table references.

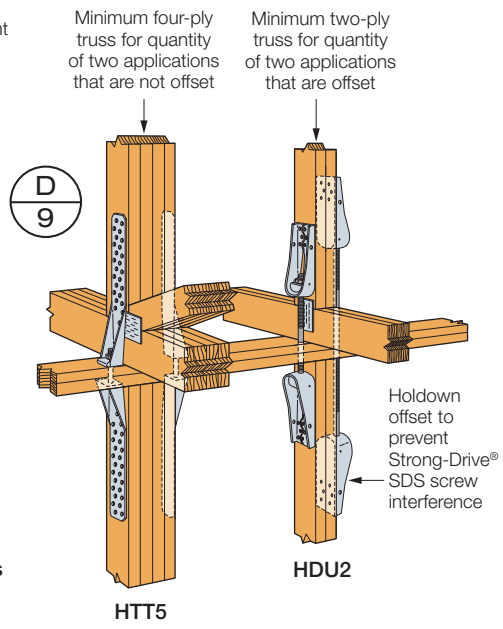


HGT Installed on Wood
Use ⅝" threaded rod, and two Simpson Strong-Tie® LBP ⅝" washers (not included) on top of each crescent washer (total of four LBP ⅝" washers)





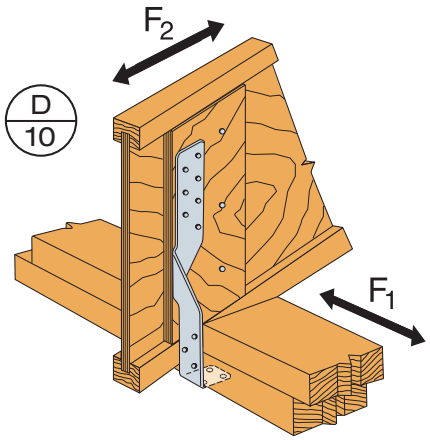




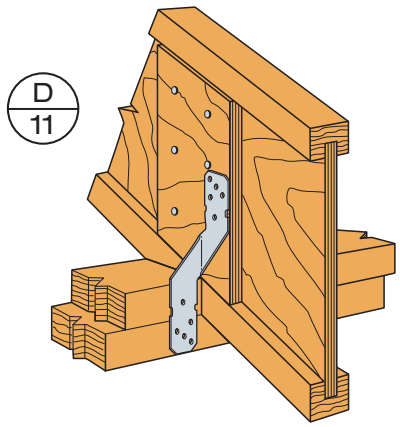
I-Joists to Wall Framing

	Model No.	Fasteners		DF/SP Allowable Loads			SPF Allowable Loads		
		To Rafters	To Plates	Uplift	Lateral (160)		Uplift	Lateral (160)	
				(160)	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)	(160)	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
SS	H8	(5) 10dx1½"	(5) 10dx1½"	745	75	—	565	75	—
SS	MTS20[1]	(7) 10dx1½"	(7) 10dx1½"	1,000	75	125	860	75	125
	MTS30[1]	(7) 10dx1½"	(7) 10dx1½"	1,000	75	125	860	75	125
	HTS20	(12) 10dx1½"	(12) 10dx1½"	1,450	75	125	1,245	75	125
	HTS30[1]	(12) 10dx1½"	(12) 10dx1½"	1,450	75	125	1,245	75	125

1. Additional fastener holes are provided on these products. Not all holes are required to be filled to achieve listed loads.
2. Consult I-joist manufacturer for blocking details and uplift limits on joist end application.
3. Connectors may be reversed as long as the required fasteners are installed on either side of the connection.
4. Web stiffener required on both sides to achieve published uplift loads.
5. When installing MTS and HTS connectors, the following installation instructions are required for the lateral loads to apply. The first 7 nail holes after the bend area must be filled with 10dx1½" nails. This applies to straps on either side of bend area. All additional fasteners may be installed in any remaining strap holes.
6. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members.
7. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note 6, page 8 under General Notes.
8. MTS and HTS may be ordered with a reversed bend configuration; add (-REV) suffix to model number(s).

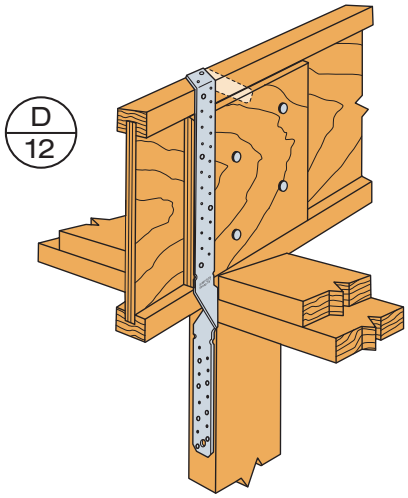


MTS Installation As an I-Joist to Top Plate Tie

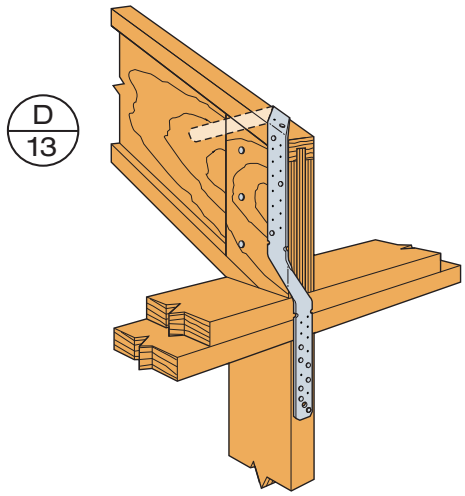


Typical H8 Installation
(I-Joist to Top Plate)

Note:
Web stiffeners required on both sides of I-joist



MTS30 to Studwall Installation

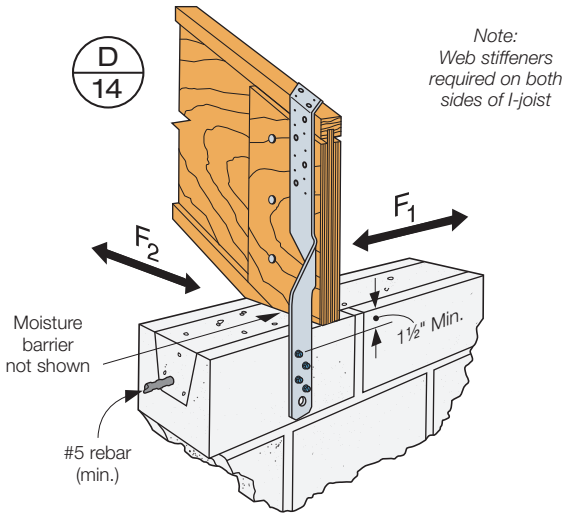


MTS30 to Studwall Installation

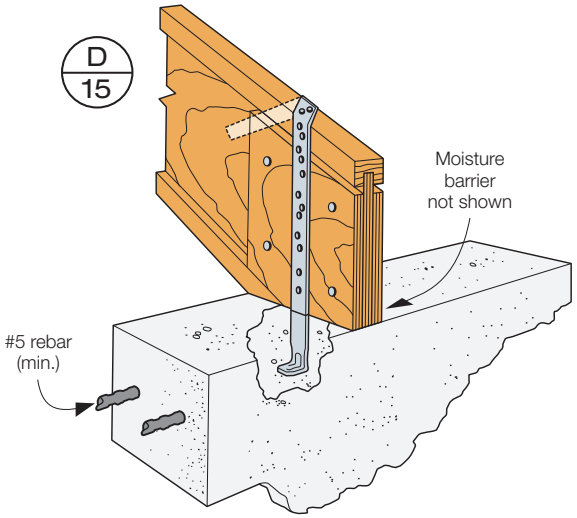
I-Joists to Masonry/Concrete

Model No.	Fasteners		DF/SP Allowable Loads		
			Uplift	Lateral	
	To I-Joist	To Grouted CMU or Bond Beam	(160)	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
MTSM16	(7) 10dx1½"	(4) ¼"x2¼" Titen[5]	875	120[4]	90[4]
MTSM20	(7) 10dx1½"	(4) ¼"x2¼" Titen[5]	875	120[4]	90[4]
HTSM16	(8) 10dx1½"	(4) ¼"x2¼" Titen[5]	1,175	120[4]	90[4]
HTSM20	(10) 10dx1½"	(4) ¼"x2¼" Titen[5]	1,175	120[4]	90[4]
META20	(7) 10dx1½"	Embed 4"	1,450	340	725
SS HETA20	(9) 10dx1½"	Embed 4"	1,810	340	725
HETA40	(9) 10dx1½"	Embed 4"	1,810	340	725

1. Additional fastener holes are provided on these products. Not all holes are required to be filled to achieve listed loads.
2. Consult I-joist manufacturer for blocking details and uplift limits on joist end application.
3. Web stiffener required on both side to achieve published uplift loads.
4. When installing MTSM and HTSM connectors, the following installation instructions are required for lateral loads to apply:
   a) The first 4 holes for Titen® screws after the bend area must be filled on the concrete/masonry end of the connection.
   b) The first 7 nail holes after the bend area must be filled with 10dx1½" nails on the wood end of the connection. Any additional required nails may be placed in any open hole on the wood end of the strap.
5. Use ¼"x1¾" Titen® screws for concrete application.
6. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members.
7. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note 6, page 8 under General Notes.



MTSM20 Fastened Directly to CMU, Bond Beam or Concrete Tie Beam



META/HETA Installation into CMU, Bond Beam or Concrete Tie Beam

Embedded Truss/Rafter to Masonry/Concrete

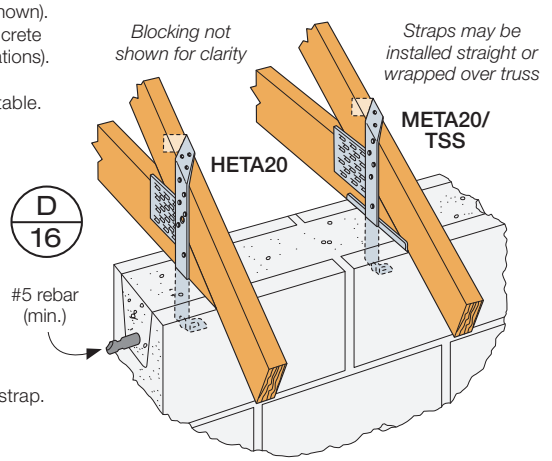
	Model No.	Qty. Req.	Application	SP Uplift One-Ply Truss[4]		SP Uplift Two- or Three-Ply Truss		SP Lateral Load	
				Fasteners to Truss/Rafter (Total)	(160)	Fasteners to Truss/Rafter (Total)	(160)	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
	HETAL12[7]	1	Block/Concrete	(10) 10dx1½"	1,040	(10) 16d	1,235	415	1,100
(META20 Only)	META12, META16, META18,META20, META22,META24, META40	1	Block/Concrete	(8) 10dx1½"	1,450	(6) 16d	1,450	340	795
	HETA12	1	Block/Concrete	(7) 10dx1½"	1,455	(7) 16d	1,730	340	795
SS (HETA20 Only)	HETA16, HETA20, HETA24, HETA40	1	Block/Concrete	(9) 10dx1½"	1,810	(8) 16d	1,810	340	795
(HETAL20 Only)	HETAL16[7] HETAL20[7]	1	Block/Concrete	(14) 10dx1½"	1,810	(13) 16d	1,810	415	1,100
	HHETA16, HHETA20, HHETA24, HHETA40	1	Block/Concrete	(10) 10dx1½"	2,235	(9) 16d	2,235	340[9]	795
(META20 Only)	META12, META16, META18,META20, META22,META24, META40	2[12]	Block	(10) 10dx1½"[12]	1,985	(14) 16d[13]	1,900	1,350	1,160
			Concrete	(10) 10dx1½"[12]	1,985	(14) 16d[13]	2,575		
SS (HETA20 Only)	HETA12, HETA16, HETA20, HETA24, HETA40	2[12]	Block	(10) 10dx1½"[12]	2,035	(12) 16d[13]	2,500	1,350	1,520
			Concrete	(10) 10dx1½"[12]	2,035	(12) 16d[13]	2,700		
	HHETA12, HHETA16, HHETA20, HHETA40	2[12]	Block	(10) 10dx1½"[12]	2,035	(12) 16d[13]	2,500	1,350	1,520
			Concrete	(10) 10dx1½"[12]	2,035	(14) 16d[13]	3,350		
	DETAL20[10]	1	Block	(18) 10dx1½"	2,480	—	—	2,000	1,370
			Concrete	(18) 10dx1½"	2,480	—	—	2,000	1,505

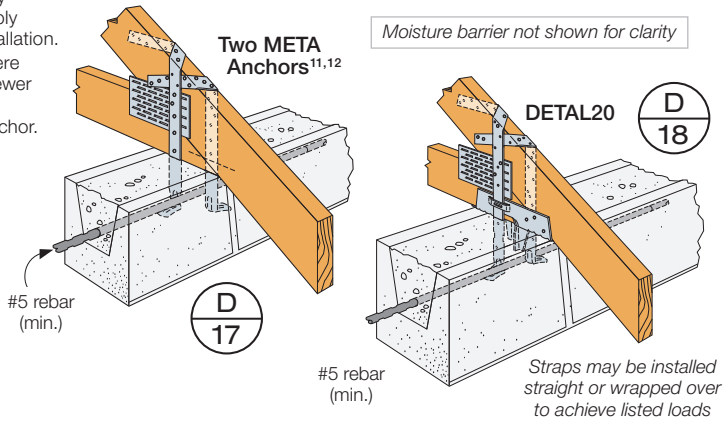
1. For SPF trusses multiply table loads by 0.78 for uplift and F_2 directions (use F_1 values as shown).
2. Unless noted otherwise, embedment is into either grout filled block (f'_m = 1,500 psi) or concrete (minimum f'_c is 2,000 psi for single strap installations and 2,500 psi for double strap installations).
3. Minimum edge distance for HETA/META is 1½" for concrete and 2" for masonry.
4. Single-ply trusses may use either 10dx1½" or 16d nails with allowable loads as noted in table. Two- or three-ply trusses shall use 16d nails.
5. For simultaneous loads in more than one direction, the connector must be evaluated as described in Note 6, page 8 under General Notes.
6. Allowable loads in the F_1 direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members.
7. The HETAL requires 5 nails to be installed into the truss seat.
8. Parallel-to-wall load towards face of HETAL is 1,975 lb.
9. 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 nails are installed.
10. The DETAL20 requires 6 nails installed in the truss seat and 6 nails in each strap.
11. Double META, HETA, and HHETA are spaced at 1⅜" for single-ply and 3⅛" for two-ply and staggered as shown. Install with spoons facing outward.
12. Where noted, for double anchors install half of the required number of fasteners in each strap.
13. Two HHETA anchors may be installed in a concrete tie beam on a two- or three-ply truss with 2 fewer nails for an allowable uplift load of 3,050 lb.
14. Double embedded anchor lateral loads apply only to two- or three-ply applications with anchors spaced a minimum of 3" apart. For single-ply applications use lateral loads from the Single Embedded Anchor Installation.
15. 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 than 7 fasteners are used with the HETA and HHETA anchors or when fewer than (6) 16d or (7) 10dx1½" fasteners are used with the META anchor. HETAL lateral loads do not apply when fewer than 5 fasteners are installed in strap – 5 fasteners required in the truss seat. DETAL lateral loads do not apply when fewer than 5 fasteners are installed in each strap – 6 fasteners required in the truss seat. Calculate the connector uplift value for a reduced number of fasteners as follows:

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

Example: META20 in SP with (6) 10dx1½" nails total (160)

$$\text{Allowable Load} = \frac{\text{6 Nails (Used)}}{\text{7 Nails (Table)}} \times \text{1,450 lbs.} = \text{1,240 lb.}$$

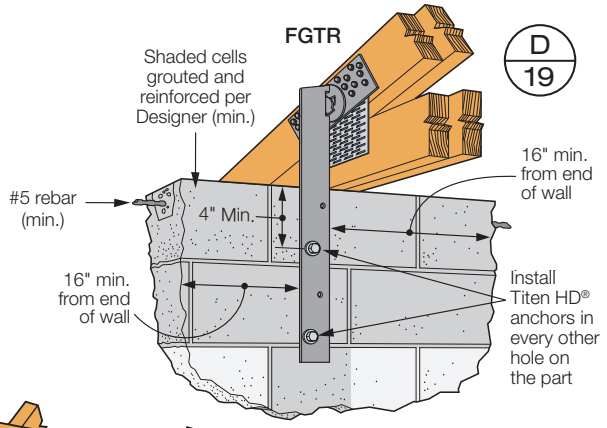


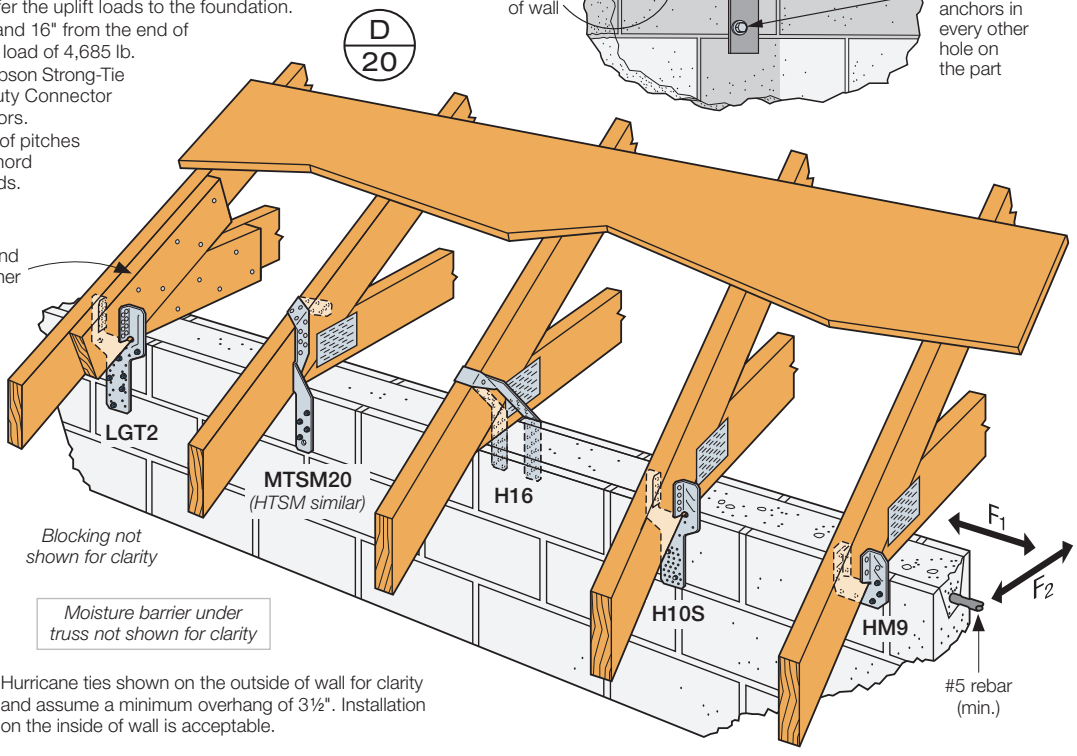


Post-Installed Truss/Rafter to Masonry/Concrete

Model No.	Qty. Req.	Fasteners to Masonry	Uplift One-Ply Truss		Uplift Two-Ply Truss		Lateral Load	
			Fasteners to Truss/Rafter (Total)	DF/SP Uplift (160)	Fasteners to Truss/Rafter (Total)	DF/SP Uplift (160)	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
HM9KT	1	(5) ¼"x2¼" Titen[4]	(4) ¼"x1½" SDS	595	N/A	N/A	425	200
HGAM10KTA	1	(4) ¼"x2¼" Titen[4]	(4) ¼"x1½" SDS	850	N/A	N/A	1,005	1,105
MTSM16, MTSM20	1	(4) ¼"x2¼" Titen[4]	(7) 10dx1½"	860	(7) 10d	860	200[6]	90[6]
H10S	1	(2) ⅜"x4" Titen HD	(8) 8dx1½"	1,065	N/A	N/A	—	—
HTSM16, HTSM20	1	(4) ¼"x2¼" Titen[4]	(8) 10dx1½"	1,175	(8) 10d	1,175	200[6]	90[6]
LTT20B[2]	1	(1) ½", ⅝", ¾" ATR[11]	(10) 10dx1½"	1,355	(10) 16d	1,500	—	—
H16[5]	1	(6) ¼"x2¼" Titen[4]	(2) 10dx1½"	1,470	N/A	N/A	—	—
H16-2[5]	1	(6) ¼"x2¼" Titen[4]	N/A	N/A	(2) 10dx1½"	1,470	—	—
MTSM16, MTSM20	2	(8) ¼"x2¼" Titen[4]	(14) 10dx1½"	1,650[12]	(14) 10d	1,650[12]	235[6]	205[6]
HTSM16, HTSM20	2	(8) ¼"x2¼" Titen[4]	(16) 10dx1½"	1,900[12]	(16) 10d	1,900[12]	235[6]	205[6]
SS DTT2Z[13,14]	1	(1) ½" ATR	(8) ¼"x1½" SDS	1,825	(8) ¼"x1½" SDS	2,145	—	—
LGT2[3]	1	(7) ¼"x2¼" Titen[4]	(16) 16d Sinkers[3]	2,150	(16) 16d Sinkers	2,150	700	170
FGTR[7,8,9,10]	1	(2) ½"x5" Titen HD	(18) ¼"x3" SDS[3]	5,000	(18) ¼"x3" SDS	5,000	—	—

1. For SPF trusses multiply table uplift and F_2 loads by 0.86 for nailed applications and 0.72 for Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws for uplift and F_2 directions (use F_1 values as shown). Higher loads may be possible (contact Simpson Strong-Tie).
2. Add a standard cut washer to seat of LTT20B when ½" or ⅝" diameter anchor bolt is used.
3. Product may be used for a single-ply truss provided the truss is blocked to receive 3" Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws or 16d sinkers and blocking is attached to the truss to act as a single unit.
4. For concrete applications, use ¼"x1¾" Titen® screws.
5. H16/H16-2 factory sloped to 5:12, but 3:12 - 7:12 roof slope is acceptable.
6. When installing MTSM and HTSM connectors, the following installation instructions are required for lateral loads to apply:
   a) The first 4 holes for Titen screws after the bend area must be filled on the concrete/masonry end of the connection.
   b) The first 7 nail holes after the bend area must be filled with 10dx1½" nails on the wood end of the connection. Any additional required nails may be placed in any open hole on the wood end of the strap.
7. To achieve the published loads, the FGTR must be attached to a grouted and reinforced block wall or reinforced concrete wall designed by others to transfer the uplift loads to the foundation.
8. FGTR installed between 4" and 16" from the end of a wall will have an allowable load of 4,685 lb.
9. FGTR is packaged with Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws and Titen HD® anchors.
10. FGTR can be installed on roof pitches up to 8:12 or on a bottom chord designed to transfer the loads.
11. ATR—All-Thread Rod or Anchor Bolt.
12. MTSM/HTSM connectors shall be installed on opposite faces of masonry/concrete to achieve loads listed for two connectors. If installed on same face of masonry/concrete, maximum uplift is 1,340 lbs.
13. For stainless steel, order DTT2SS.
14. DTT2 is 6 15/16" tall. Truss heel height or rafter vertical depth must accommodate.





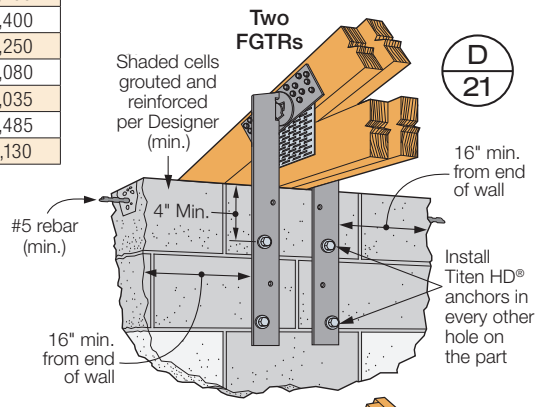
TITEN® SCREW WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry and noncorrosive environments only, provide moisture barrier, or use a stainless-steel fastener. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie® Titen® installation tool kit (Part TTNT01); it has a bit that is designed to reduce the potential for overtightening the screw.

Hurricane ties shown on the outside of wall for clarity and assume a minimum overhang of 3½". Installation on the inside of wall is acceptable.

Girder/Truss to Masonry/Concrete

	Model No.	Qty. Req.[3]	No. of Plies	Fasteners		DF/SP Uplift	SPF Uplift
				To Girder/Truss	To Masonry/Concrete	(160)	(160)
	LTA2 Parallel to Wall Installation	1	1	(10) 10dx1½"	Embedded	1,390[13]	1,015
	LTA2 Perpendicular to Wall Installation	1	1	(10) 10dx1½"	Embedded	1,425[13]	1,015
	H16-2[12]	1	2	(2) 10dx1½"	(6) ¼"x2¼" Titen[7]	1,470	1,265
SS	DTT2Z	1	1	(8) ¼"x1½" SDS	(1) ½" ATR	1,825	1,800
SS	DTT2Z	1	2	(8) ¼"x1½" SDS	(1) ½" ATR	2,145	1,835
	LGT2	1	2	(14) 16d Sinkers	(7) ¼"x2¼" Titen[7]	2,150	1,850
	THA222-2	1	2	(6) 16dx2½	(14) ⅜"x2¼" Titen[7]	2,150	1,850
	VGT L/R	1	2	(16) ¼"x3" SDS	(1) ⅝" ATR	2,230	1,605
	PA28[5]	1	2	(20) 16d	Embed 4"	2,765	2,765
	HDU2-SDS2.5	1	2	(6) ¼"x2½" SDS	(1) ⅝" ATR	3,075	2,215
	LGT3-SDS2.5	1	3	(12) ¼"x2½" SDS	(4) ⅜"x5" Titen HD	3,285	2,365
	LGT4-SDS3	1	4	(16) ¼"x2½" SDS	(4) ⅜"x5" Titen HD	3,285	2,365
	HTT4	1	2	(18) 10dx1½"	(1) ⅝" ATR	3,610	3,105
	MGT	1	2	(22) 10d	(1) ⅝" ATR	3,965	3,330
	HTT4	1	2	(18) 16dx2½"	(1) ⅝" ATR	4,235	3,640
	HTT5	1	2	(26) 10dx1½"	(1) ⅝" ATR	4,350	3,740
	HDU4-SDS2.5	1	2	(10) ¼"x2½" SDS	(1) ⅝" ATR	4,565	3,285
	HTT5	1	2	(26) 10d	(1) ⅝" ATR	4,670	4,015
	VGT[11]	1	2	(16) ¼"x3" SDS	(1) ⅝" ATR	4,940	3,555
	FGTR[8,9,10,11]	1	2	(18) ¼"x3" SDS	(2) ½"x5" Titen HD	5,000	4,300
	HTT5	1	2	(26) 16dx2½"	(1) ⅝" ATR	5,090	4,375
	HPA35[5]	1	2	(27) 16d	Embed 8¼"	5,145	4,525
	VGT L/R[11]	2	2	(32) ¼"x3" SDS	(2) ⅝" ATR	5,545	3,990
	HDU5-SDS2.5	1	2	(14) ¼"x2½" SDS	(1) ⅝" ATR	5,645	4,065
	HDU2-SDS2.5	2	2	(12) ¼"x2½" SDS	(2) ⅝" ATR	6,150	4,430
	VGT[11]	2	2	(32) ¼"x3" SDS	(2) ⅝" ATR	7,185	5,175
	HDQ8-SDS3	1	2	(20) ¼"x3" SDS	(1) ⅞" ATR	8,325	7,210
	HTT5	2	2	(52) 10dx1½"	(2) ⅝" ATR	8,700	7,480
	VGT[11]	2	3	(32) ¼"x3" SDS	(2) ⅝" ATR	8,890	6,400
	HGT-4	1	4	(16) 10d	(2) ¾" ATR	9,250	9,250
	FGTR[8,9,10,11]	2	2	(36) ¼"x3" SDS	(4) ½"x5" Titen HD	9,400	8,080
	HGT-3	1	3	(16) 10d	(2) ¾" ATR	10,530	9,035
	HGT-2	1	2	(16) 10d	(2) ¾" ATR	10,980	6,485
	HDU5-SDS2.5	2	2	(28) ¼"x2½" SDS	(2) ⅝" ATR	11,290	8,130

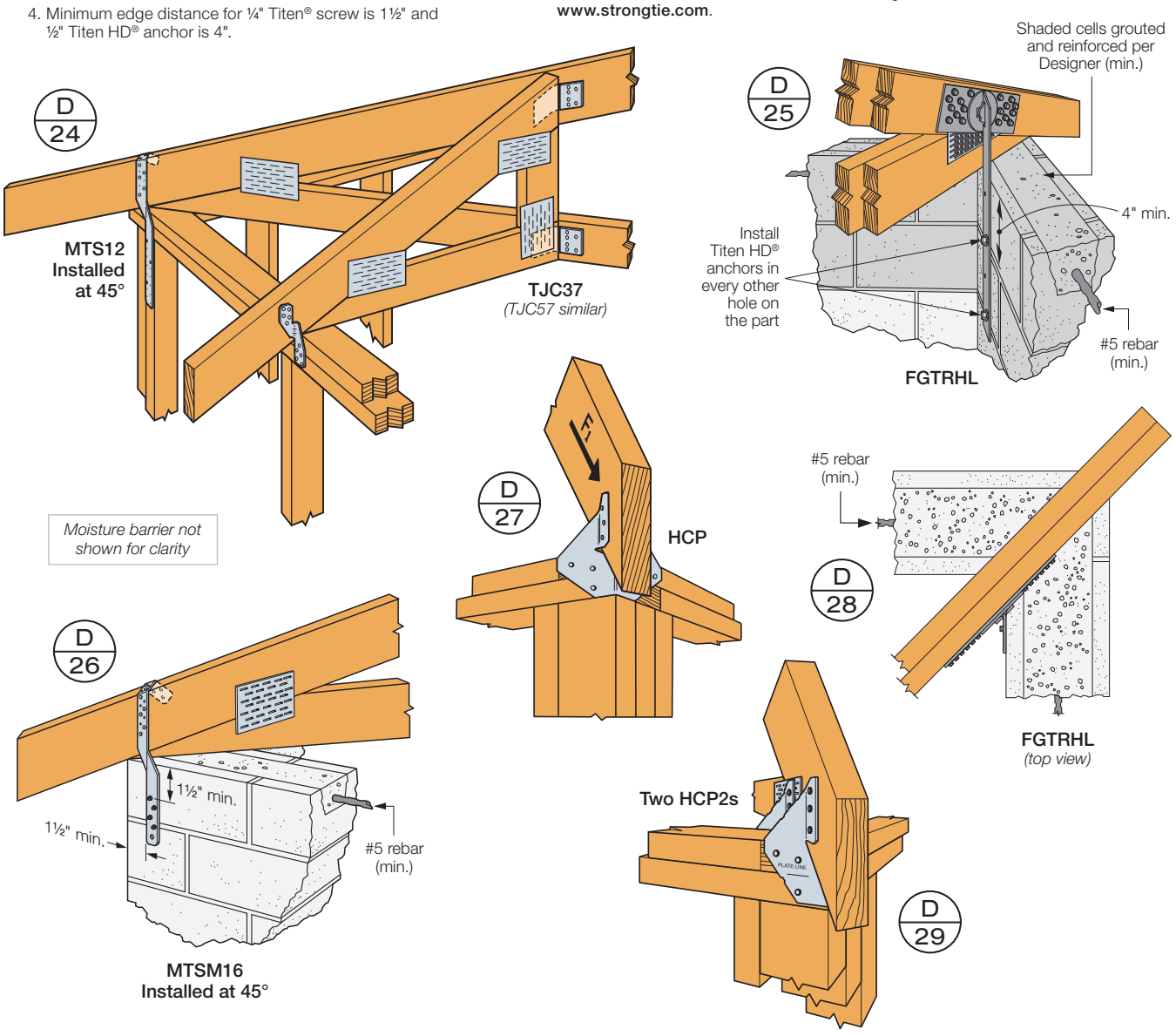
1. Holdown load values are based on a 3" thick vertical member. See the current Simpson Strong-Tie® *Wood Construction Connectors* catalog for load values based on different wood thicknesses. Wood member design by Specifier.
2. The Designer must specify anchor type, length and embedment.
3. The Designer must evaluate multiple installations not listed.
4. ATR—All-Thread Rod or Anchor Bolt.
5. PA28 and HPA35 must be embedded in center of a concrete tie beam (minimum width = 7⅝").
6. Multiple HDUs and HTTs must be installed staggered on truss.
7. For concrete applications use ¼"x1¾" Titen® screws.
8. To achieve the published loads, the FGTR must be attached to a grouted and reinforced block concrete wall designed by others to transfer the uplift loads to the foundation.
9. FGTR is packaged with Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws and Titen HD® anchors.
10. Screw holes on FGTR and VGT are configured to allow for a double installation on a two-ply truss.
11. To achieve the loads listed for the MGT, HGT and VGT single and double connector options, anchor into a 8" wide concrete tie-beam or grouted and reinforced CMU tie-beam can be made using Simpson Strong-Tie® SET epoxy anchoring adhesive with a minimum embedment depth of 12", a minimum end distance of 12" and centered in the 8" member. Vertical reinforcement may be required to transfer the loads per Designer.
12. H16-2 factory sloped to 5:12, but 3:12-7:12 roof slope is acceptable.
13. LTA2 uplift is 1,210 lb. for DF.
14. THDRC listed for use with 8" concrete tie beam, 1¾" edge, 8" end distance, uncracked concrete with no supplementary reinforcement and 2,500 psi concrete minimum. Designer shall specify adhesive anchor for CMU bond beam.



Truss/Rafter Hip to Wall

	Model No.	Member Size	Fasteners		DF/SP Allowable Loads (160)		SPF Allowable Loads (160)	
			To Truss/Rafter	To Wall	Uplift	F_1	Uplift	F_1
	TJC37 (1–85°)	2x4 min.	(6) 8dx1½"	(6) 8dx1½"	425[7]	—	365[7]	—
	TJC57 (1–85°)	2x6 min.	(12) 8dx1½"	(12) 8dx1½"	830[7]	—	715[7]	—
SS	HCP2[1]	2x	(6) 10dx1½"	(6) 10dx1½"	645	300	555	260
SS	HCP1.81[1]	1¾	(6) 10dx1½"	(6) 10dx1½"	605	300	520	260
SS	MTS12	2x	(7) 10dx1½"	(7) 10dx1½"	840	—	730	—
	MTSM16	2x	(7) 10dx1½"	(4) ¼"x2¼" Titen[3]	840	—	730	—
SS	HCP4	4x	(8) 10d	(8) 10d	1,000	265	860	230
SS	HTS16	2x	(8) 10dx1½"	(8) 10dx1½"	1,105	—	950	—
	HTSM16	2x	(8) 10dx1½"	(4) ¼"x2¼" Titen[3]	1,105	—	950	—
	FGTRH L/R[5,6]	(2) 2x	(18) ¼"x3" SDS	(2) ½"x5" Titen HD	3,850	—	3,850	—

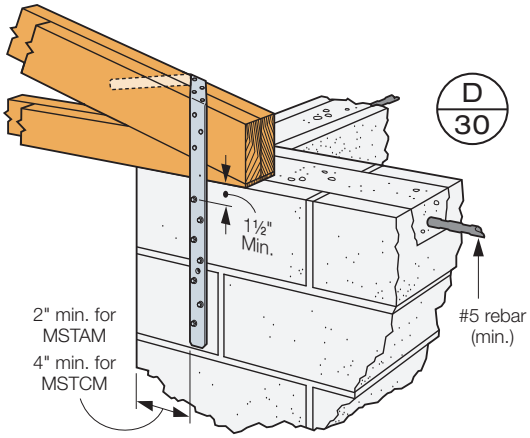
1. The HCP can be installed on the inside and the outside of the wall with a flat bottom chord truss and achieve twice the load capacity.
2. MTS12, HTS16, HTSM16 and MTSM16 can be field bent once to a 45° angle.
3. For concrete applications for the MTSM16 and HTSM16, use ¼"x1¾" Titen® screws.
4. Minimum edge distance for ¼" Titen® screw is 1½" and ½" Titen HD® anchor is 4".
5. To achieve the published loads, the FGTR must be attached to a grouted and reinforced block wall or reinforced concrete wall designed by others to transfer the uplift loads to the foundation.
6. FGTR is packaged with Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws and Titen HD anchors.
7. For alternate TJC installation angles, fasteners and load values, see the *Wood Construction Connectors* catalog or visit **www.strongtie.com**.



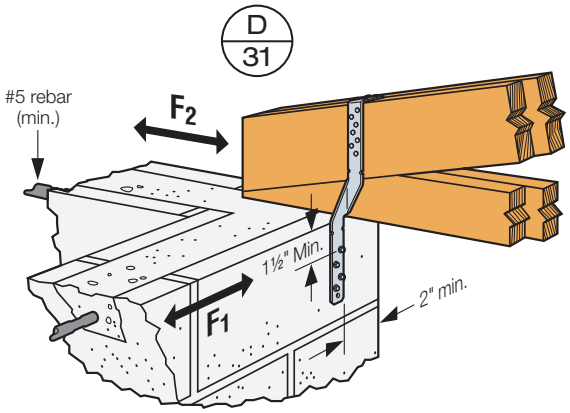
Truss/Rafter Hip to End Wall

Model No.	Member Size (Min.)	Fasteners		DF/SP Allowable Loads			SPF Allowable Loads		
		To Truss	To Wall	Uplift (160)	F_1	F_2	Uplift (160)	F_1	F_2
MTSM16[1,3,6]	(2) 2x	(7) 10d	(4) ¼"x2¼" Titen	875	120	90	750	120	90
HTSM16[1,3,6]	(2) 2x	(8) 10d	(4) ¼"x2¼" Titen	1,175	120	90	1,020	120	90
MSTAM24[1,3]	(2) 2x	(9) 10d	(5) ¼"x2¼" Titen	1,500	—	—	1,500	—	—
MSTAM36[1,3]	(2) 2x	(13) 10d	(8) ¼"x2¼" Titen	1,870	—	—	1,870	—	—
MSTCM40[1,3]	(2) 2x	(26) 16d Sinkers	(14) ¼"x2¼" Titen	4,220	—	—	4,220	—	—
MSTCM60[1,3]	(2) 2x	(26) 16d Sinkers	(14) ¼"x2¼" Titen	4,220	—	—	4,220	—	—
FGTR[2,4,5]	(2) 2x	(18) ¼"x3" SDS	(2) ½"x5" Titen HD	4,685	—	—	4,300	—	—

1. Minimum edge distance for ¼" Titen® screw is 1½".
2. Minimum edge distance for ½" Titen HD® anchor is 4".
3. For concrete tie beam applications, use ¼"x1¾" Titen screws.
4. To achieve the published loads, the FGTR must be attached to a grouted and reinforced block wall or reinforced concrete wall designed by others to transfer the uplift loads to the foundation.
5. FGTR is packaged with Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws and Titen HD anchors.
6. When installing MTSM and HTSM connectors, the following installation instructions are required for lateral loads to apply:
   a) The first 4 holes for Titen screws after the bend area must be filled on the concrete/masonry end of the connection.
   b) The first 7 nail holes after the bend area must be filled with 10dx1½" nails on the wood end of the connection. Any additional required nails may be placed in any open hole on the wood end of the strap.

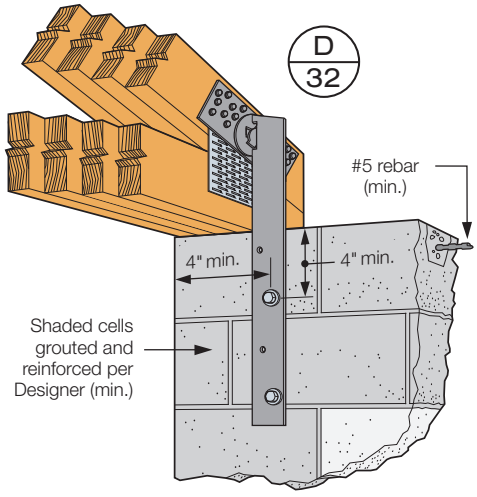


MSTAM36
(MSTAM24, MSTCM40 similar)

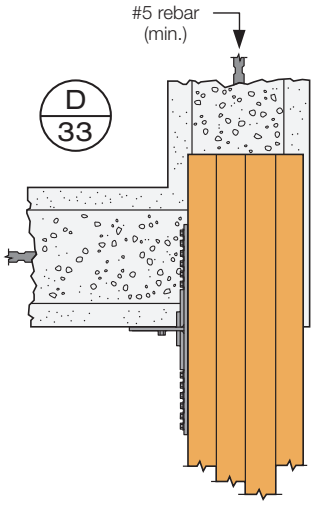


MTSM16
(HTSM16 similar)

Moisture barrier not shown for clarity



FGTR



FGTR
(top view)

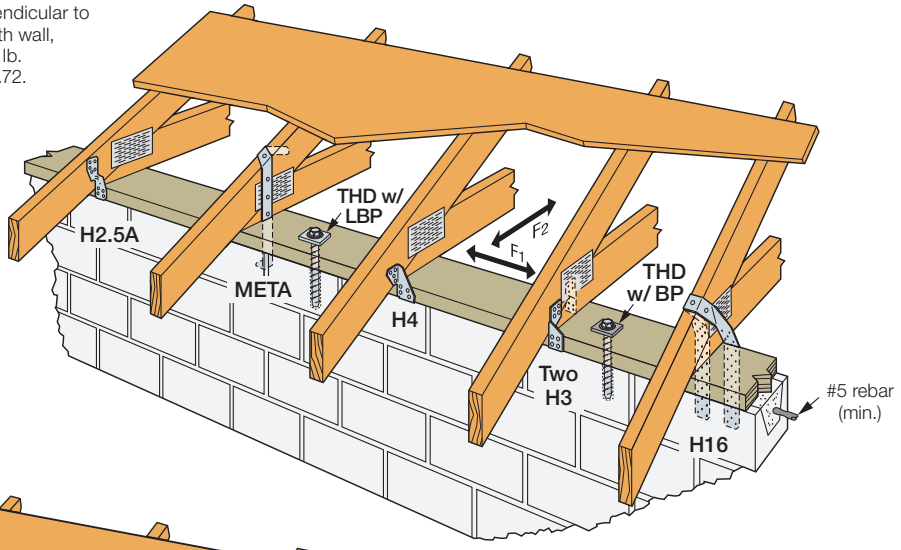
Truss/Rafter to Single Top Plate

	Model No.	Qty. Req.	No. of Plies (Min.)	Fasteners		DF/SP Allowable Loads			SPF Allowable Loads		
				To Truss/Rafter	To Plate	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)
SS	H2.5ASS	1	2	(4) SS8d	(4) SS8d	285	—	—	245	—	—
SS	H4	1	2	(4) 8d	(4) 8d	360	165	160	235	140	135
	H2.5A	1	1	(4) 8dx1½"	(4) 8dx1½"	390	—	—	335	—	—
SS	H3	1	2	(4) 8d	(4) 8d	455	125	160	320	105	140
	FCB43.5[7]	1	1	(4) SD10x1½"	(4) SD10x1½"	655	395	670	565	395	550
	HGA10[6]	1	1	(4) ¼"x1½" SDS	(4) ¼"x1½" SDS	605	500	720	435	360	520
SS	H4	2[4]	2	(8) 8d	(8) 8d	720	330	320	470	280	270
	H2.5A	2[4]	1	(8) 8dx1½"	(8) 8dx1½"	780	—	—	630	—	—
SS	H3	2[4]	2	(8) 8d	(8) 8d	910	250	320	640	210	280
	META16	1	1	(7) 10dx1½"	N/R	1,450	340	725	1,180	340	635
	META20	1	1	(7) 10dx1½"	N/R	1,450	340	725	1,180	340	635
	H16	1	1	(2) 10dx1½"	(6) ¼"x2¼" Titen[1]	1,470	—	—	1,265	—	—

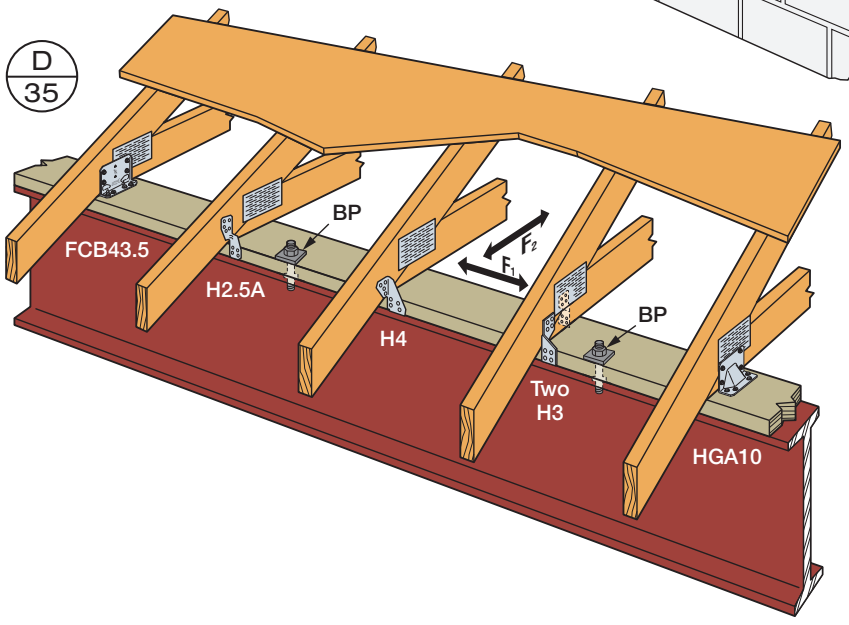
1. H16 fastened to masonry or concrete wall below single plate. Use 1¾" Titen® screws for concrete applications.
2. N/R—Not required, product is embedded into concrete or CMU.
3. Refer to page 20 for multiple META loads.
4. Refer to page 51 for installation details of two connectors on a single truss.
5. H16 factory sloped to 5:12, but 3:12-7:12 roof slope is acceptable.
6. HGA10 loads in table are for when truss is perpendicular to the wall as depicted in D35. If truss is parallel with wall, then uplift is 695 lbs., F_1 is 925 lb. and F_2 is 780 lb. for DF/SP. For SPF/HF, multiply load values by 0.72.
7. Provided the structural steel is ⅜" thick with F_y = 36 ksi minimum, the FCB43.5 may be connected directly to steel with a minimum of (3) #12-14 self-drilling screws for full loads listed above. For uplift, that load is limited to 500 lb., but F_1 and F_2 loads may be full loads per table above and (4) 0.157 PDPAT powder-actuated fasteners may be installed. It is the responsibility of the Designer to select proper-length fasteners based on the installation.

Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

D 34

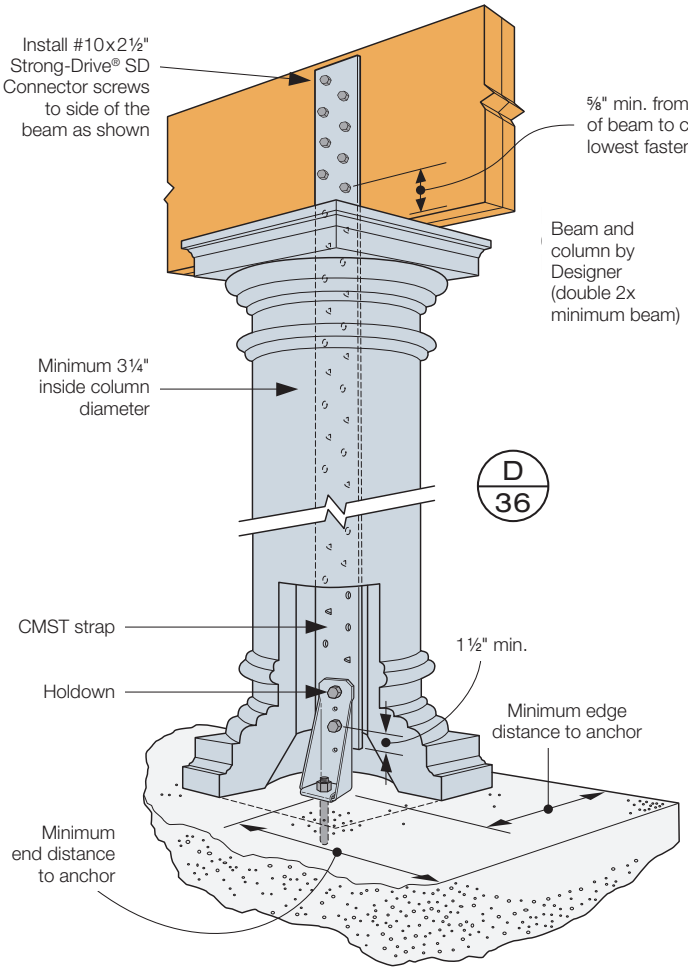


D 35

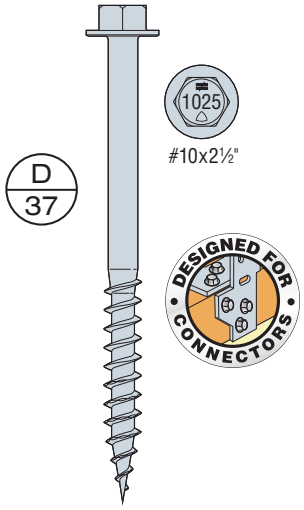


Hollow Column

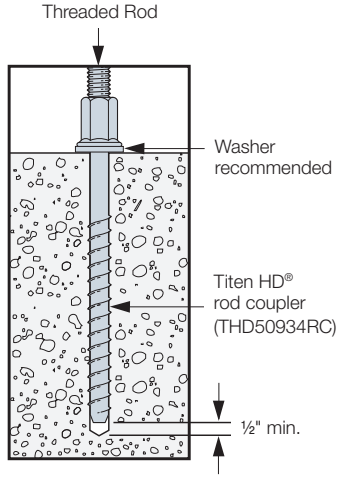
Refer to technical bulletin T-COLUMN for allowable load tables and more installation information.

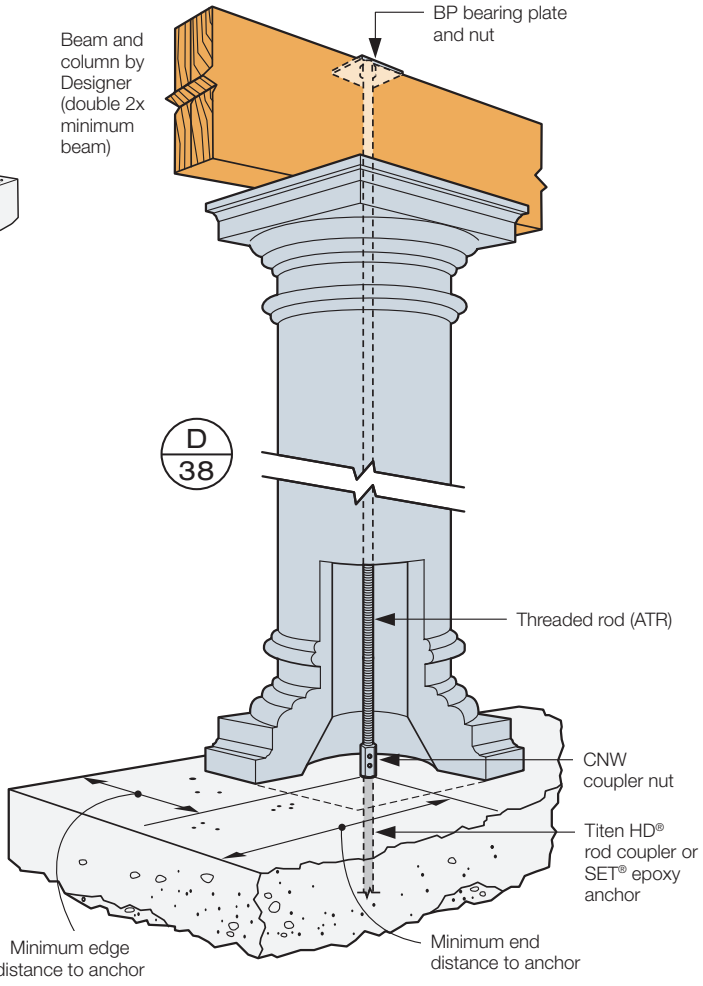


CMST Strap Configuration Installation



Strong-Drive® SD CONNECTOR Screw (SD10)
U.S. Patent 7,101,133



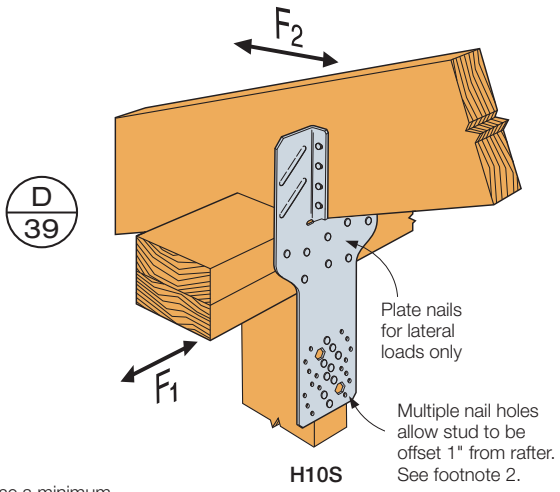


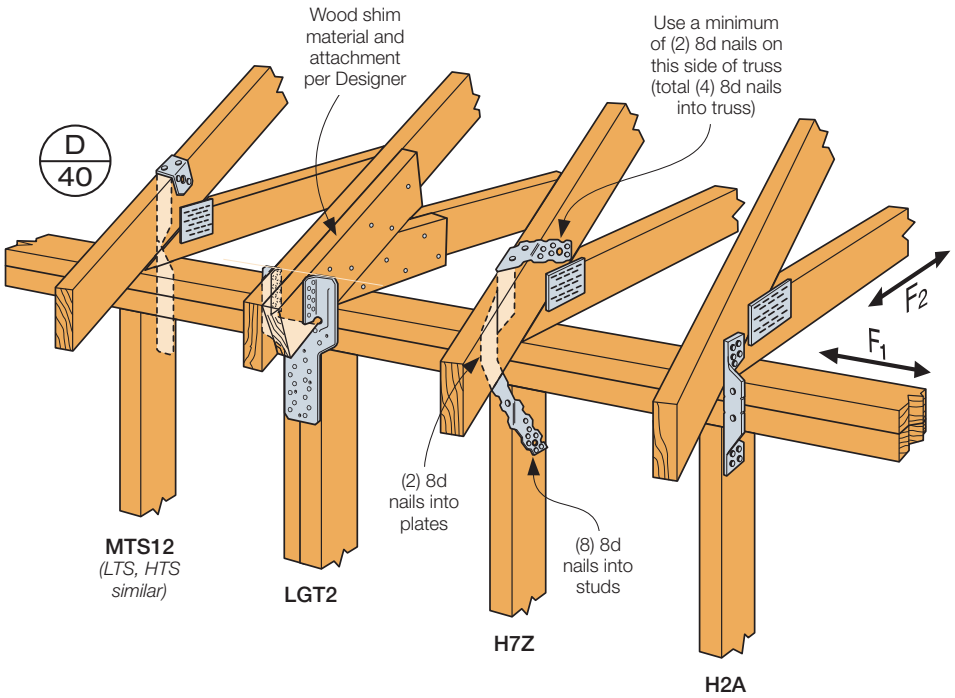
All-Thread Rod Configuration Installation

Truss/Rafter Directly to Stud

	Model No.	Qty. Req.	Fasteners (Total)			DF/SP Allowable Loads			SPF Allowable Loads		
			To Truss/Rafter	To Stud	To Plate	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)	Uplift (160)	Parallel to Plate (F_1) (160)	Perp. to Plate (F_2) (160)
SS	H2ASS	1	(5) SSN8	(5) SSN8	(2) SSN8	400	130	55	345	130	55
	H2A	1	(5) 8dx1½"	(5) 8dx1½"	(2) 8dx1½"	575	130	55	495	130	55
SS	LTS12[6]	1	(6) 10dx1½"	(6) 10dx1½"	—	720	75	125	620	75	125
	H7Z	1	(4) 8d	(8) 8d	(2) 8d	985	400	—	845	345	—
SS	MTS12[6]	1	(7) 10dx1½"	(7) 10dx1½"	Footnote 1	1,000	300	295	860	250	250
SS	MTS20[6]	1	(7) 10dx1½"	(7) 10dx1½"	Footnote 1	1,000	300	295	860	250	250
	H10S[2,3]	1	(8) 8dx1½"	(8) 8d	(8) 8dx1½"	1,010	545	215	870	470	185
	H2A	2	(10) 8dx1½"	(10) 8dx1½"	(4) 8dx1½"	1,150	260	110	990	260	110
SS	HTS20[6]	1	(12) 10dx1½"	(12) 10dx1½"	Footnote 1	1,450	300[1]	295[1]	1,245	300[1]	295[1]
	LGT2[5]	1	(16) 16d Sinkers	(14) 16d Sinkers	Footnote 4	2,050	700[4]	170[4]	1,785	700[4]	170[4]

1. When installing MTS and HTS connectors, the following installation instructions are required for the lateral loads to apply. The first 7 nail holes after the bend area must be filled with 10dx1½" nails. This applies to straps on either side of bend area. All additional fasteners may be installed in any remaining strap holes.
2. H10S can have the stud offset a maximum of 1" from rafter (center to center) for a reduced uplift of 890 lbs. (DF/SP) and 765 lbs. (SPF).
3. H10S nails to plates are optional for uplift but required for lateral loads.
4. LGT2—F_1 load = 700 lb.; F_2 load = 170 lb. with optional installation of (4) 16d sinkers optional nail holes.
5. LGT2—two-ply member required – attached members must be designed to resist applied loads.
6. Twist straps do not have to be wrapped over the truss to achieve the load.
7. The load capacities of stainless-steel connections match those of carbon-steel connectors when installed with Simpson Strong-Tie® stainless-steel, ring-shank nails.



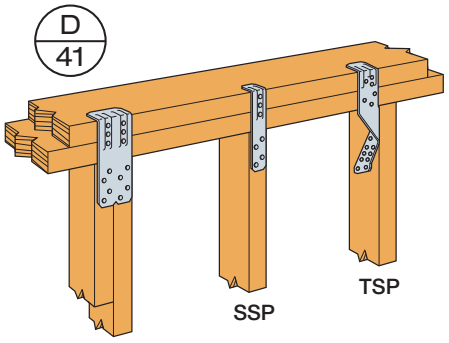


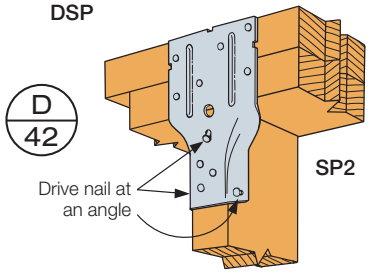
Top Plates to Stud

	Model No.	Qty. Req.	Fasteners (Total)		DF/SP Allowable Loads	SPF Allowable Loads
			To Plate	To Stud	Uplift (160)	Uplift (160)
	SSP	1	(3) 10dx1½"	(4) 10dx1½"	350	350
SS	H2.5ASS	1	(5) SS8d	(5) SS8d	440	380
	RSP4	1	(4) 8dx1½"	(4) 8dx1½"	450	370
SS	H5	1	(4) 8dx1½"	(4) 8dx1½"	455	265
	H2.5A	1	(5) 8dx1½"	(5) 8dx1½"	480	480
	SDWC15600	1	Wide or narrow face of stud[8]		590	510
SS	LTS12	1	(6) 10dx1½"	(6) 10dx1½"	720	620
SS	H8	1	(5) 10dx1½"	(5) 10dx1½"	745	565
	TSP	1	(6) 10dx1½"	(9) 10dx1½"	755	650
	DSP	1	(6) 10dx1½"	(8) 10dx1½"	775	775
SS	H5[2]	2	(8) 8dx1½"	(8) 8dx1½"	910	530
	H2.5A[2]	2	(10) 8dx1½"	(10) 8dx1½"	960	960
SS	MTS12	1	(7) 10dx1½"	(7) 10dx1½"	1,000	860
	TSP	1	(6) 10d	(9) 10dx1½"	1,015	875
	SP2[3]	1	(6) 10d	(6) 10d	1,065	605
	SDWC15600	2	Wide face of stud only[8]		1,135	980
SS	LTS12[2]	2	(12) 10dx1½"	(12) 10dx1½"	1,440	1,240
SS	HTS20	1	(12) 10dx1½"	(12) 10dx1½"	1,450	1,245
	SDWC15600	3	Wide face of stud only[8]		1,700	1,470
SS	MTS12[2]	2	(14) 10dx1½"	(14) 10dx1½"	2,000	1,720
SS	HTS20[2]	2	(24) 10dx1½"	(24) 10dx1½"	2,900	2,490

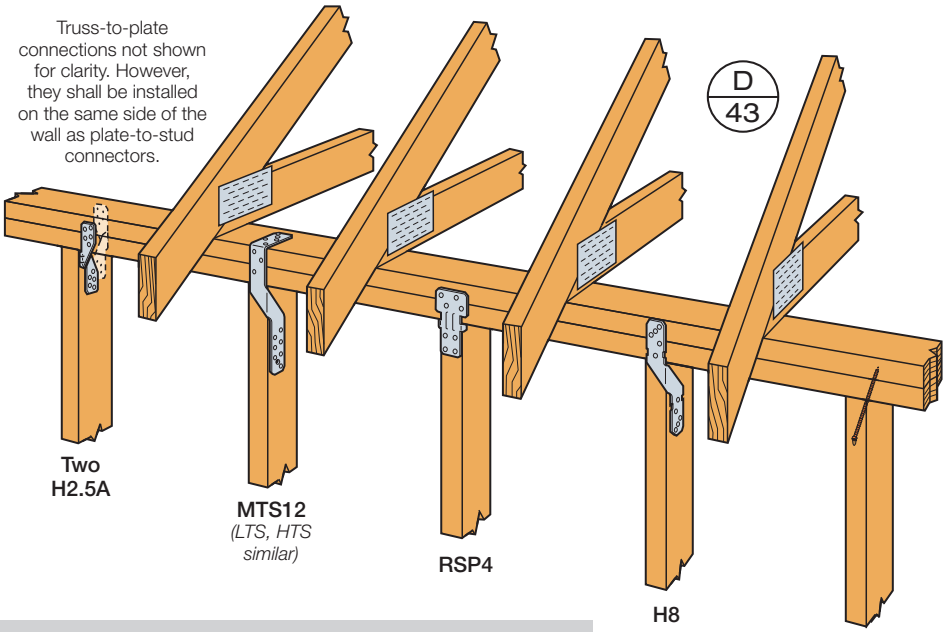
Model No.	Qty. Req.	Fasteners (Total)		Allowable Uplift Loads			
		To Plate	To Stud	DF/SP		SPF/HF	
				Side[4] (160)	Center[5] (160)	Side[4] (160)	Center[5] (160)
SP4 SP6 SP8	1	N/R	(6) 10dx1½"	440	885	380	760
SPH4[7] SPH6[7] SPH8	1	N/R	(12) 10dx1½"	745[6]	1,490[6]	585	1,170

1. N/R—Not required.
2. Where noted in table, when multiple connectors are installed on opposite sides of wall the top plate shall be loaded concentrically. See Figure D44.
3. For SP2, drive one stud nail at an angle through the stud into the plate. Drive two nails through the connector at an angle into the wide faces of the stud.
4. Use side (eccentric) load when uplift loads are applied to only one face of the top plate.
5. Use center (concentric) loads when uplift loads are applied at the center of the top plate, or where equal loads are applied to both sides of the top plate. Center loads may also be used for stud-to-bottom-plate loads.
6. Maximum load for SPH in Douglas Fir is 1,360 lbs. for center loading, and 680 lb. for side loading.
7. SPH4 and SPH6 can be installed over nominal ½" sheathing with a maximum DF/SP load of 1,360 lb. for center loading. Order SPH4R or SPH6R.
8. See pages 58–61 for required installation angles, spacing requirements and additional installation instructions.





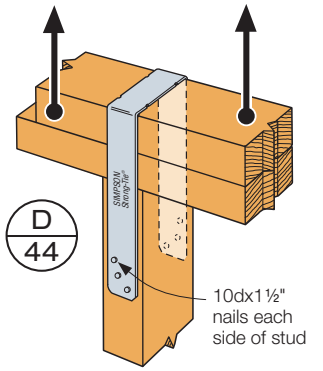
Truss-to-plate connections not shown for clarity. However, they shall be installed on the same side of the wall as plate-to-stud connectors.



SDWC Narrow Face of Stud-to-Top Plate Connection
(This application requires SDWC15600)

Side (eccentric) load when uplift loads are only applied to one face of top plate *(footnote 4)*

Center (concentric) load when uplift loads are applied at centerline of top plate *(footnote 5)*



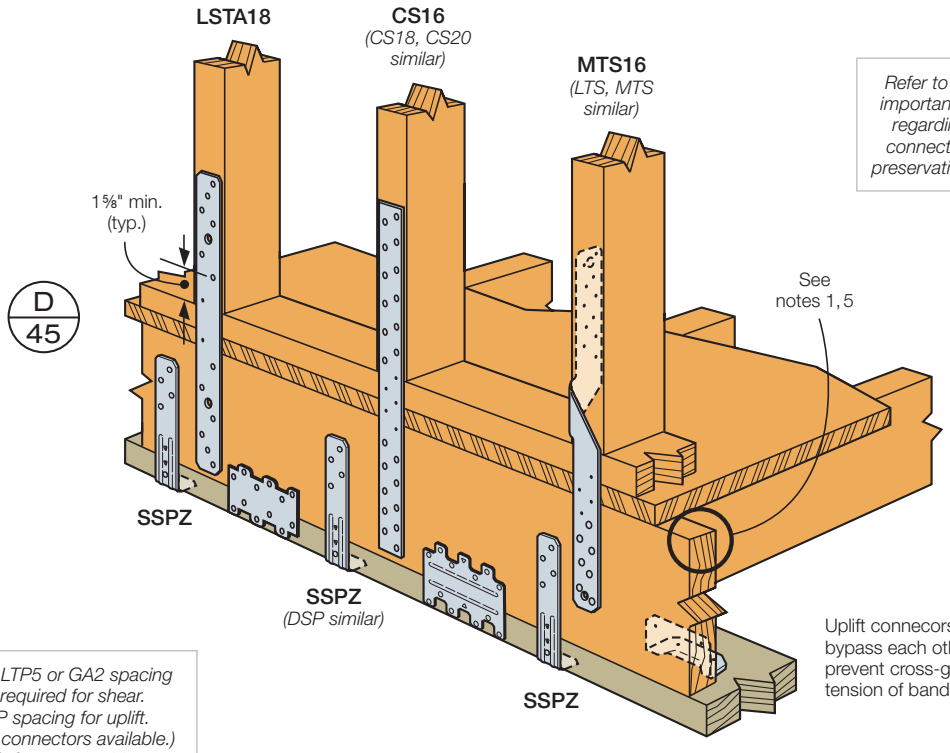
SP4
(SPH4 similar)

For more detailed information on fastening options with the Strong-Drive® SDWC Truss screw, see pages 58–61.

Stud to Band Joist

	Model No.	Single-Ply Band Joist (1½" Wide)				Double-Ply Band Joist (3" Wide)			
		DF/SP Allowable Uplift Loads		SPF Allowable Uplift Loads		DF/SP Allowable Uplift Loads		SPF Allowable Uplift Loads	
		Fasteners (Total)	(160)	Fasteners (Total)	(160)	Fasteners (Total)	(160)	Fasteners (Total)	(160)
SS	LSTA12[1]	(6) 10dx1½"	555	(6) 10dx1½"	480	(6) 10d	555	(6) 10d	480
SS	LTS16	(12) 10dx1½"	720	(12) 10dx1½"	620	(12) 10d	775	(12) 10d	665
SS	H6	(16) 8d	950	(16) 8d	820	(16) 8d	950	(16) 8d	820
SS	MTS16	(14) 10dx1½"	1,000	(14) 10dx1½"	860	(14) 10d	1,000	(14) 10d	860
	CS20[1]	(12) 10dx1½"	1,030	(14) 10dx1½"	1,030	(12) 10d	1,030	(14) 10d	1,030
SS	LSTA18[1]	(12) 10dx1½"	1,110	(12) 10dx1½"	955	(12) 10d	1,110	(12) 10d	955
SS	HTS20	(16) 10dx1½"	1,150	(16) 10dx1½"	990	(16) 10d	1,450	(16) 10d	1,245
SS	LSTA24[1]	(14) 10dx1½"	1,235	(16) 10dx1½"	1,235	(14) 10d	1,235	(16) 10d	1,235
	CS18[1]	(16) 10dx1½"	1,370	(18) 10dx1½"	1,370	(16) 10d	1,370	(18) 10d	1,370
SS	LSTA30[1]	(16) 10dx1½"	1,505	(16) 10dx1½"	1,295	(16) 10d	1,505	(16) 10d	1,295
SS	CS16[1]	(18) 10dx1½"	1,700	(20) 10dx1½"	1,630	(18) 10d	1,700	(20) 10d	1,630
	CMST14[1,6]	(24) 10dx1½"	2,390	(24) 10dx1½"	2,065	(24) 16d	2,810	(24) 16d	2,435
	MST37[1,6]	(24) 10dx1½"	2,530	(24) 10dx1½"	2,150	(24) 16d	2,950	(24) 16d	2,570
	CMST12[1,6]	(24) 10dx1½"	2,630	(24) 10dx1½"	2,210	(24) 16d	3,060	(24) 16d	2,650
	MSTC28[1,6]	(28) 10dx1½"	2,690	(28) 10dx1½"	2,325	(28) 16d Sinkers	2,690	(28) 16d Sinkers	2,325

1. Loads for stud to band joist connections are based on a minimum band joist depth of 11¼".
2. Loads for straps based on 2½" clear span between stud and band joist.
3. Multiple members must be fastened together to act as a single unit.
4. For straight straps, use half of the total fasteners listed on each member in the connection. Refer to the Coil Strap Calculator at **www.strongtie.com/software**.
5. Reduce loads for a single band joist less than 1½" thick.
6. CMST and MST require double studs of a minimum 3" width.
7. Values for straps assume a minimum nail penetration of 10 nail diameters into the stud or rim joist.
8. Nailing over sheathing is acceptable as long as 10 nail diameters' minimum penetration into the framing is maintained. See page 54.
9. Where possible cross-grain tension occurs in detail D45, consider full-length adjacent connectors or EWP rim designed to resist cross-grain tension loads. Refer to D136 on page 53.



Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

LTP4, LTP5 or GA2 spacing as required for shear. SSP spacing for uplift. (Other connectors available.) Refer to page 44.

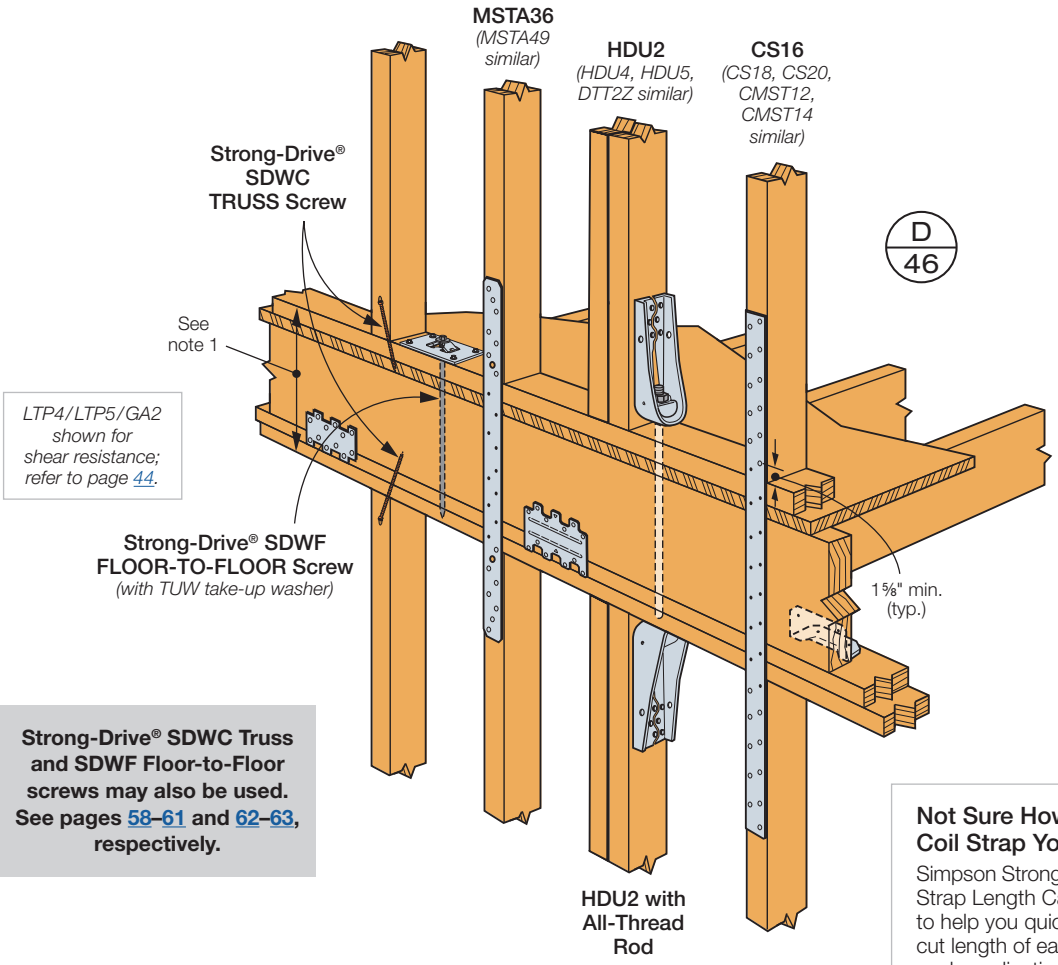
Stud to Stud

	Model No.	Qty. Req.	DF/SP Allowable Loads		SPF Allowable Loads	
			Fasteners (Total)	Uplift (160)	Fasteners (Total)	Uplift (160)
	CS20[2]	1	(14) 8d	1,030	(16) 8d	1,030
	LSTA36[2]	1	(14) 10d	1,315	(14) 10d	1,135
SS	MSTA36[2]	1	(14) 10d	1,345	(14) 10d	1,160
	CS18[2]	1	(18) 8d	1,370	(22) 8d	1,370
SS	CS16[2]	1	(22) 8d	1,705	(26) 8d	1,705
	MSTA49[2]	1	(26) 10d	2,020	(26) 10d	2,020
SS	DTT2Z[6]	2	(16) ¼"x1½" SDS	1,825	(16) ¼"x1½" SDS	1,800
	DTT2Z-SDS2.5[3]	2	(16) ¼"x2½" SDS	2,145	(16) ¼"x2½" SDS	2,105
	MSTC40[2]	1	(28) 16d Sinkers	2,695	(28) 16d Sinkers	2,320
	HDU2-SDS2.5[3]	2	(12) ¼"x2½" SDS	3,075	(12) ¼"x2½" SDS	2,215
	HDU4-SDS2.5[3]	2	(20) ¼"x2½" SDS	4,565	(20) ¼"x2½" SDS	3,285
	HDU5-SDS2.5[3]	2	(28) ¼"x2½" SDS	5,645	(28) ¼"x2½" SDS	4,065
	MSTC66[2]	1	(64) 16d Sinkers	5,860	(64) 16d Sinkers	5,495
	CMST14[2]	1	(56) 16d	6,490	(66) 16d	6,490
	CMST12[2]	1	(74) 16d	9,215	(84) 16d	9,215

1. Loads are based on an 18" clear span. **Note:** Where straps are used, longer straps will be required to achieve the same loads for larger clear spans, or the strap capacity will have to be reduced as described in footnote 7 below.
2. Nailing over ½" minimum wood structural panel sheathing is acceptable provided minimum 2½" long nails are used. See page 54.
3. Allowable loads for DTT2Z-SDS2.5 and HDU based on (2) 2x and greater vertical wood member.
4. Cut lengths for coil strap are CS16 = 46", CS18 = 42", CS20 = 36", CMST14 = 78", CMST12 = 94".
5. For straight straps, use half the total fasteners listed on each member in the connection.
6. For stainless steel, order DTT2SS.
7. Calculate the straight strap value for a reduced number of nails as follows:

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

or refer to the Coil Strap Calculator at **www.strongtie.com/software**.



Strong-Drive® SDWC Truss and SDWF Floor-to-Floor screws may also be used. See pages 58–61 and 62–63, respectively.

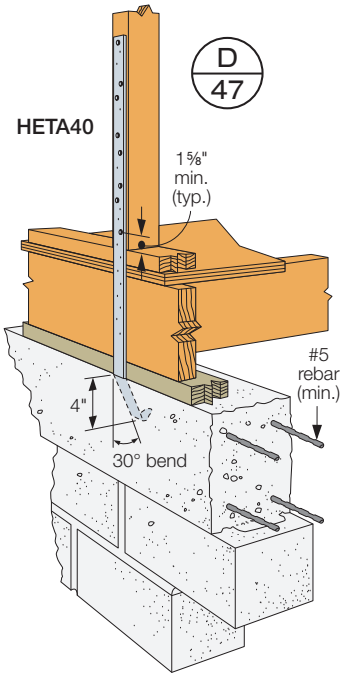
Not Sure How Much Coil Strap You Need?

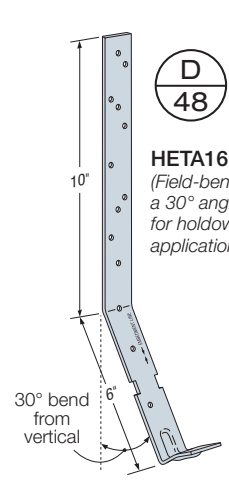
Simpson Strong-Tie offers the Coil Strap Length Calculator, designed to help you quickly determine the cut length of each strap needed for each application or a project. Visit **www.strongtie.com/software**.

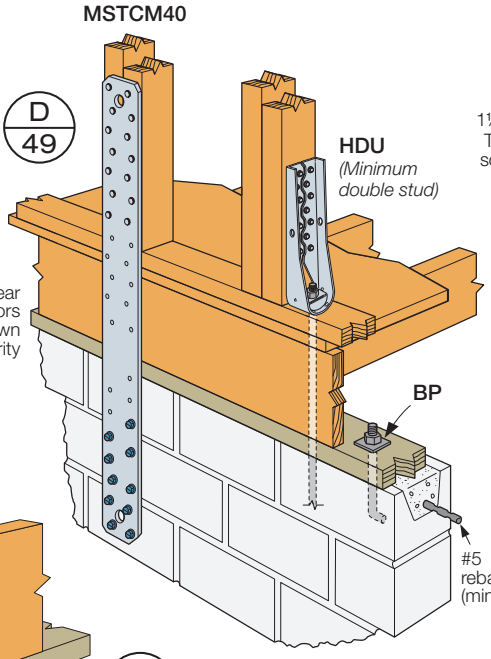
Floor to Masonry/Concrete

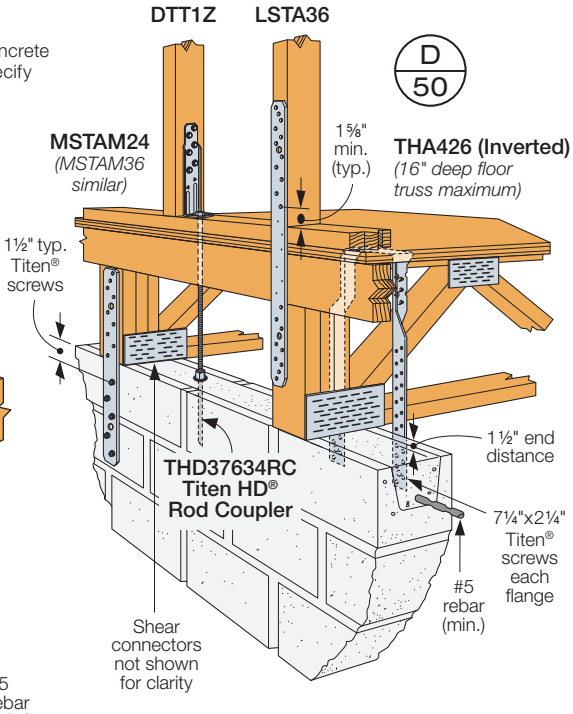
	Model No.	Qty. Req.	Fasteners To Block/ Concrete	DF/SP Allowable Loads		SPF Allowable Loads	
				Fasteners To Wood Framing	Uplift (160)	Fasteners To Wood Framing	Uplift (160)
	DTT1Z	1	⅜" ATR and THD37634RC[8]	(8) 10dx1½"	910	(8) 10dx1½"	850
	HETA16	1	Embedded	(8) 10dx1½"	1,355	(8) 10dx1½"	1,330
	MSTAM24	1	(5) ¼"x2¼" Titen[5]	(9) 10d	1,500	(9) 10d	1,500
SS	HETA20	1	Embedded	(10) 10dx1½"	1,810	(11) 10dx1½"	1,810
	HETA40	1	Embedded	(10) 10dx1½"	1,810	(11) 10dx1½"	1,810
SS	DTT2Z	1	½" ATR	(8) ¼"x1½" SDS	1,825	(8) ¼"x1½" SDS	1,800
	MSTAM36	1	(8) ¼"x2¼" Titen[5]	(13) 10d	1,870	(13) 10d	1,870
	THA426	1	(14) ¼"x2¼" Titen[5]	(6) 16d	2,150	(6) 16d	1,850
	HETA16	2	Embedded	(16) 10dx1½"	2,815	(16) 10dx1½"	2,655
	HDU2-SDS2.5	1	⅝" ATR	(6) ¼"x2½" SDS	3,075	(6) ¼"x2½" SDS	2,215
	MSTCM40[3]	1	(14) ¼"x2¼" Titen[5]	(26) 16d Sinkers	4,220	(26) 16d Sinkers	4,220
	MSTCM60[3]	1	(14) ¼"x2¼" Titen[5]	(26) 16d Sinkers	4,220	(26) 16d Sinkers	4,220
	HTT5	1	⅝" ATR	26-10d	4,670	26-10d	4,015
	HDU5-SDS2.5	1	⅝" ATR	(14) ¼"x2½" SDS	5,645	(14) ¼"x2½" SDS	4,065

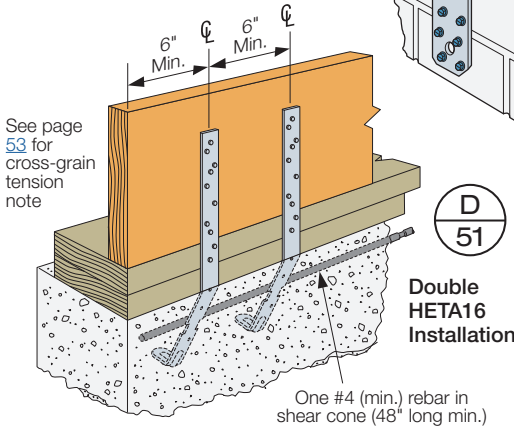
1. Holdown load values are based on a 3" thick vertical member. See the current Simpson Strong-Tie® *Wood Construction Connectors* catalog for load based on different wood thickness. Post design by Specifier.
2. HETA will require a 30° bend and a 4" minimum embedment depth in a concrete tie beam only. Loads based on SP lumber only. Strap may be bent one full cycle only.
3. MSTCM requires attachment to a minimum 3" wide member.
4. When nailing a strap over ½" maximum wood structural panel sheathing, use 2½" long nail minimum.
5. For concrete applications use ¼"x1¾" Titen® screws.
6. ATR—All-Thread Rod. The Designer must specify anchor type, length and embedment.
7. Standard cut washer is required with the ⅜" All-Thread Rod.
8. THDRC listed for use with 8" concrete tie beam, 1¾" edge, 8" end distance, uncracked concrete with no supplementary reinforcement and 2,500 psi concrete minimum. Designer shall specify adhesive anchor for CMU bond beam.











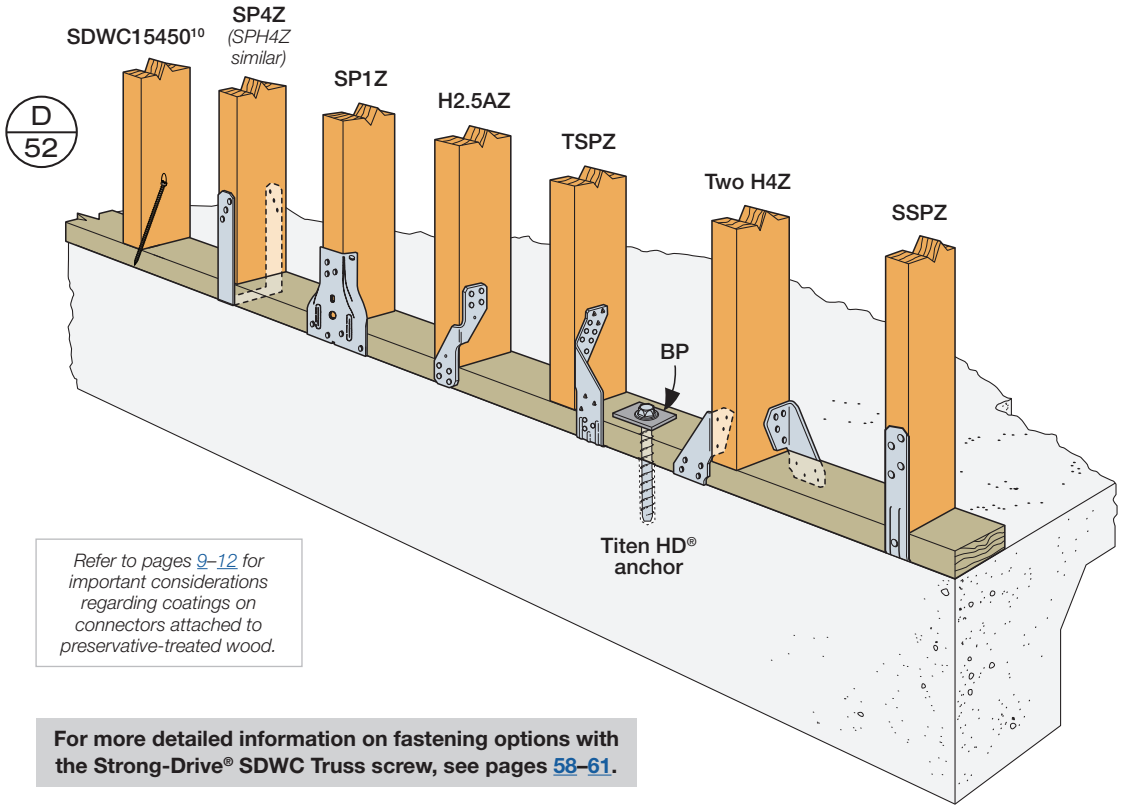
Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

TITEN® SCREW WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry and noncorrosive environments only, provide moisture barrier, or use a stainless-steel fastener. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie® Titen® installation tool kit (Part TTNT01); it has a bit that is designed to reduce the potential for overtightening the screw.

Stud to Sill Plate

	Model No.	Qty. Req.	Fasteners (Total)		DF/SP Allowable Loads	SPF Allowable Loads
			To Stud	To Plate	Uplift (160)	Uplift (160)
SS	H2.5ASS	1	(4) SS8d	(4) SS8d	285	245
	SDWC15450	1	Narrow Face of Stud Only[7,10]		295	255
SS	H8	1	(5) 10dx1½"	(4) 10dx1½"	310	310
	RSP4	1	(4) 8dx1½"	(4) 8dx1½"	315	285
SS	H4	1	(4) 8dx1½"	(4) 8dx1½"	360	235
	SDWC15450	1	Wide Face of Stud[7,10]		360	310
	H2.5A	1	(4) 8dx1½"	(4) 8dx1½"	390	315
	SSP	1	(4) 10dx1½"	(1) 10dx1½"	420	325
	SDWC15600	1	Wide or Narrow Face of Stud[7,10]		450	310
SS	H3	1	(4) 8d	(4) 8d	455	320
	SP1	1	(6) 10d4	(4) 10d	585	535
	TSP	1	(6) 10dx1½"	(3) 10dx1½"	585	425
	DSP	1	(8) 10dx1½"	(2) 10dx1½"	660	545
	SDWC15450	2	Wide Face of Stud Only[7,10]		690	595
SS	H4	2	(8) 8dx1½"	(8) 8dx1½"	720	470
	SDWC15600	2	Wide Face of Stud Only[7,10]		865	595
SS	SP4	1	(6) 10dx1½"	N/R	885	760
SS	SP6	1	(6) 10dx1½"	N/R	885	760
	SP8	1	(6) 10dx1½"	N/R	885	760
SS	H3	2	(8) 8d	(8) 8d	910	640
	SDWC15450	3	Wide Face of Stud Only[7,10]		1,035	895
	SDWC15600	3	Wide Face of Stud Only[7,10]		1,295	895
	SPH4[6]	1	(12) 10dx1½"	N/R	1,490[3]	1,170
	SPH6[6]	1	(12) 10dx1½"	N/R	1,490[3]	1,170
	SPH8	1	(12) 10dx1½"	N/R	1,490[3]	1,170

1. N/R—Not required.
2. SPF loads reflect attachment to SPF stud and/or sill.
3. Maximum loads for SPH in Douglas Fir is 1,360 lb.
4. SP1 drive one stud nail at an angle through the stud into the plate to achieve table load.
5. SPH4 and SPH6 can be installed over nominal ½" wood structural panel sheathing with a maximum DF/SP load of 1,360 lb. Order SPH4R or SPH6R.
6. Douglas Fir allowable uplift load for TSP is 470 lb.
7. See pages 58–61 for required installation angles, spacing requirements and additional installation instructions.
8. The load capacities of stainless-steel connections match those of carbon-steel connectors when installed with Simpson Strong-Tie® stainless-steel, ring-shank nails.
9. Refer to technical bulletin T-C-STRAPS for retrofit options.
10. Strong-Drive® SDWC15600 should not be used to attach a stud to a treated sill plate. Instead use SDWC15450 with E-coat. SDWC15600 can be used at stud-to-raised-floor, bottom-plate connections.



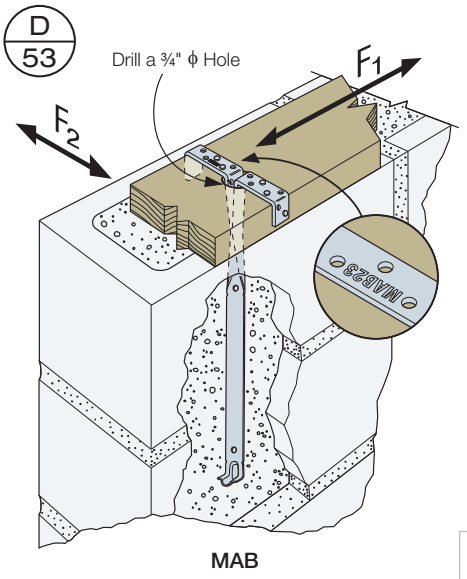
Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

For more detailed information on fastening options with the Strong-Drive® SDWC Truss screw, see pages 58–61.

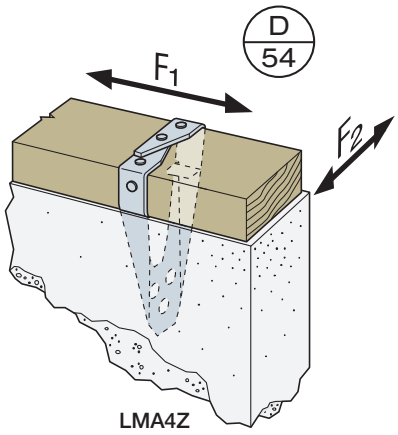
Sill Plate to Foundation

Model No.	Fasteners (Total)	DF/SP Allowable Loads		
		Uplift	Parallel to Plate (F_1)	Perpendicular to Plate (F_2)
		(160)	(160)	(160)
MAB15	(6) 10dx1½"	565	670	500
MAB23	(6) 10dx1½"	565	670	500
MA4	(4) 10dx1½"	830	575	430
LMA4Z	(6) 10dx1½"	905	675	520
MASA	(9) 10dx1½"	920	1,515	1,095
THD50600H[1]	—	1,375[3]	1,005	500

1. Titen HD® anchor ½"x6" is based on SP lumber, 1¾" edge, 8" end distance, uncracked concrete and no supplementary reinforcement.
2. MASA installed with one leg attached to stud has loads of 785 lb. (uplift), 1,005 lb. (parallel to plate) and 995 lb. (perpendicular to plate).
3. Uplift shown requires BP⅝ with Titen HD anchor ½"x6".
4. Minimum concrete strength 2,500 psi.
5. Loads are based on single 2x sill plate applications.

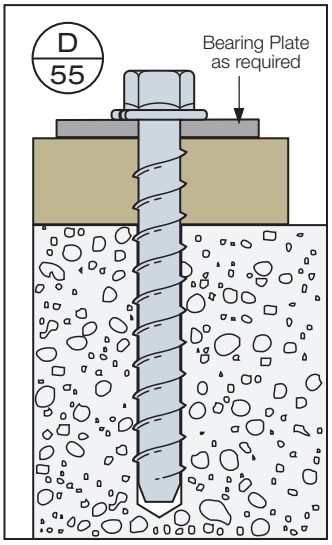


MAB



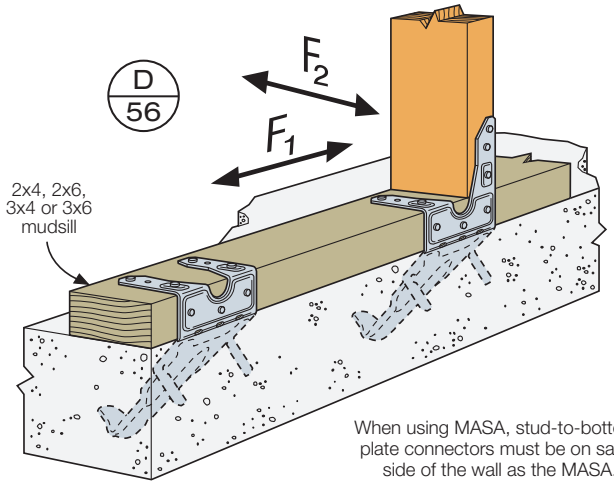
LMA4Z

Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

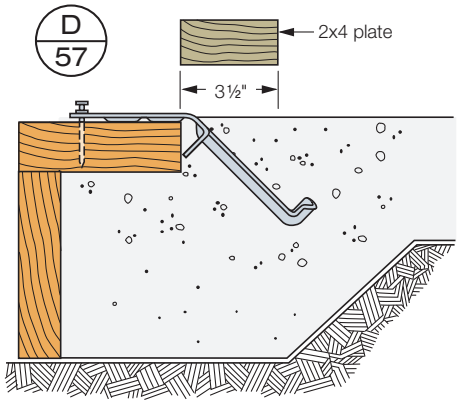


Titen HD® anchor
(See page 67 for design loads)

MASAZ



When using MASA, stud-to-bottom-plate connectors must be on same side of the wall as the MASA.



Alternate MASA Installation for Brick Ledges

Header to Wall Framing

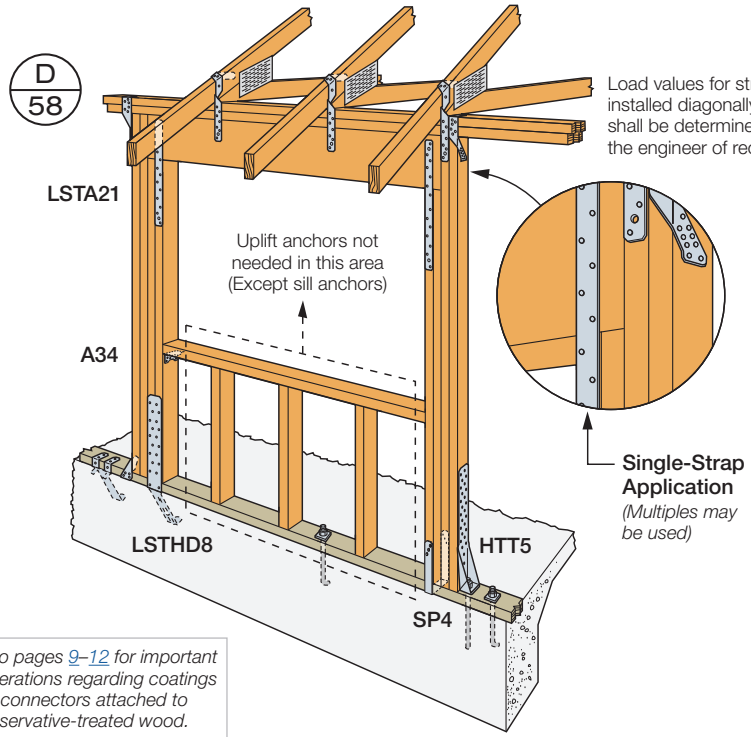
Header to Studs

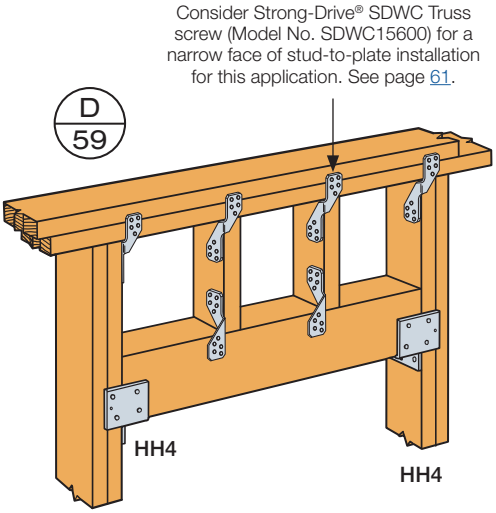
	Model No.	Minimum Header Height	DF/SP Allowable Loads		SPF Allowable Loads	
			Fasteners (Total)	Uplift (160)	Fasteners (Total)	Uplift (160)
	HH4	3.50"	(11) 10dx1½"	575	(11) 10dx1½"	495
	HH4[9]	3.50"	(13) 16d	710	(13) 16d	610
SS	LSTA12	7.25"	(10) 10d	970	(10) 10d	830
	HH6	5.50"	(16) 10dx1½"	1,065	(16) 10dx1½"	915
	CS16	7.25"	(12) 10d	1,180	(12) 10d	1,020
SS	LSTA18	9.25"	(14) 10d	1,235	(14) 10d	1,165
SS	LSTA21	11.25"	(16) 10d	1,235	(16) 10d	1,235
	CS16	9.25"	(16) 10d	1,575	(16) 10d	1,360
		11.25"	(18) 10d	1,705	(20) 10d	1,700

Studs to Plate/Foundation

	Model No.	Fasteners		DF/SP Allowable Loads	SPF Allowable Loads
		Stud	Plate/ Foundation	Uplift (160)	Uplift (160)
	DSP[7]	(8) 10dx1½"	(2) 10dx1½"	660	545
SS	SP4, SP6, SP8[10]	(6) 10dx1½"	—	885	760
	SPH4[8], SPH6[8], SPH8	(10) 10dx1½"	—	1,240	1,065
		(12) 10dx1½"	—	1,490[6]	1,170
SS	DTT2Z[5]	(8) ¼"x1½" SDS	½" ATR	1,825	1,800
	LSTHD8[11,12] LSTHD8RJ	(20) 16d Sinkers	Embedded	2,700	2,700
	HDU2-SDS2.5	(6) ¼"x2½" SDS	⅝" ATR	3,075	2,215
	HTT4	(18) 10dx1½"	⅝" ATR	3,610	3,105
		(18) 16dx2½"	⅝" ATR	4,235	3,640
	HTT5	(26) 10dx1½"	⅝" ATR	4,350	3,740
		(26) 10d	⅝" ATR	4,670	4,015
		(26) 16dx2½"	⅝" ATR	5,090	4,375
	HTT5KT[13]	(26) #10x2½" SD	⅝" ATR	5,445	5,360
	HDU5-SDS2.5	(14) ¼"x2½" SDS	⅝" ATR	5,645	4,065

1. Straps must use half the total fasteners into each member being connected to achieve the listed loads.
2. Multiple straps may be used for increased uplift capacity.
3. For a continuous load path, truss/rafter-to-top-plate/stud/header connections must be on the same side of wall as header-to-stud connections.
4. ATR—All-Thread Rod or Anchor Bolt. The Designer must specify anchor type, length, and embedment.
5. For stainless steel, order DTT2SS.
6. Maximum load for SPH in Douglas Fir is 1,360 lb.
7. DSP is for double-stud connections.
8. SPH4 and SPH6 can be installed over nominal ½" sheathing with a maximum DF/SP load of 1,360 lb. Order SPH4R or SPH6R.
9. Where noted, minimum supporting post thickness is 2½".
10. SP4 and SP6 available in stainless steel. SP8 is not.
11. Where noted in table, load listed is for 6" or 8" stemwall corner condition with ½" min. edge distance into non-cracked 2,500 psi concrete. For midwall condition, allowable load is 3,115 lb. for 6" or 8" stemwall. For end-of-wall condition, allowable load is 1,690 lb. for 6" stemwall (2,230 lb. for 8" stemwall).
12. For other STHD models, refer to page 45.
13. HTT5KT packaged with (26) Strong-Drive® SD Connector screws.



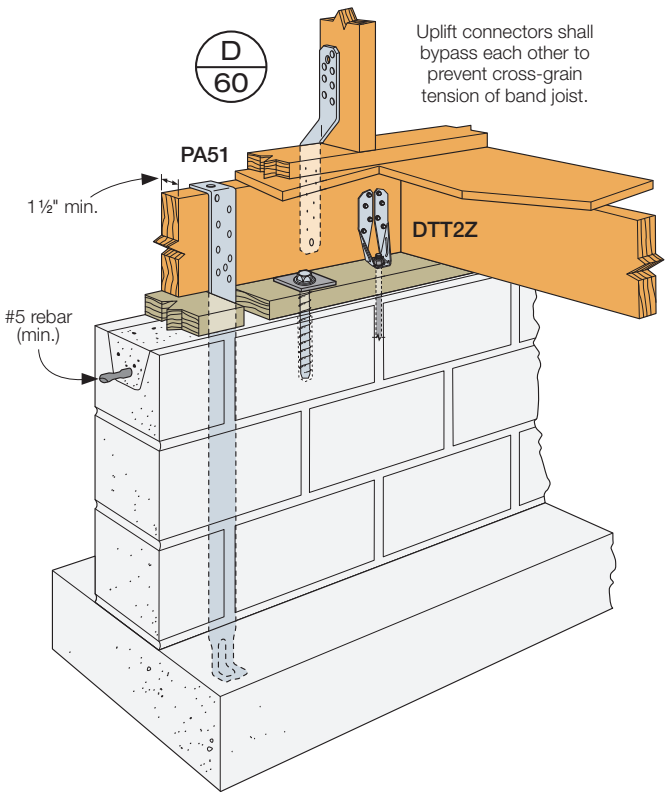


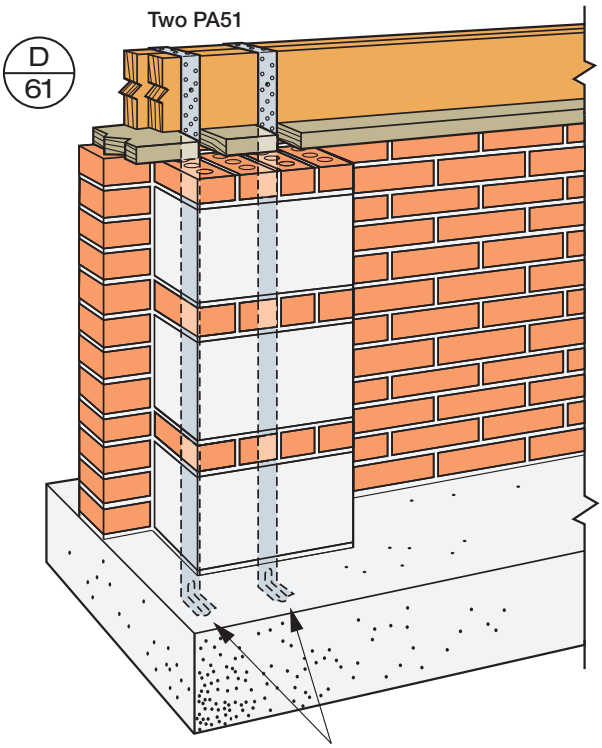
Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

Stemwall/Crawlspace

	Model No.	Qty. Req.	Fasteners		DF/SP Allowable Loads	SPF Allowable Loads
			Anchors	Fasteners	Uplift (160)	Uplift (160)
SS	DTT2Z[3]	1	(1) ½" ATR	(8) ¼"x1½" SDS	1,825	1,800
	PA51[1,2]	1	4" Embed	(9) 16d	2,220	1,925
	PA68[1,2]	1	4" Embed	(9) 16d	2,220	1,925
	FJA[3]	2	(4) ½" ATR	(16) 10dx1½"	2,410	2,070

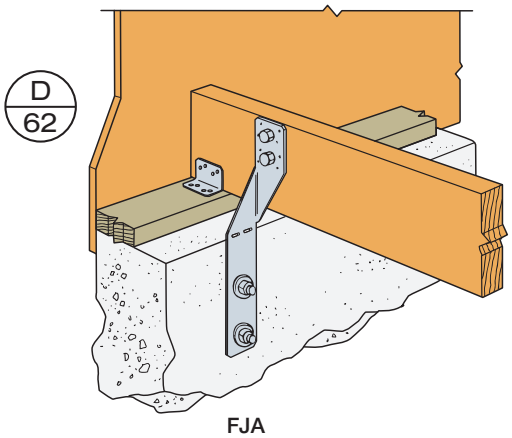
1. Minimum embedment for PA into concrete footing is 4" with a minimum of 5" to nearest edge. 8" minimum spacing between straps. Optional nail holes provided.
2. Refer to Simpson Strong-Tie® technical bulletin T-PAUPLIFT for additional information on use of PA straps as foundation anchors, including strap extension.
3. For stainless steel, order DTT2SS.





Minimum Two Straps per Pier
Minimum 4" Embedment into Footing

Per ICC 600-2008, Section 305.2.2.2., the assembly shown above is limited to 110 mph and one- and two-story buildings.



FJA

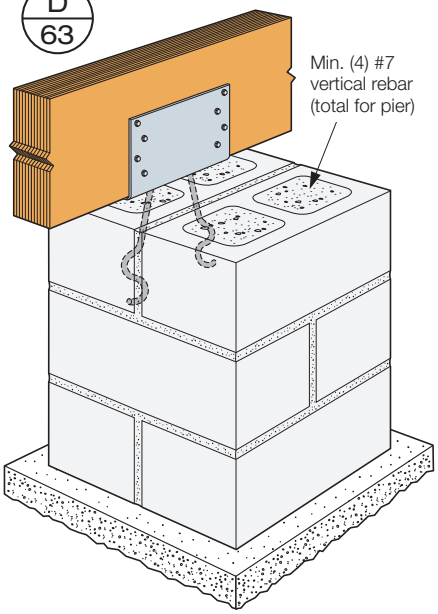
Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

Beam to CMU or Concrete Pier

Model No.	No. of ¼"x2½" SDS Screws			16" Square Grout-Filled CMU Pier[3,6]				16" Square CMU Shell Filled with 3,000 psi Concrete[3,7]				Deck Joist Connection	
				Uplift (160)			Lateral (160)	Uplift (160)			Lateral (160)	Download (100)	Uplift (160)
	Main Beam	Side Beam	Deck Beam	Main Beam	Side Beam	Total		Main Beam	Side Beam	Total			
CCQM-SDSHDG	12	—	—	6,750	—	6,750	2,460	6,855	—	6,855	2,770	—	—
CCTQM-SDSG	12	8	—	6,750	5,375	6,750	2,460	6,855	6,720	6,855	2,770	—	—
CCCQM-SDSG	12	8	—	6,750	5,375	6,750	2,460	6,855	6,720	6,855	2,770	—	—
ECCLQMG-KT[8]	16	16	—	6,240	6,240	7,300	2,220	6,240	6,240	8,260	2,680	—	—
ECCLQMDG-KT	16	16	6	6,240	6,240	7,300	2,220	6,240	6,240	8,260	2,680	5,475	2,010

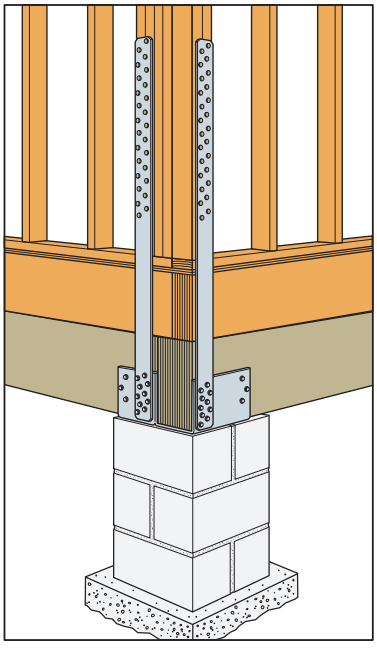
1. The allowable loads have been increased for wind or earthquake loading with no further increase allowed.
2. Total uplift load and lateral load is based on tested anchor failure in the pier.
3. Allowable loads are based on either a 16" square grout-filled CMU pier with f'_m of 1,500 psi or a 16" square CMU shell filled with 3,000 psi concrete. A minimum of (4) #7 vertical rebars are required. The Designer shall design and detail the CMU/concrete pier to resist all forces including uplift, shear, and moment.
4. Pier height per Designer.
5. Side beam and main beam uplift loads assume DF members and are not additive.
6. The allowable loads listed for grout-filled CMU apply to solid concrete piers of 2,500 psi concrete a minimum of 16" square.
7. The allowable loads listed for CMU shell-filled with 3,000 psi concrete apply to solid concrete piers of 3,000 psi concrete a minimum of 12" square.
8. The ECCLQM-KT is a kit packaged with (2) MSTQM straps and (32) Strong-Drive® ¼"x2½" SDS Heavy-Duty Connector screws. One strap may be installed on each face of the ECCLQM (as shown), using the Strong-Drive SDS Heavy-Duty Connector screws into the beams and 26-16dx2½" nails (not provided) into the wall framing. The MSTQM strap's allowable tension load is 6,240 lbs.
9. Any side stirrup not fully supported by grout- or concrete-filled CMU has an allowable down load of 7,000 lb.

D 63



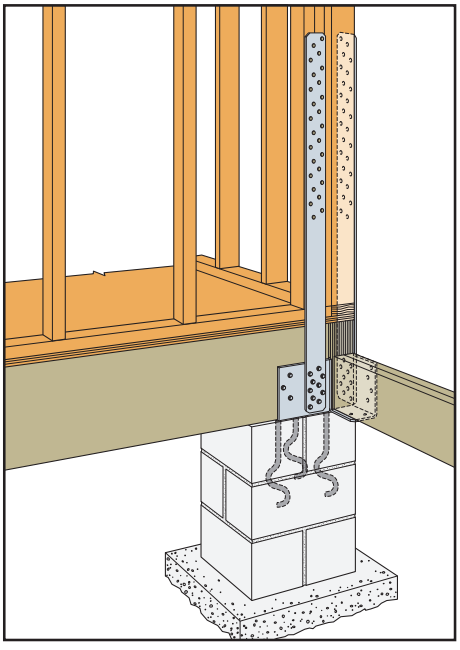
Typical CCQM Installation

D 64



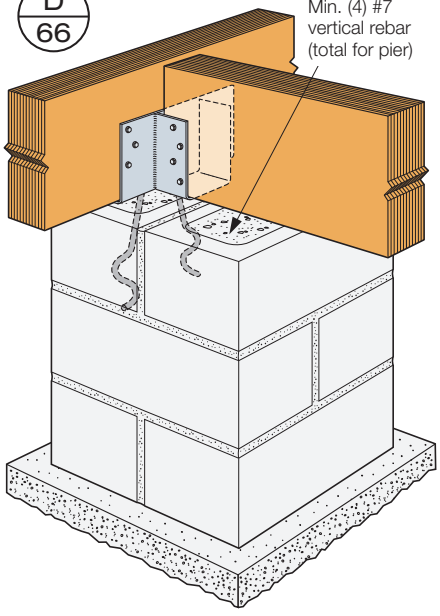
Typical ECCLQM Installation

D 65



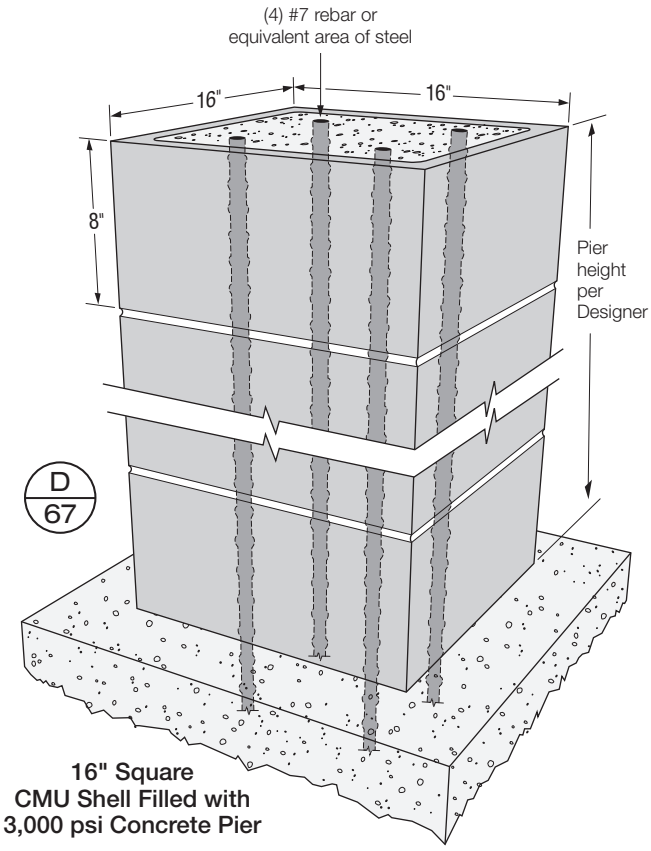
Typical ECCLRQMD-KT Installation

D 66

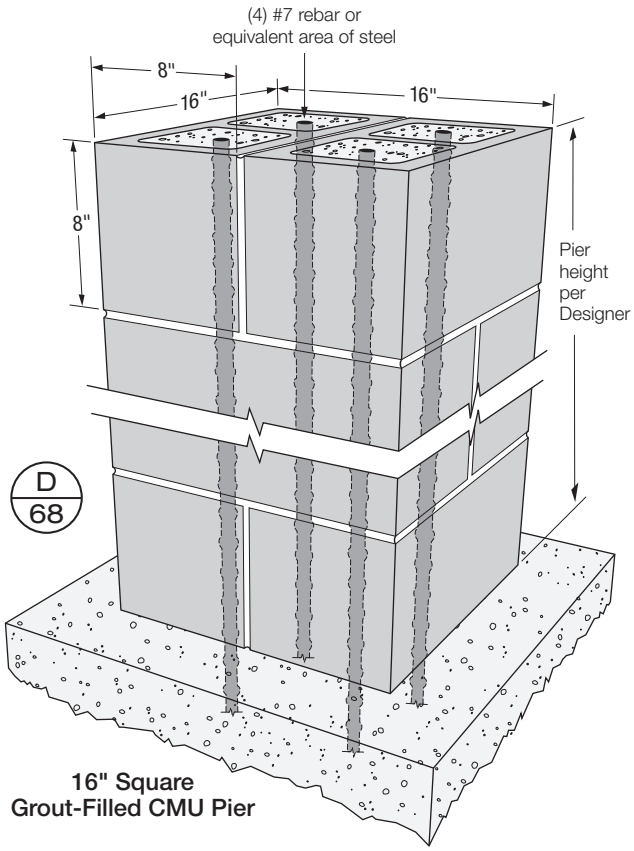


Typical CCTQM Installation

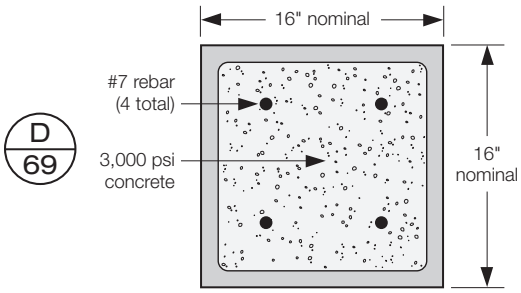
Beam to CMU or Concrete Pier (cont.)



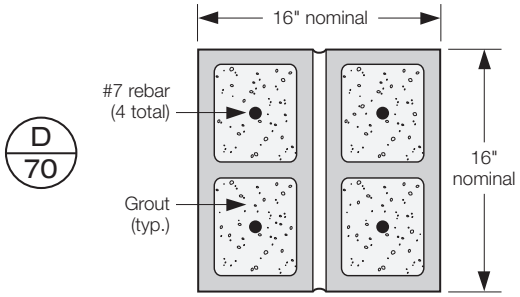
16" Square CMU Shell Filled with 3,000 psi Concrete Pier



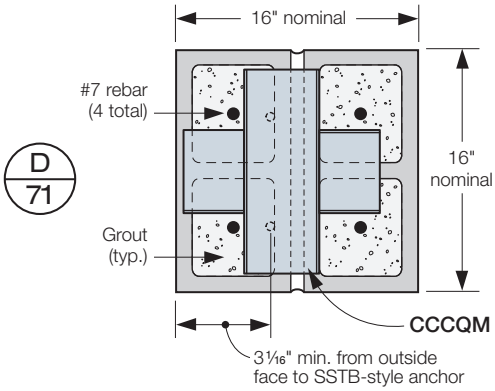
16" Square Grout-Filled CMU Pier



16" Square CMU Shell Filled with 3,000 psi Concrete Pier
(plan view)



16" Square Grout-Filled CMU Pier
(plan view)



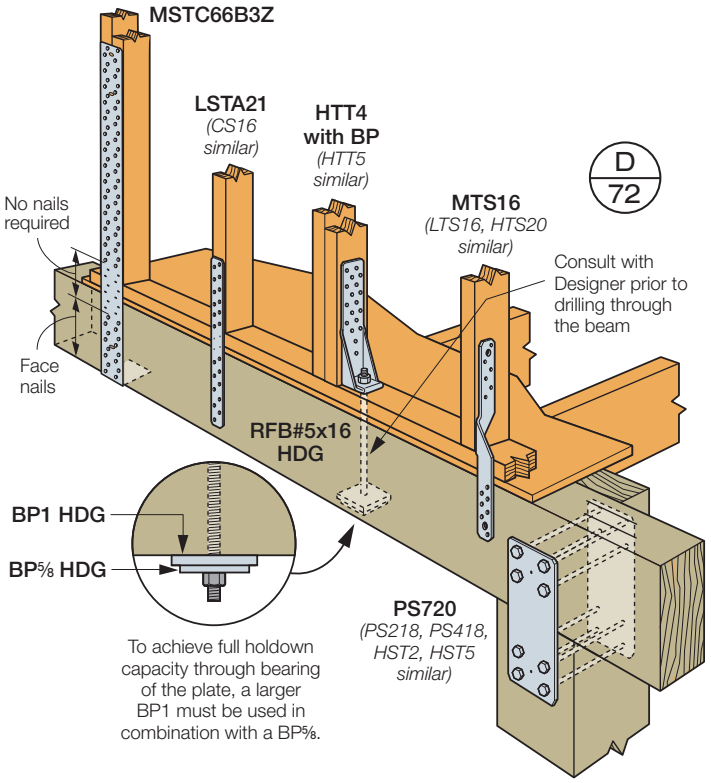
CCCQM Installed on 16" Square Grout-Filled CMU
(plan view)

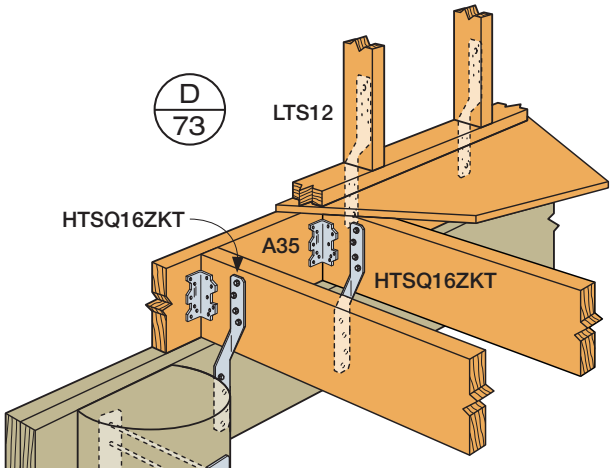
Main channel of CCCQM cannot be centered when installed into 16" grout-filled CMU piers. Layout considerations should be made accordingly.

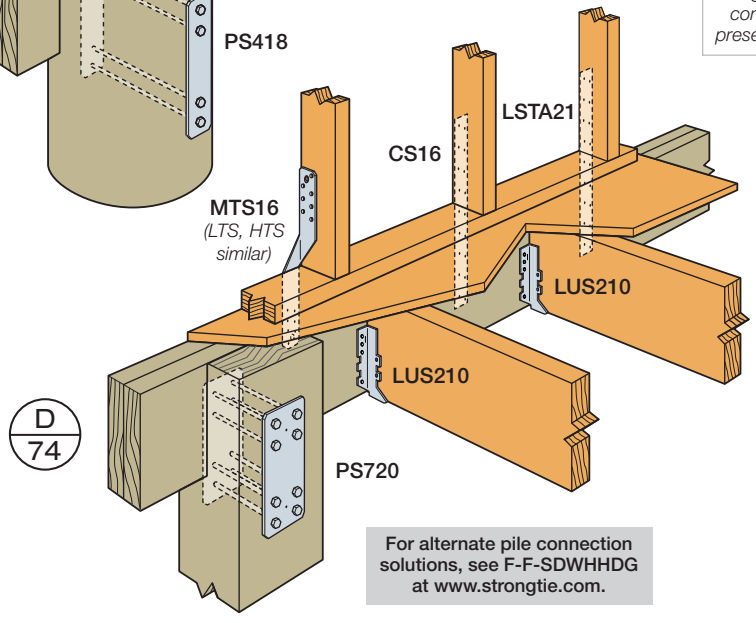
Wall to Pile/Girder

	Model No.	Qty. Req.	DF/SP Allowable Loads		SPF Allowable Loads	
			Fasteners (Total)	Uplift (160)	Fasteners (Total)	Uplift (160)
SS	A35	1	(12) 8dx1½"	450	(12) 8dx1½"	450
SS	LTS12	1	(12) 10dx1½"	720	(12) 10dx1½"	620
SS	LTS16	1	(12) 10dx1½"	720	(12) 10dx1½"	620
	DTT1Z	1	(8) 10dx1½"	910	(8) 10dx1½"	850
SS	MTS12	1	(14) 10dx1½"	1,000	(14) 10dx1½"	860
SS	MTS16	1	(14) 10dx1½"	1,000	(14) 10dx1½"	860
SS	HTSQ16ZKT	1	(8) ¼x1½" SDS	1,145	(8) ¼x1½" SDS	800
SS	HTS20	1	(16) 10dx1½"	1,150	(16) 10dx1½"	990
SS	LSTA21	1	(12) 10d	1,235	(14) 10d	1,160
SS	CS16	1	(20) 10d	1,705	(22) 10d	1,705
SS	DTT2Z	1	(8) ¼x1½" SDS	1,825	(8) ¼x1½" SDS	1,800
	HTT4	1	(18) 10dx1½"	3,610	(18) 10dx1½"	3,105
SS	PS218	2	(4) ¾" MB	4,290	(4) ¾" MB	3,340
SS	PS418	2	(4) ¾" MB	4,330	(4) ¾" MB	3,355
	HTT5	1	(26) 10dx1½"	4,350	(26) 10dx1½"	3,740
	MSTC66B3Z	1	(56) 10d	4,505	(56) 10d	3,875
SS	HST2	2	(6) ⅝" MB	5,220	(6) ⅝" MB	4,835
SS	PS720	2	(8) ½" MB	5,795	(8) ½" MB	5,155
SS	HST5	2	(12) ⅝" MB	10,650	(12) ⅝" MB	9,870

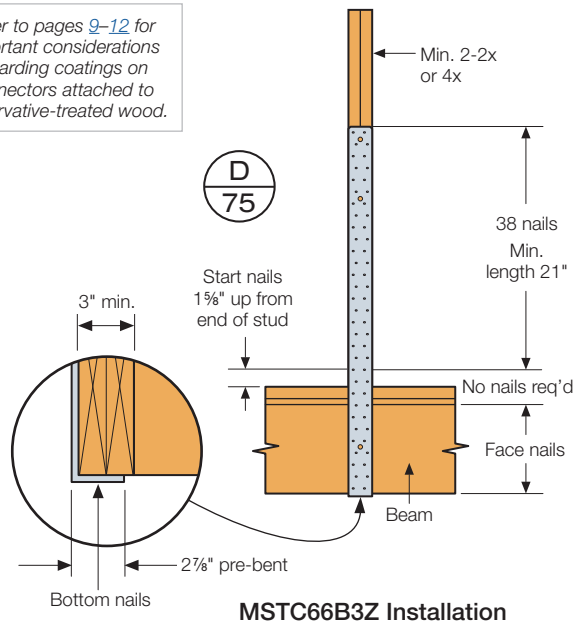
1. Loads are based on 11¼" girder depth. See the current Simpson Strong-Tie® *Wood Construction Connectors* catalog for other options.
2. PS and HST are for pile-to-girder applications only and installed in pairs. Published loads are governed by double shear perp-to-grain bolt calculations using a minimum member thickness of 3½". Alternate values may be calculated per the NDS for other girder and pile widths. Straps must be centered about splice joint, and bolt edge and end distances must meet the NDS minimum requirements.
3. For straight straps, use half the total number of fasteners listed on each member in the connection.
4. Refer to pages 9–12 for corrosion considerations.







Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.



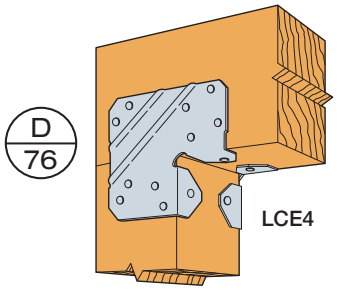
MSTC66B3Z Installation with no Rim Joist
(MSTC66B3 similar)

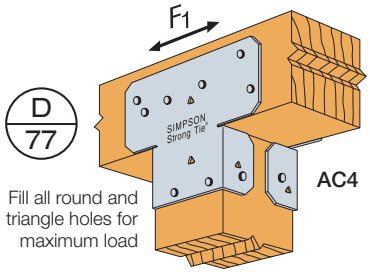
For alternate pile connection solutions, see F-F-SDWHHDG at www.strongtie.com.

Post/Column to Beam

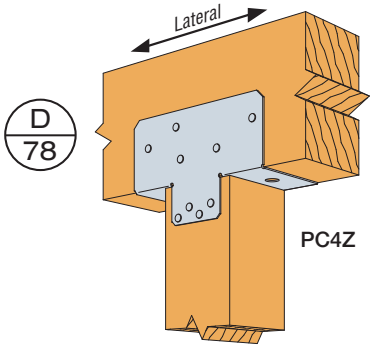
Model No.	Qty. Req.	Fasteners		DF/SP Allowable Loads		SPF Allowable Loads
		Beam	Post	Uplift (160)	Lateral F_1 (160)	Uplift (160)
4x4 POST/COLUMN TO 4x BEAM						
ECCU44	1	(2) ⅝" MB	(2) ⅝" MB	205	—	155
LPC4[2]	2	(8) 10d	(8) 10d	760	325	655
SS BC4	1	(6) 16d	(6) 16d	980	1,000	845
SS AC4 (Min)[2]	2	(12) 16d	(8) 16d	1,430	715	1,230
CC44	1	(2) ⅝" MB	(2) ⅝" MB	1,465	—	—
PC4Z	1	(10) 10d	(8) 10d	1,480	1,260	1,275
EPC4Z	1	(10) 10d	(8) 10d	1,130	1,075	970
SS LCE4[2]	2	(14) 16d	(10) 16d	1,800	1,425	1,545
SS AC4 (Max)[2]	2	(14) 16d	(14) 16d	2,500	1,070	2,150
SS MSTA18	2	(28) 10d	(28) 10d	2,630	—	2,260
ECCQ44-SDS2.5	1	(14) ¼"x2½" SDS	(14) ¼"x2½" SDS	4,040	—	2,910
CCQ44SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	5,680	—	4,090
4x6 POST/COLUMN TO 4x BEAM						
BC46	1	(12) 16d	(6) 16d	980	1,000	840
PC4Z	1	(10) 10d	(8) 10d	1,480	1,260	1,275
EPC4Z	1	(10) 10d	(8) 10d	1,130	1,075	970
CC46	1	(4) ⅝" MB	(2) ⅝" MB	2,800	—	—
ECCQ46-SDS2.5	1	(14) ¼"x2½" SDS	(14) ¼"x2½" SDS	4,040	—	2,910
CCQ46SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	7,145	—	5,145
6x6 POST/COLUMN TO 6x BEAM						
LPC6[2]	2	(8) 10d	(8) 10d	915	490	785
BC6	1	(12) 16d	(12) 16d	1,050	2,000	900
ECCU66	1	(4) ⅝" MB	(2) ⅝" MB	1,165	—	875
SS AC6 (Min)[2]	2	(12) 16d	(8) 16d	1,430	715	1,230
PC6Z	1	(10) 10d	(8) 10d	1,480	1,295	1,275
EPC6Z	1	(10) 10d	(8) 10d	1,435	1,230	1,235
SS LCE4[2]	2	(14) 16d	(10) 16d	1,800	1,425	1,545
SS AC6 (Max)[2]	2	(14) 16d	(14) 16d	2,500	1,070	2,150
CC66	1	(4) ⅝" MB	(2) ⅝" MB	4,040	—	—
ECCQ66-SDS2.5	1	(14) ¼"x2½" SDS	(14) ¼"x2½" SDS	4,040	—	2,910
CCQ66SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	7,145	—	5,145
4x4 POST/COLUMN TO 2 (2x) BEAM						
BCS2-2/4	1	(8) 10d	(6) 10d	780	1,025	670
BCS2-2/4SS	1	(8) 10dSS	(6) 10dSS	575	850	—
PC4Z	1	(10) 10d	(8) 10d	1,480	1,120	1,275
EPC4Z	1	(10) 10d	(8) 10d	1,130	895	970
BCS2-3/6	1	(12) 16d	(6) 16d	800	1,495	690
BCS2-3/6SS	1	(12) 16dSS	(6) 10dSS	525	1,055	—
ECCQ4.62-3.62SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	4,040	—	2,910
CCQ4.62-3.62SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	5,680	—	4,090
4x4 POST/COLUMN TO 3⅛" BEAM						
CC3¼-4	1	(4) ⅝" MB	(2) ⅝" MB	3,640	—	—
ECCQ3-4SDS2.5	1	(14) ¼"x2½" SDS	(14) ¼"x2½" SDS	3,695	—	2,660
CCQ3-4SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	5,680	—	4,090
6x6 POST/COLUMN TO 5⅛" BEAM						
ECCU5¼-6	1	(4) ¾" MB	(2) ¾" MB	2,735	—	1,995
ECCQ5-6SDS2.5	1	(14) ¼"x2½" SDS	(14) ¼"x2½" SDS	5,530	—	3,980
CCQ5-6SDS2.5	1	(16) ¼"x2½" SDS	(14) ¼"x2½" SDS	7,245	—	5,210
CC5¼-6	1	(4) ¾" MB	(2) ¾" MB	7,530	—	—

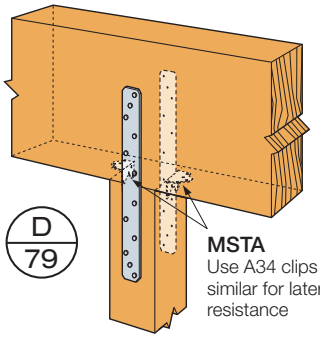
1. "—" in the tables indicates that the product has not been tested in the particular load direction listed.
2. Where noted, connectors must be installed in pairs to achieve listed loads.
3. For end conditions, specify ECCQ or ECCU when heavy column cap required.
4. Straps must use half the total fasteners in each member being connected to achieve the listed loads.
5. For SPF F_1 loads, multiply DF/SP F_1 loads by 0.86.

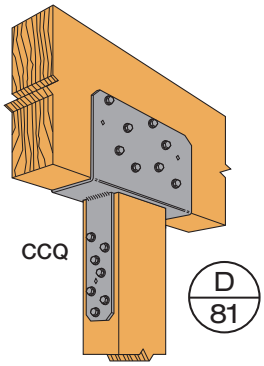


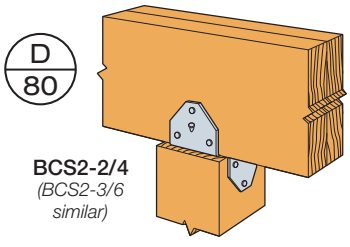


Fill all round and triangle holes for maximum load







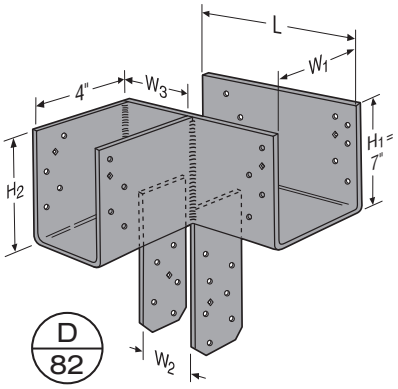


Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

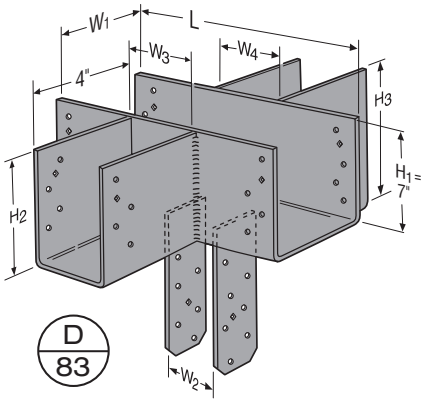
Beam to Corner Post/Column

Series	Allowable Loads				
	Uplift (160)			Download (100)	
	Main Beam	Side Beam	Total[3]	Side Beam	Total
ECCLQ-SDS2.5	2,835	1,840	3,795	6,780	Refer to note #5
CCCQ-SDS2.5	4,780	2,390[2]	4,780	7,000	
CCTQ-SDS2.5	4,910	2,350	5,315	7,000	

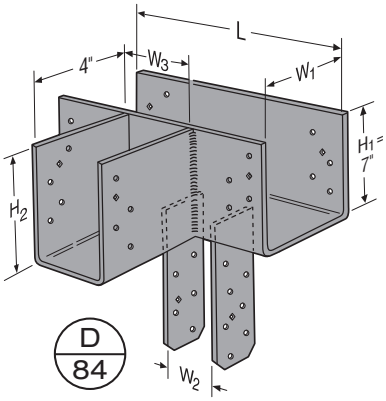
1. Uplift loads have been increased for wind or seismic; reduce where other loads govern. Downloads may not be increased.
2. Allowable load is per seat. Side beams must be loaded symmetrically for the CCCQ.
3. The combined uplift loads applied to all beams in the connector must not exceed the total allowable uplift load listed in the table.
4. The ECCLQ side beam may use a side beam uplift load up to 2,350 lb. The deflection of this load may exceed the standard ⅛" deflection by an additional ⅛".
5. The combined download for all of the carried beams shall not exceed the allowable download for the unmodified product in the current Simpson Strong-Tie® *Wood Construction Connectors* catalog (CCQ load for CCCQ and CCTQ, or ECCQ load for ECCLQ). The download for each side beam shall not exceed the lesser of 35% of the allowable download or 9,265 lb. for the unmodified product.
6. The download to each side beam shall not exceed the allowable load shown, nor 35% of the allowable load for the unmodified product, whichever is lower.
7. Column width in the direction of the beam width must be the same as the main beam width (W_1).
8. Refer to T-CCQLTC-WS for ordering instructions.



ECCLQ-SDS2.5
(Left direction shown)



CCCQ-SDS2.5



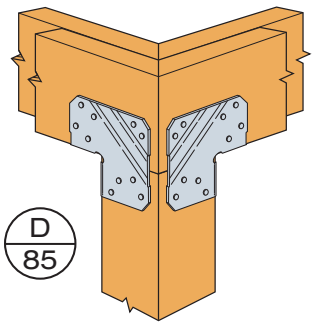
CCTQ-SDS2.5

Model No.	Dimensions (in.)		Total No. of Fasteners		DF/SP Uplift Loads (lb.)	SPF Uplift Loads (lb.)
	W	L	Beam	Post	Total Uplift (160)	Total Uplift (160)
LCE4Z (Mitered Corner)	5⅜	5⅜	(14) 16d	(10) 16d	985	845

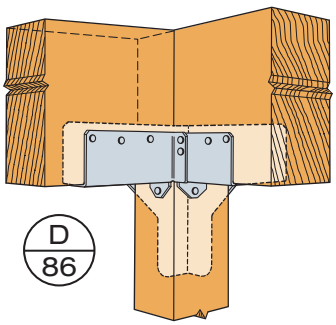
1. The allowable download for the mitered LCE4 connection is limited to bearing of the mitered section on the post and shall be determined by the Designer.
2. Connectors must be installed in pairs to achieve listed loads.

Model No.	Dimensions (in.)		Total No. of Fasteners		DF/SP Uplift Loads (lb.)			SPF Uplift Loads (lb.)		
	W	L	Beam	Post	Side Beam	Main Beam	Total	Side Beam	Main Beam	Total
RTC44[1] (Mitered Corner)	3⅜16	4¾	(16) 16d	(10) 16d	900	900	1,800	775	775	1,550
RTC44[2] (Square Cut)	3⅜16	4¾	(16) 16d	(10) 16d	925	1,230	1,760	795	1,060	1,515

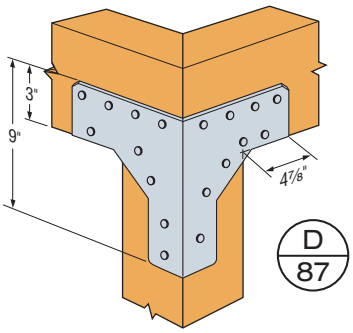
1. The allowable download for the mitered RTC44 connection is limited to bearing of the mitered beams on the post and shall be determined by the Designer.
2. The allowable download for the main beam in the square cut RTC44 connection is limited to bearing of the beam on the post and shall be determined by the Designer. The side beam allowable download is 1,170 lb.
3. The combined uplift loads applied to all beams in the connector must not exceed the total allowable uplift load listed in the table.



Typical LCE4Z Installation
(Mitered Corner)



RTC44 Installation
(Square Cut)



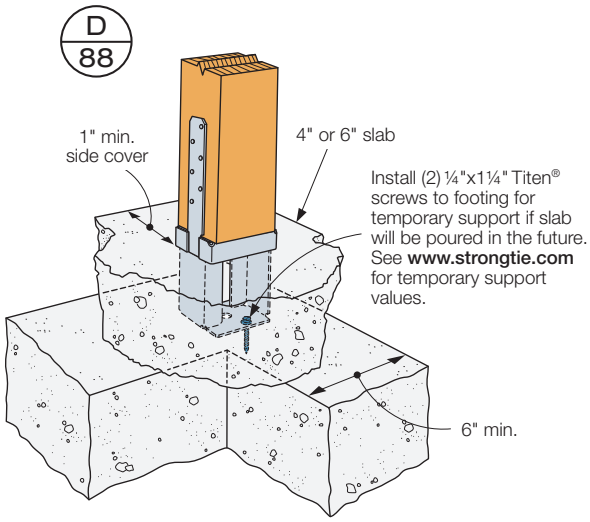
RTC44 Installation
(Mitered Corner)

Post/Column to Foundation

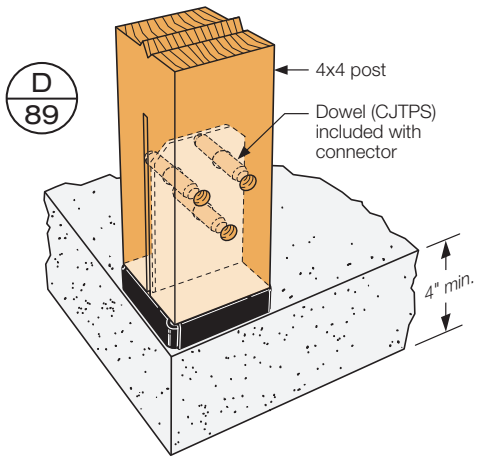
	Model No.[6]	Qty. Req.	Anchor Diameter	Fasteners to Wood	DF/SP Allowable Loads Uplift (160)	SPF Allowable Loads Uplift (160)
	4x4 POST/COLUMN BASES					
	CPT44Z	1	½"	(3) ½"x2¾" dowel	505[7]	505[7]
	ABA44	1	½"	(6) 10d	555	—
	ABW44Z	1	½"	(8) 10d	1,005	
	RPBZ	1	⅜"	(4) ¼"x1½" SDS	1,085	
	PB44	1	Embed	(12) 16d	1,365	—
	PPB44-4Z	1	Embed	(12) 10d	1,480	
	PPB44-6Z	1	Embed	(12) 10d	2,105	
SS	ABU44	1	⅝"	(12) 16d	2,200	—
	RPBZ	2	⅜"	(8) ¼"x1½" SDS	2,235	
	PBS44A	1	Embed	(14) 16d	2,400	—
	HTT4	1	⅝"	(18) 10dx1½"	3,610	3,105
SS	CB44	1	Embed	(2) ⅝" MB	4,200	—
	HTT4	1	⅝"	(18) 16dx2½"	4,235	3,640
	LCB44	1	Embed	(2) ½" MB	4,250	—
	HTT5	1	⅝"	(26) 10dx1½"	4,350	3,740
	CPS4	1	⅝"	(4) 10d	4,490	—
	HTT5	1	⅝"	(26) 10d	4,670	4,015
	HTT5	1	⅝"	(26) 16dx2½"	5,090	4,375
	CBSQ44-SDS2	1	Embed	(14) ¼"x2" SDS	5,335	—
	6x6 POST/COLUMN BASES					
	CPT66Z	1	½"	(3) ½" x 4¾" dowel	580[7]	580[7]
	ABA66	1	⅝"	(8) 16d	720	—
	ABW66Z	1	½"	(12) 10d	1,190	—
	PB66	1	Embed	(12) 16d	1,640	—
SS	ABU66	1	⅝"	(12) 16d	2,300	—
	RPBZ	2	⅜"	(8) ¼"x1½" SDS	2,235	
	PBS66	1	Embed	(14) 16d	3,160	—
	HTT4	1	⅝"	(18) 10dx1½"	3,320	2,855
	PBV6PC	1	⅝"	(4) ¼"x3" SDS	See Note 4	—
SS	CB66	1	Embed	(2) ⅝" MB	4,200	—
	LCB66	1	Embed	(2) ½" MB	4,230	—
	HTT4	1	⅝"	(18) 16dx2½"	4,235	3,640
	HTT5	1	⅝"	(26) 10dx1½"	4,350	3,740
	CPS6	1	⅝"	(4) 10d	4,490	—
	HTT5	1	⅝"	(26) 10d	4,670	4,015
	HTT5	1	⅝"	(26) 16dx2½"	5,090	4,375
	CBSQ66-SDS2	1	Embed	(14) ¼"x2" SDS	6,855	—
	8x8 POST/COLUMN BASES					
	CPT88Z	1	½"	(3) ½" x 4¾" dowel	625[7]	625[7]
SS	ABU88	1	2⅝"	(18) 16d	2,320	—
	CPS7	1	⅝"	(4) 10d	4,490	—
	CB88	1	Embed	(2) ¾" MB	6,650	—

1. ATR—All-Thread Rod or Anchor Bolt. The Designer must specify anchor type, length, and embedment. Refer to the Simpson Strong-Tie® Connector-Anchor Selector web app for guidance on selected products.
2. For multiple holdowns, verify the allowable tension capacity of the wood member.
3. Horizontal bolts and nails shall not be combined on connectors.
4. Allowable uplift for PBV6PC is 3,800 lb. based on a Ponderosa Pine round wood post.
5. For additional anchorage, placement conditions and installation instructions regarding these products, visit **www.strongtie.com**.
6. Additional nominal and rough post base sizes are available. Visit **www.strongtie.com**.
7. Uplift capacity shown is based on corner-flush edge condition using SET-XP® anchoring adhesive with (2) ½"-diameter ATR anchors. Increased capacity is possible with cast-in-place anchorage by Designer or increasing anchorage edge distances. See **www.strongtie.com** for more information.
8. Some of the bases/caps shown on this page and page 39 have been tested to work with hollow columns by Cox and Woodtone. See S-C-23COXHC and S-C-23WDTONE, respectively, for more information.

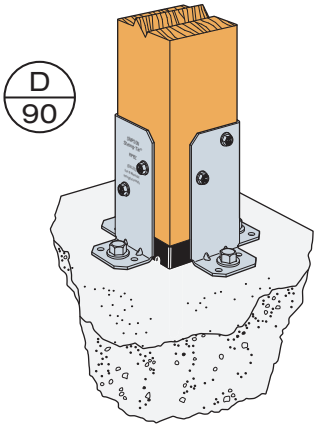
Post bases do not provide adequate resistance to prevent members from rotating about the base and therefore are not recommended for non-top-supported installations such as fences, unbraced carports or a trellis.



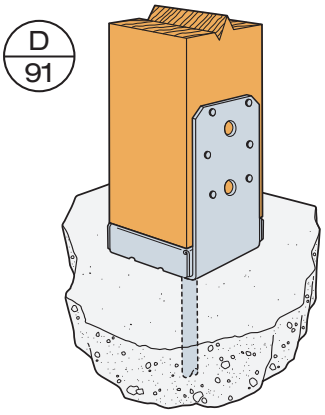
Typical PPB44-4Z Installation
(PPB44-6Z similar)



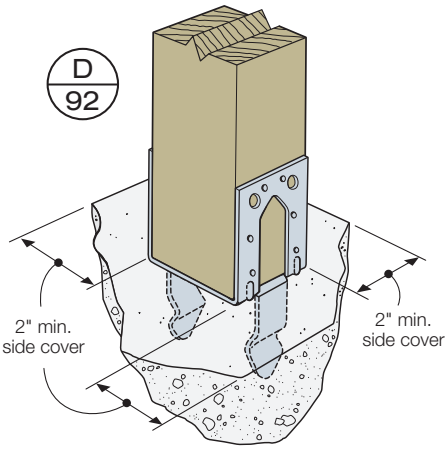
Typical CPT44Z Corner-Flush Edge Installation[7]
(CPT66Z and CPT88Z similar)



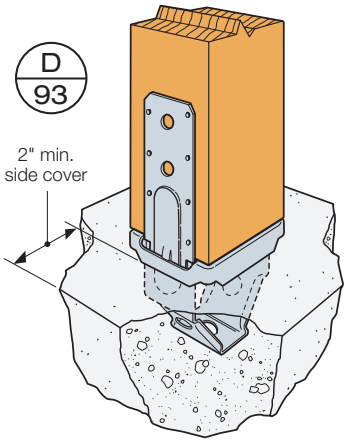
RPBZ Installation with CPS Away from Edge on Concrete



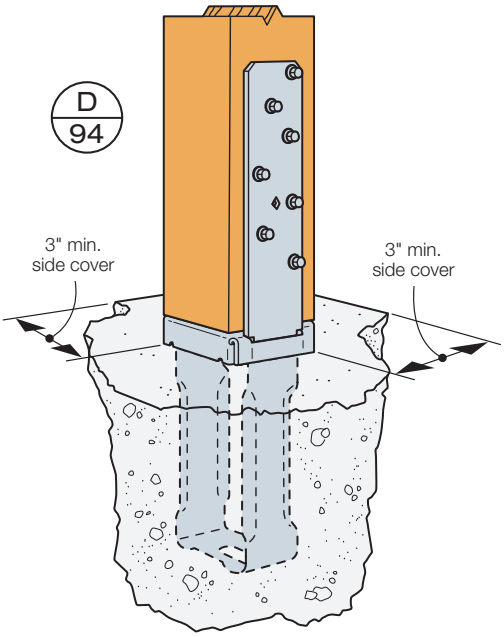
ABU44
(ABU66, ABU88 similar)



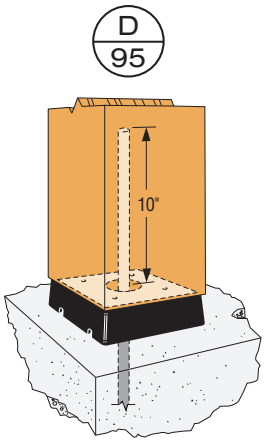
PB44Z
(PB66Z similar)



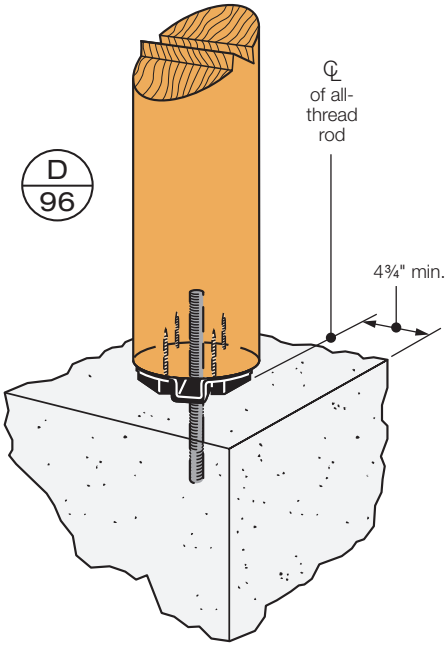
PBS44A



CBSQ44-SDS2
(CBSQ66-SDS2 similar)



CPS4
(CPS6, CPS7 similar)



PBV6PC

Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.

CPS/PBV INSTALLATION:

Post:

- Drill a ¾" diameter hole, 10" into the center of the post.
- Clean out dust. Fill hole halfway with Simpson Strong-Tie® SET epoxy anchoring adhesive.
- Insert all-thread rod and allow epoxy to set and cure.
- Secure standoff to post using (4) 10d nails except PBV, which uses (4) Simpson Strong-Tie Strong-Drive® SDS Heavy-Duty Connector screws.

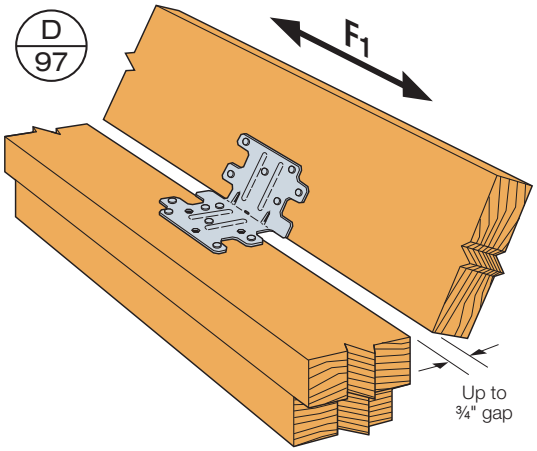
Concrete:

- Drill a ¾" diameter hole per anchor design.
- Prepare anchor site per instructions on anchoring adhesive package, or refer to pages 124–127 of the *Anchoring and Fastening Systems for Concrete and Masonry* catalog (C-A-2016).
- Fill hole at least halfway with SET epoxy anchoring adhesive, insert post subassembly into hole and allow to cure per cure schedule on adhesive packaging.
- 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).

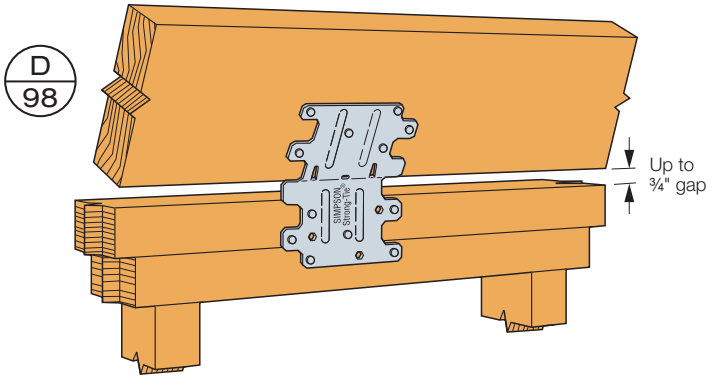
Roof Boundary Connection

Model No.	Type of Connection	Bending Angle	Fasteners		DF/SP Allowable Loads	SPF Allowable Loads
			To Wall	To Blocking	Lateral (F_1) (160)	Lateral (F_1) (160)
RBC	1	45° to 90°	(6) 10dx1½"	(6) 10dx1½"	445	380
	2	< 30°	(6) 10dx1½"	(6) 10dx1½"	435	375
		30° to 45°	(6) 10dx1½"	(6) 10dx1½"	480	415
	3	0° to 45°	(3) ¼"x2¼" Titen[4]	(6) 10dx1½"	350	350

1. Allowable loads are for one anchor attached to blocking minimum 1½" thick.
2. RBC can be installed with up to ¾" gap and achieve 100% of the listed load.
3. Allowable loads have been increased for wind or earthquake loading with no further increase allowed. Reduce where other loads govern.
4. When attaching to concrete, use (3) ¼"x1¾" Titen® screws.
5. RBC installed over 1" foamboard has a load of 395 lb. (160) in a parallel-to-wall (F_1) load direction for Douglas Fir. For SPF, the load is 340 lb.
6. RBC may be installed over ½" structural sheathing using 10dx1½" nails with no load reduction.
7. Refer to flier F-C-RBC for additional information.

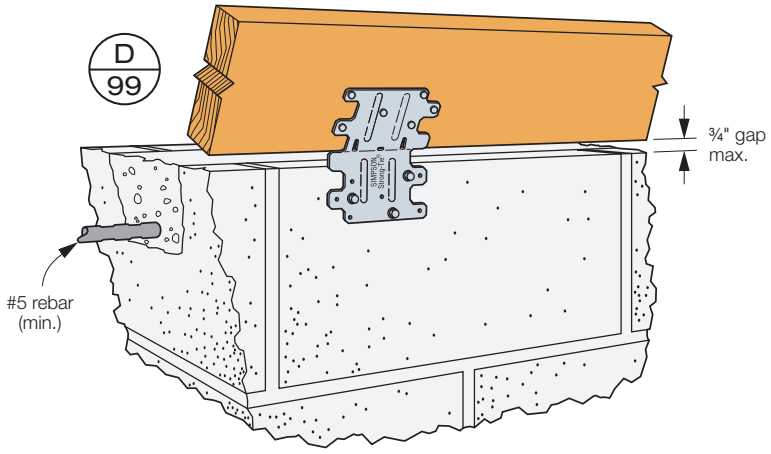


1 Typical RBC Installation



2 Typical RBC Installation

TITEN® SCREW WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use this product in dry and noncorrosive environments only, provide moisture barrier, or use a stainless-steel fastener. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie® Titen® installation tool kit (Part TTNT01); it has a bit that is designed to reduce the potential for overtightening the screw.

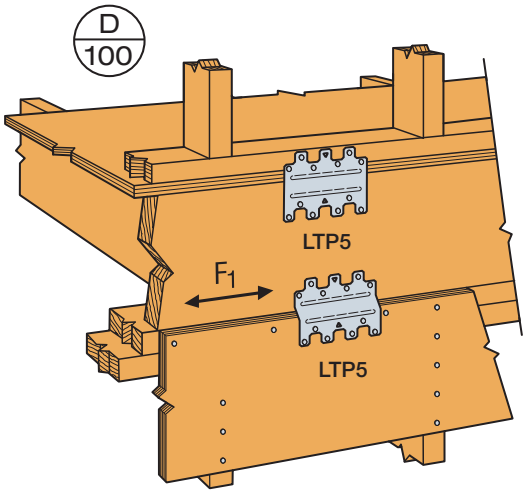


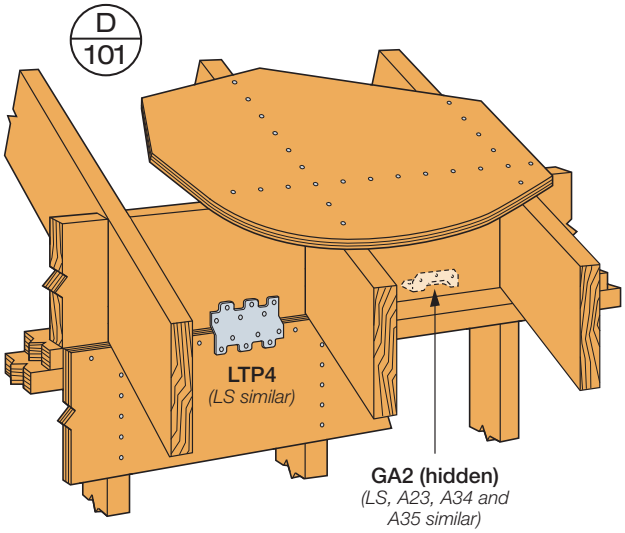
3 Typical RBC Installation to CMU Block

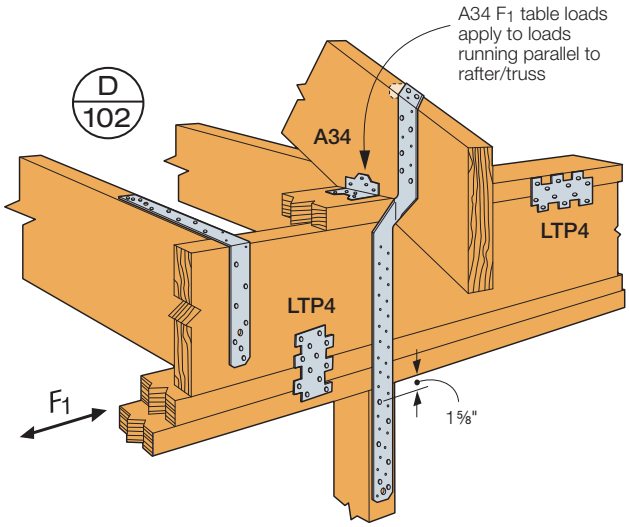
Lateral Load

	Model No.	Qty. Req.	Fasteners (Total)	DF/SP Allowable Loads F_1 (160)	SPF Allowable Loads F_1 (160)
SS	LS30	1	(6) 10dx1½"	325	280
	GA1	1	(4) 10dx 1½"	330	285
SS	LS30	1	(6) 10d	395	340
SS	A35	1	(6) SPAX #6x1½ to sheathing (6) 8dx1½" to framing	425	365
SS	A34	1	(8) 8dx1½"	515	445
	GA2	1	(6) 10dx1½"	550	475
SS	A23	1	(8) 10dx1½"	565	485
SS	LS50	1	(8) 10dx1½"	565	485
	LTP5	1	(12) 8dx1½"	620	535
SS	LS70	1	(10) 10dx1½"	640	550
	LTP4	1	(12) 8dx1½"	670	575
SS	A35	1	(12) 8dx1½"	695	600
SS	LS50	1	(8) 10d	730	630
SS	LS90	1	(12) 10dx1½"	845	725
SS	LS70	1	(10) 10d	915	785
SS	LS90	1	(12) 10d	1,040	895

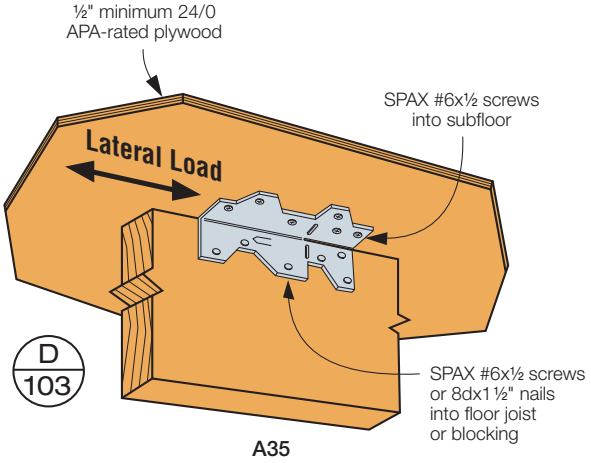
1. LTP4 can be installed over ⅜" wood structural panel sheathing with 8dx1½" nails and achieve 72% of the listed load, or over ½" and achieve 64% of the listed load. 8d commons will achieve 100% load.
2. The LTP5 may be installed over wood structural panel sheathing up to ½" thick using 8dx1½" nails with no reduction in load.







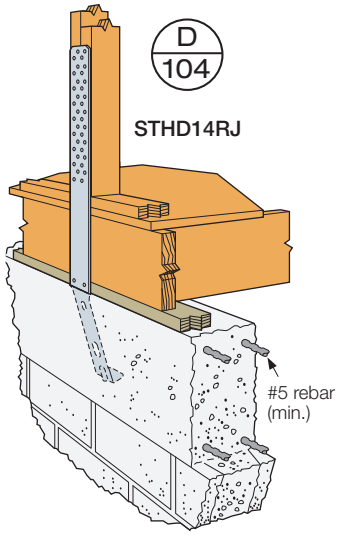
Simpson Strong-Tie has tested the performance of A35 framing angles installed with SPAX 0.138 pan-head, unidrive wood screws (approx. 0.138" diameter x ½" long, Simpson Strong-Tie® Model No. SPAX #6x½-R200) in lieu of 8dx1½" nails, as specified in the *Wood Construction Connectors* catalog. Each leg of the A35 was attached to ½" 24/0 APA-rated plywood sheathing with the SPAX 0.138 pan-head, unidrive wood screws.

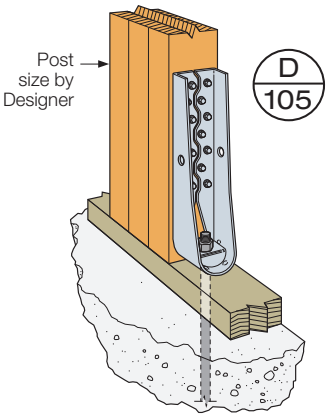


Holdowns

	Model No.	Qty. Req.	Anchor Diameter (in.)	Min. Wood Member Thickness[1] (in.)	Fasteners (Stud)	DF/SP Allowable Loads Uplift (160)	SPF Allowable Loads Uplift (160)
	DTT1Z	1	⅜	1½	(8) 10dx1½"	910	850
SS	DTT2Z[8]	1	½	3	(8) ¼"x1½" SDS	2,145	1,835
	LSTHD8/STHD8RJ	1	Embed	—	(20) 16d Sinkers	2,700[2,10]	2,700[2,10]
	HDU2-SDS2.5	1	⅝	3	(6) ¼"x2½" SDS	3,075	2,215
	HD3B	1	⅝	3	(2) ⅝" MB[6]	3,130	3,050
	HTT4	1	⅝	3	(18) 10dx1½"	3,610	3,105
SS	HD5SS[12]	1	⅝	3	(2) ⅝" MB[6]	3,850	3,275
	STHD10/STHD10RJ	1	Embed	—	(24) 16d Sinkers	4,120[3,10]	4,120[3,10]
	HTT4	1	⅝	3	(18) 16dx2½"	4,235	3,640
	HTT5	1	⅝	3	(26) 10dx1½"	4,350	3,740
	HD5B	1	⅝	3	(2) ¾" MB[6]	4,505	3,785
	HDU4-SDS2.5	1	⅝	3	(10) ¼"x2½" SDS	4,565	3,285
	HTT5	1	⅝	3	(26) 10d	4,670	4,015
	HTT5	1	⅝	3	(26) 16dx2½"	5,090[11]	4,375[11]
	STHD14/STHD14RJ	1	Embed	—	(30) 16d Sinkers	5,345[4,10]	5,345[4,10]
	HTT5KT	1	⅝	3	(26) #10x2½" SD	5,445	5,360
	HDU5-SDS2.5	1	⅝	3	(14) ¼"x2½" SDS	5,645	4,065
SS	HD7SS[12]	1	⅞, 1	3	(3) ⅞" MB[6]	6,480	5,510
	HD7B	1	⅞	3	(3) ¾" MB[6]	6,645	5,650
	HDU8-SDS2.5	1	⅞	4½	(20) ¼"x2½" SDS	7,870	5,665
	HDQ8-SDS3	1	⅞	4½	(20) ¼"x3" SDS	9,230	6,645
	HDC10/22-SDS2.5	1	⅞	3	(24) ¼"x2½" SDS	9,665	8,425
	HD9B	1	⅞	4½	(3) ⅞" MB[6]	9,920	8,435
SS	HHDQ11SS-SDS2.5SS[12]	1	1	5½	(24) ¼"x2½" SDS	10,385	7,480
	HDU11-SDS2.5	1	1	7¼	(30) ¼"x2½" SDS	11,175	8,045
SS	HD9SS[12]	1	⅞, 1	4½	(3) 1" MB[6]	12,100	10,285
	HDU14-SDS2.5[9]	1	1	7¼	(36) ¼"x2½" SDS	14,375[9]	10,435[9]
	HD19	1	1¼	7¼	(5) 1" MB[6]	19,360	15,270

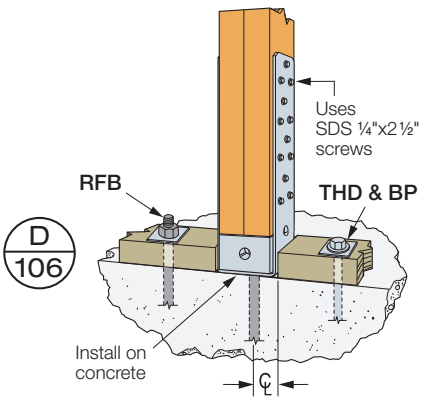
1. See the current Simpson Strong-Tie® *Wood Construction Connectors* catalog for load values based on different wood thickness. Post design by Specifier.
2. Where noted in table, load listed is for 6" or 8" stemwall corner condition with ½" min. edge distance into non-cracked 2,500 psi concrete. For midwall condition, allowable load is 3,115 lb. for 6" or 8" stemwall. For end-of-wall condition, allowable load is 1,690 lb. for 6" stemwall (2,230 lb. for 8" stemwall).
3. Where noted in table, load listed is for 8" stemwall corner condition with ½" min. edge distance into non-cracked 2,500 psi concrete. For midwall condition, allowable load is 4,755 lb. For end-of-wall condition, allowable load is 3,145 lb. See the current *Wood Construction Connectors* catalog for 6" stemwall loads.
4. Where noted in table, load listed is for 8" stemwall corner or midwall condition with ½" min. edge distance into non-cracked 2,500 psi concrete. For end-of-wall condition, allowable load is 4,470 lb. See the current *Wood Construction Connectors* catalog for 6" stemwall loads.
5. ATR—All-Thread Rod or Anchor Bolt. The Designer must specify anchor type, length, and embedment. Refer to technical bulletin T-ANCHORSPEC for guidance on selected products.
6. Lag bolts will not develop the listed loads.
7. STHD straps may be installed over ½" maximum wood structural panel sheathing. Installing STHD with StrapMate® strap holder reduces the possibility of concrete spalling.
8. For stainless steel, order DTT2SS.
9. HDU14 requires heavy hex anchor nut to achieve tabulated loads (supplied with holdown).
10. For further clarification on midwall, end-of-wall and corner conditions, reference the current *Wood Construction Connectors* catalog.
11. Allowable load for HTT5 with a BP⅝-2 bearing plate washer installed in the seat of the holdown is 5,295 lb. for DF/SP and 4,555 lb. for SPF/HF.
12. For more stainless-steel holdown load options as dictated by anchor diameter, wood member thickness and other factors, please reference L-C-SSHD15 at **www.strongtie.com**.



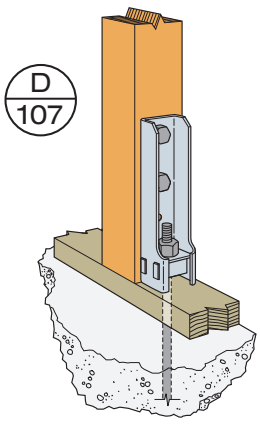


HDU5
(HDU2, HDU8, HDU11 and HDU14 similar)

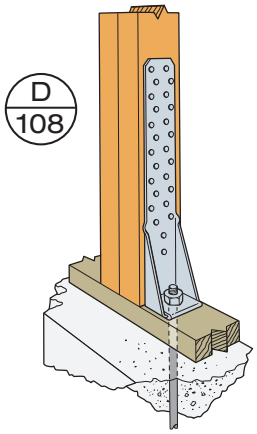
Refer to pages 9–12 for important considerations regarding coatings on connectors attached to preservative-treated wood.



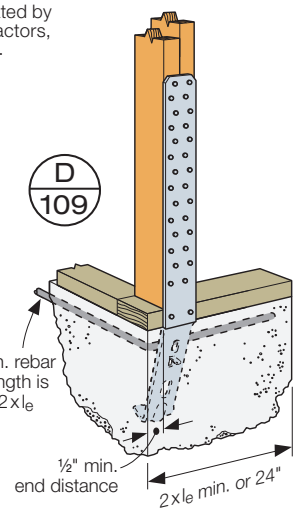
Typical HDC Installation with (2) 2x4 Studs



HD5B
(HD7B, HD9B similar)



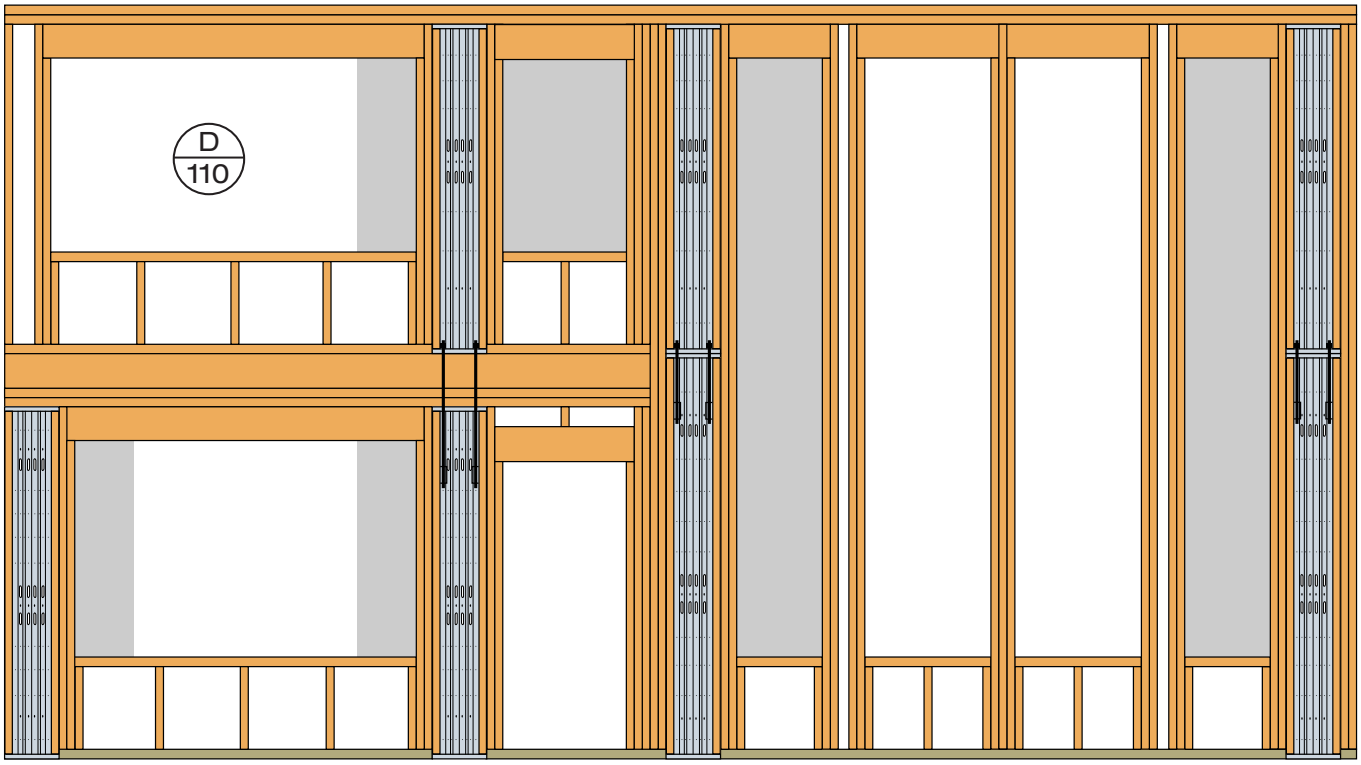
HTT5
(HTT4 similar)



Typical STHD Corner Installation

Strong-Wall® Shearwalls

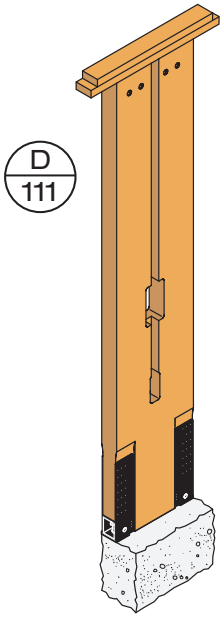
Simpson Strong-Tie® Strong-Wall® shearwalls provide design flexibility while offering high lateral-load capacities that are required in some building designs. Strong-Wall shearwall solutions increase the amount of allowable window opening space by 48% when compared to wider, site-built shearwalls with the same capacity. The gray areas below represent window openings made possible by Strong-Wall shearwalls.



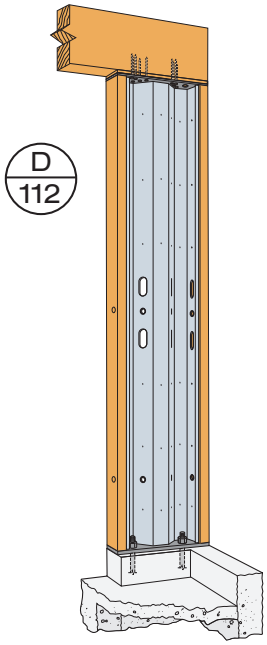
Uplift connectors not shown for clarity

Broad Variety of Shearwall Solutions

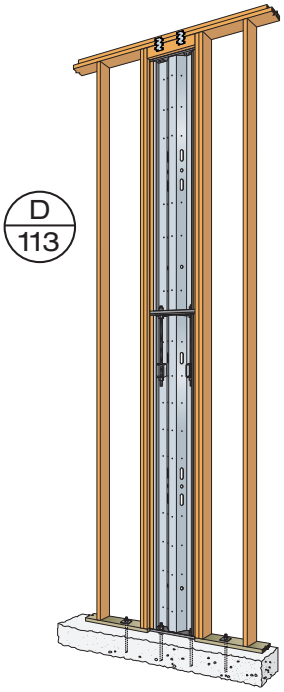
The Steel Strong-Wall and Strong-Wall SB shearwall solutions combine superior performance with ease of installation for maximum design flexibility. For in-depth information about Strong-Wall shearwalls, visit **www.strongtie.com**.



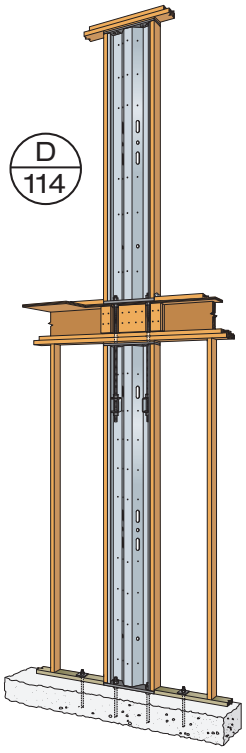
Strong-Wall SB for Standard and Balloon-Framing Applications



Garage Front Application
(Full-height and portal-frame options available)



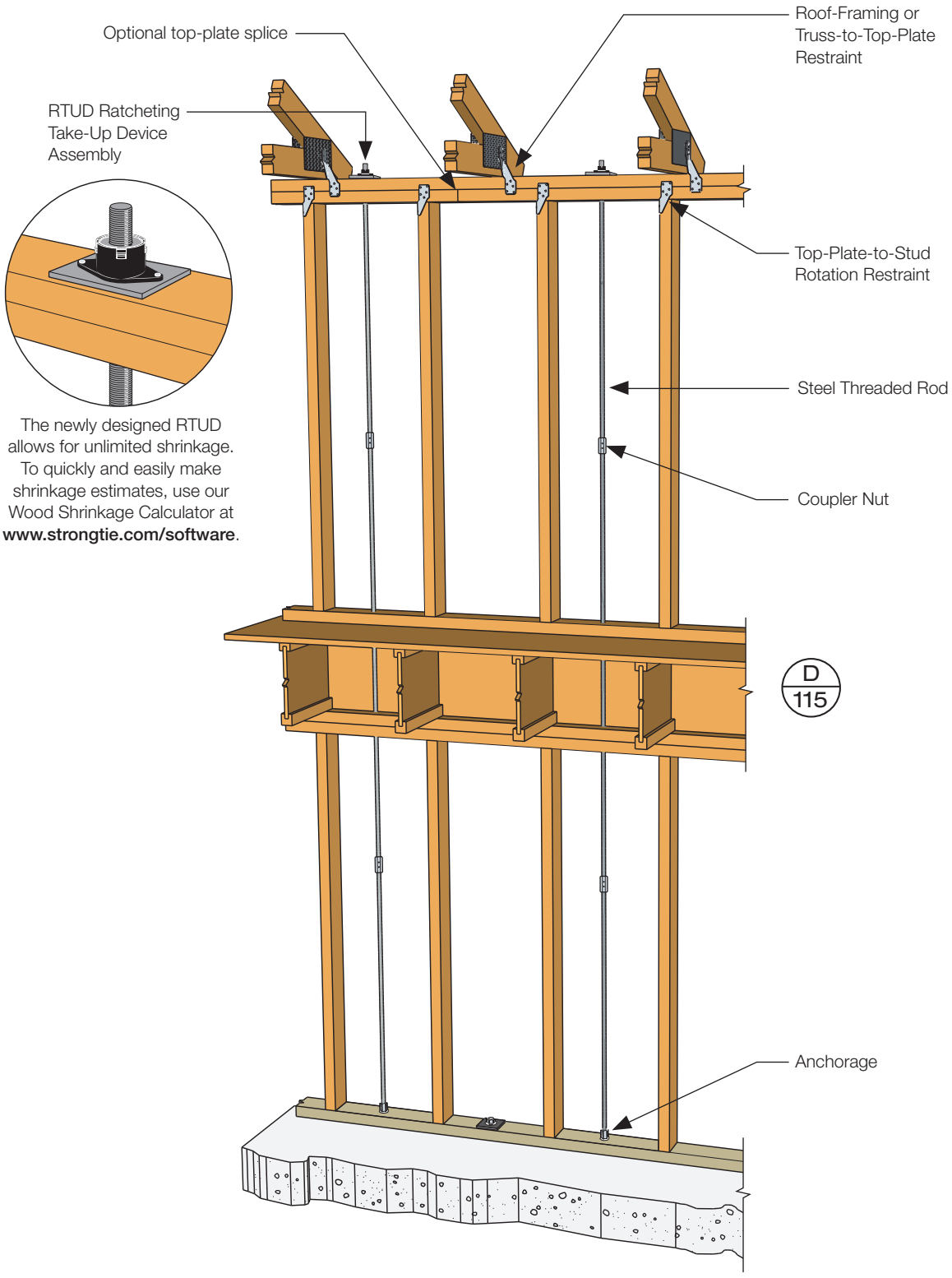
Balloon-Framing Applications up to 20'



Two-Story Stacked-Wall Applications

Strong-Rod™ Uplift Restraint System

The Simpson Strong-Tie® Strong-Rod™ Uplift Restraint System for roofs (Strong-Rod URS) is a continuous rod tiedown solution designed to provide a complete load path to resist suction (uplift) pressure on the roof. After hurricane ties transfer roof uplift forces into the uppermost top plates in a wood-frame structure, a Strong-Rod URS continues to transmit that resistance down to the foundation or final termination point. Visit **www.strongtie.com/srs** for more information.



The newly designed RTUD allows for unlimited shrinkage. To quickly and easily make shrinkage estimates, use our Wood Shrinkage Calculator at **www.strongtie.com/software**.

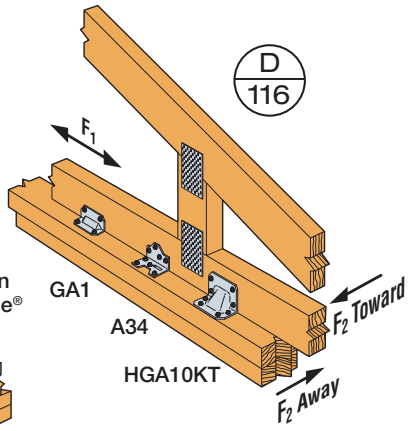
Gable End to Wall Framing

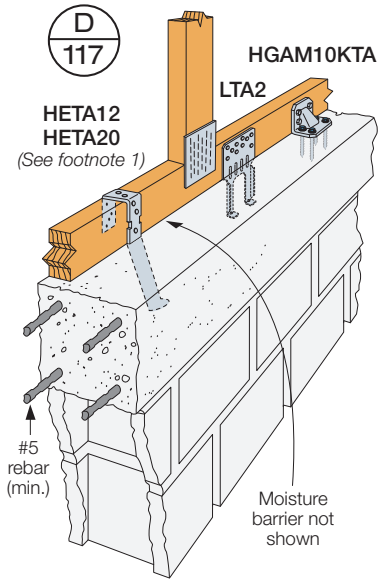
	Model No.	Fasteners (Total)	DF/SP Allowable Loads				SPF Allowable Loads			
			Uplift	Parallel to End of Wall (F_1)	Perp. to End of Wall Toward Anchor (F_2)	Perp. to End of Wall Away from Anchor (F_2)	Uplift	Parallel to End of Wall (F_1)	Perp. to End of Wall Toward Anchor (F_2)	Perp. to End of Wall Away from Anchor (F_2)
			(160)	(160)	(160)	(160)	(160)	(160)	(160)	(160)
	SHEAR CONNECTIONS									
	LTP4	(12) 8dx1½"	—	670	—	—	—	575	—	—
	LTP5	(12) 8dx1½"	—	620	—	—	—	535	—	—
SS	A34	(8) 8dx1½"	—	515	455	—	—	340	390	—
SS	A34	(8) SD9x1½"	240	640	495		170	550	425	
SS	A35	(12) 8dx1½"	—	695	670	—	—	450	575	—
	END-OF-WALL CONNECTIONS (CONCRETE/MASONRY)									
	HGAM10KTA	(4) ¼"x1½" SDS (4) ¼"x2¾" Titen[6]	850	1,005	1,165	680	610	725	795	530
	RBC	(3) ¼"x2¼" Titen[6] (6) 10dx1½"	—	350	—	—	—	350	—	—
	LTA2	(10) 10dx1½"	1,390[7]	950	220	220	1,015	800	220	220
	HETA12[1]	(7) 10dx1½"	1,515[8]	65	85	85	1,210	55	75	75
	HETA20[1]	(12) 10dx1½"	1,810	730	335	335	1,810	625	215	215
	END-OF-WALL CONNECTIONS (WOOD)									
	HGA10KT	(4) ¼"x1½" SDS	695	1,165	940	780	500	840	675	495
	RBC	(4) ¼"x3" SDS	—	445	—	—	—	380	—	—
	LSTA15	(6) 10dx1½"	—	—	—	485	—	—	—	415
	LSTA18	(6) 10d	—	—	—	645	—	—	—	555
	LSTA21	(8) 10d	—	—	—	965	—	—	—	830
	LSTA24	(12) 10d	—	—	—	965	—	—	—	830
	LSTA30	(12) 10d	—	—	—	1,305	—	—	—	1,125

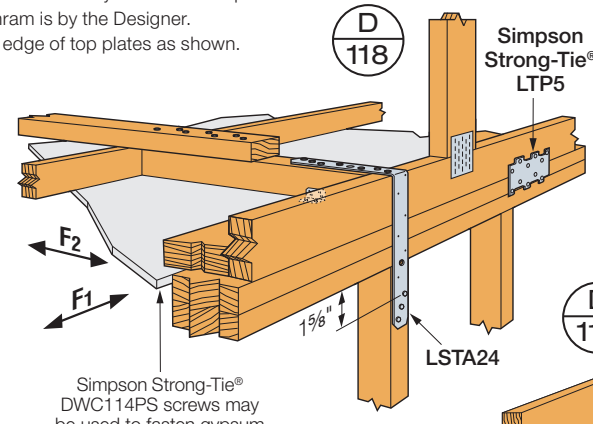
1. HETA will require a 30° bend and a 4" minimum embedment depth in a concrete tie beam only.
2. Refer to Prescriptive Standards for spacing and construction of assembly shown in detail D118.
3. Straps must use half the total fasteners into each member being connected to achieve the listed loads.
4. LTP4 can be installed over ⅜" wood structural panel sheathing with 8dx1½" nails and achieve 72% of the listed load, or more than ½" and achieve 64% of the listed load. 8d commons will achieve 100% load.
5. The LTP5 may be installed over wood structural panel sheathing up to ½" thick using 8dx1½" nails with no reduction in load.
6. For concrete applications use ¼"x1¾" Titen® screws.
7. LTA2 allowable uplift listed in table is based on SP lumber. Uplift load on DF is 1,210 lb.
8. HETA12 allowable uplift listed in table is based on SP lumber. Uplift load on DF is 1,400 lb.

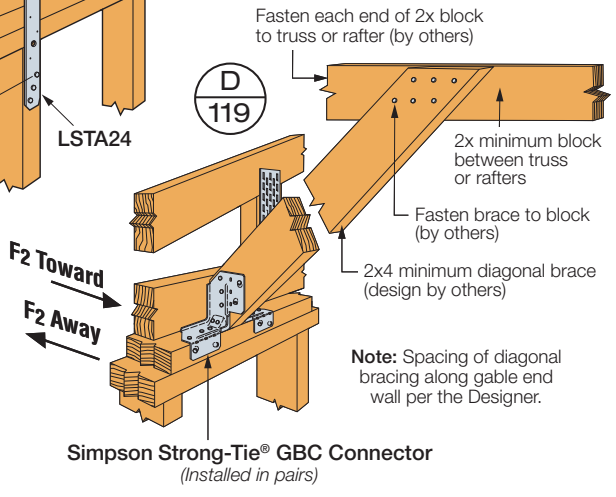
Model No.	Qty. Req.	Fasteners per Connector		DF/SP Allowable Loads (160) Perpendicular to End of Wall (F_2)				SPF Allowable Loads (160) Perpendicular to End of Wall (F_2)			
				Toward Anchors		Away from Anchors		Toward Anchors		Away from Anchors	
		Gable Brace	Top Plates	Gable Brace Angle		Gable Brace Angle		Gable Brace Angle		Gable Brace Angle	
				40°-45°	46°-60°	40°-45°	46°-60°	40°-45°	46°-60°	40°-45°	46°-60°
GBC	2	(5) 8dx1½"	(7) 8d	635	570	425	325	535	480	355	275

1. For 1¾"x3½" (or larger) LVL gable brace, the allowable load at 40° to 45° is 635 lb. toward anchors, 515 lb. away from anchors.
2. Use minimum 2x4 gable brace. Larger members may be used or required.
3. Connection of gable brace to roof diaphram is by the Designer.
4. Gable brace should be flush with inside edge of top plates as shown.





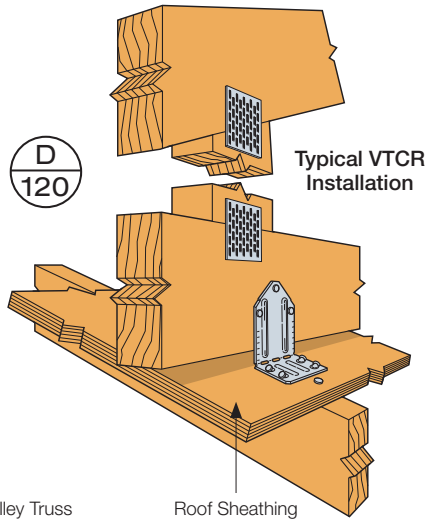


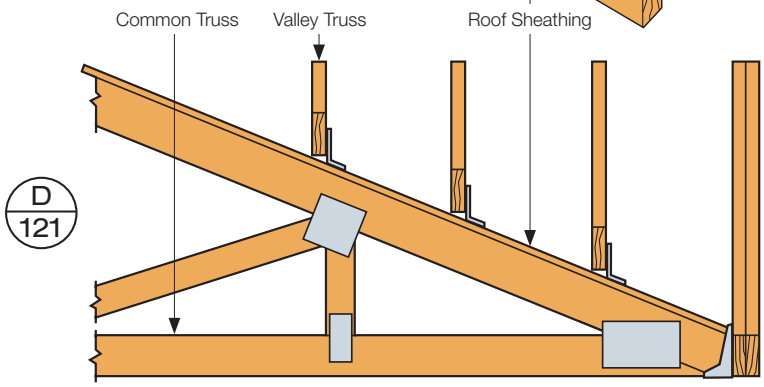


Valley Truss to Roof Framing

Model No.	Fasteners		Supporting Roof Pitch	DF/SP Allowable Loads		SPF/HF Allowable Loads	
	Supporting Framing	Valley Truss		Uplift[2] (160)	Download[4] (100/115/125/160)	Uplift[2] (160)	Download[5] (100/115/125/160)
VTCR	(4) 10d	(3) 10dx1½"	< 4/12	370	790	320	655
			4/12 to 12/12	370	790	320	655
	(4) #9x2½" SD	(3) #9x1½" SD	< 4/12	390	790	335	655
			4/12 to 12/12	500	790	430	655

1. Loads are based on installation over 7⁄16" or 15⁄32" sheathing. For installation over 19⁄32" or 5⁄8" sheathing, allowable uplift loads are 285 lb. (DF/SP) and 245 lb. (SPF/HF) when installed with nails, or 370 lb. (DF/SP) and 320 lb. (SPF/HF) when installed with screws.
2. When attached directly to the supporting framing with either screws or nails, the allowable uplift for pitches less than 4:12 is 240 lb. (DF/SP) and 205 lb. (SPF/HF). For pitches 4:12 to 12:12, use the tabulated uplift loads.
3. Allowable uplift loads are based on the lower of the test loads at 3⁄16" deflection or the ultimate load divided by 3.
4. Southern Pine allowable download is 750 lb.
5. Hem Fir allowable download is 625 lb.
6. When the valley truss and supporting framing are of different species, use the lower tabulated values.



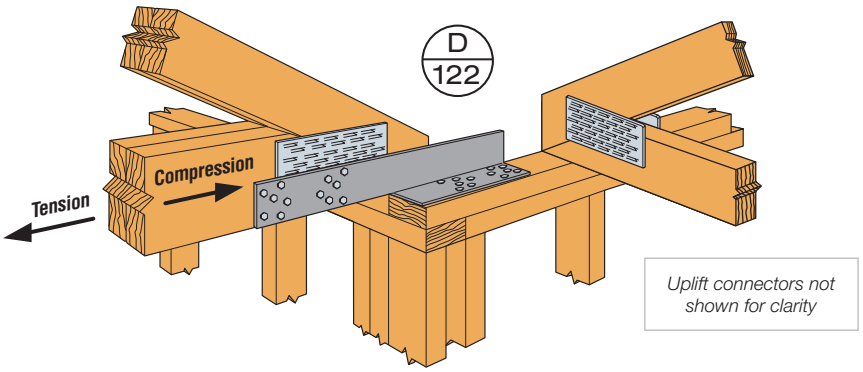


Typical VTCR Installation – Side View

Drag Strut Connection

Model No.	L (in.)	Fasteners	DF/SP Allowable Loads		SPF/HF Allowable Loads	
			Compression (160)	Tension (160)	Compression (160)	Tension (160)
DSC2R/L-SDS3	16	(20) ¼"x3" SDS	2,590	3,720	1,865	2,680
DSC5R/L-SDS3	21	(24) ¼"x3" SDS	4,745	5,925	3,415	4,265

1. Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screws' minimum penetration is 2¾", minimum end distance is 2½" for DSC2 and 3¾" for DSC5 and minimum edge distance is ⅝" for full load values.
2. Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws are permitted to be installed through metal truss plates as approved by the Truss Designer, provided the requirements of ANSI/TPI 1-2007 Section 7.5.3.4 are met (pre-drilling required through the plate using a maximum of 5⁄32" bit). When installing fasteners through truss plates that will extend out past the back face of the member, care must be taken to ensure that the fastener does not push the truss plate out on the back face.



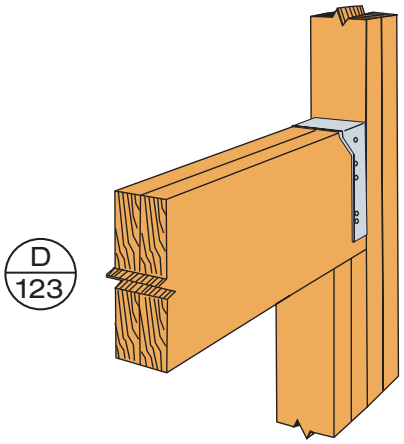
DSC5-SDS3
(DSC2-SDS3 similar)
(Right-hand DSC shown; specify right or left hand when ordering)

Hanger Uplift Considerations

- Combine loads by inverting the proper size and type of Simpson Strong-Tie® connectors in a girder, truss or beam connection, as shown below, to obtain additional uplift loads.
- In a combined installation of an inverted connector with a standard connector, all the component uplift and downloads can be added together (as shown in the example below with HGUS26-2 hangers) to obtain higher load values.
- Allowable loads shown are based on the lesser of either National Design Specification (NDS) calculations or the results of static load tests.
- Other hanger and connector options than those shown can be used as specified by the Designer.

Model No.	Fasteners		DF/SYP Allowable Uplift Loads
	Header	Joist	(160)
HUC26-2[1]	(12) 16d	(6) 10d	2,700
HUC28-2[1]	(14) 16d	(6) 10d	3,040
HUC210-2[1]	(18) 16d	(10) 10d	4,100

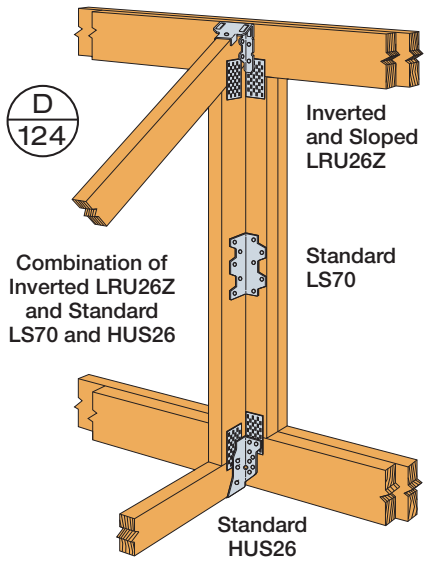
1. Values based on an inverted hanger installation.
2. Loads include a 60% increase for wind loading with no further increases allowed.
3. Table values also apply to triple 2x and 4x HUC models with the same nailing pattern.
4. Download assumed to be carried by jack studs.



Combined-Connector Example

Model No.	Fasteners		DF/SYP Allowable Loads			
	Header	Joist	Uplift Loads	Downloads		
			(160)	Snow (115)	Roof (125)	Roof (160)
LRU26Z[1]	(4) 16d	(5) 16d	1,360	880	880	880
LS70	(5) 10d	(5) 10d	915	675	730	915
HUS26	(14) 16d	(6) 16d	1,550	3,095	3,335	3,335
Combined Total Load[3]			3,825	4,650	4,945	5,130

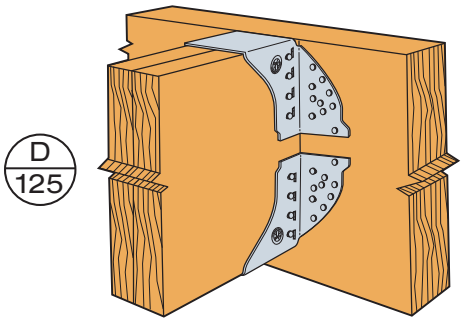
1. Values based on an inverted hanger installation.
2. Where (160) is noted, loads include a 60% increase for wind loading with no further increases allowed.
3. Combined Total Load is based on the combined results of individual connector allowable loads. The Designer shall determine if using the combined total load is appropriate.
4. Other connectors can be used for this application per the Designer.



Combined-Hanger Example

Model No.	Fasteners		DF/SYP Allowable Loads			
	Header	Joist	Uplift Loads	Downloads		
			(160)	Snow (115)	Roof (125)	Roof (160)
HGUS26-2	(20) 16d	(8) 16d	2,155	4,875	5,230	5,575
HGUS26-2[1]	(20) 16d	(8) 16d	5,575	2,155	2,155	2,155
Combined Total Load			7,730	7,030	7,385	7,730

1. Values based on an inverted hanger installation.
2. Where (160) is noted, loads include a 60% increase for wind loading with no further increases allowed.
3. Other hangers can be used for this application. Contact Simpson Strong-Tie for load information.

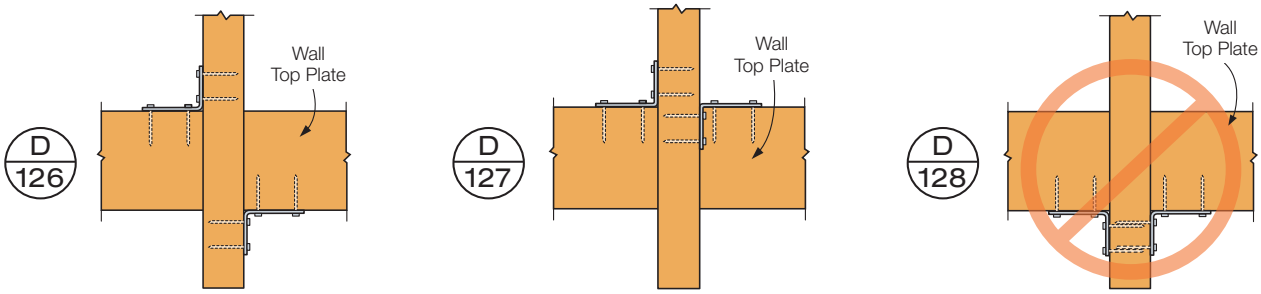


Combination of Inverted and Standard HGUS26-2

Load Path Installation Considerations

Hurricane Tie Installations to Achieve Twice the Load (Top View)

Both connectors shall be same model.



Install diagonally across from each other for minimum 2x truss.

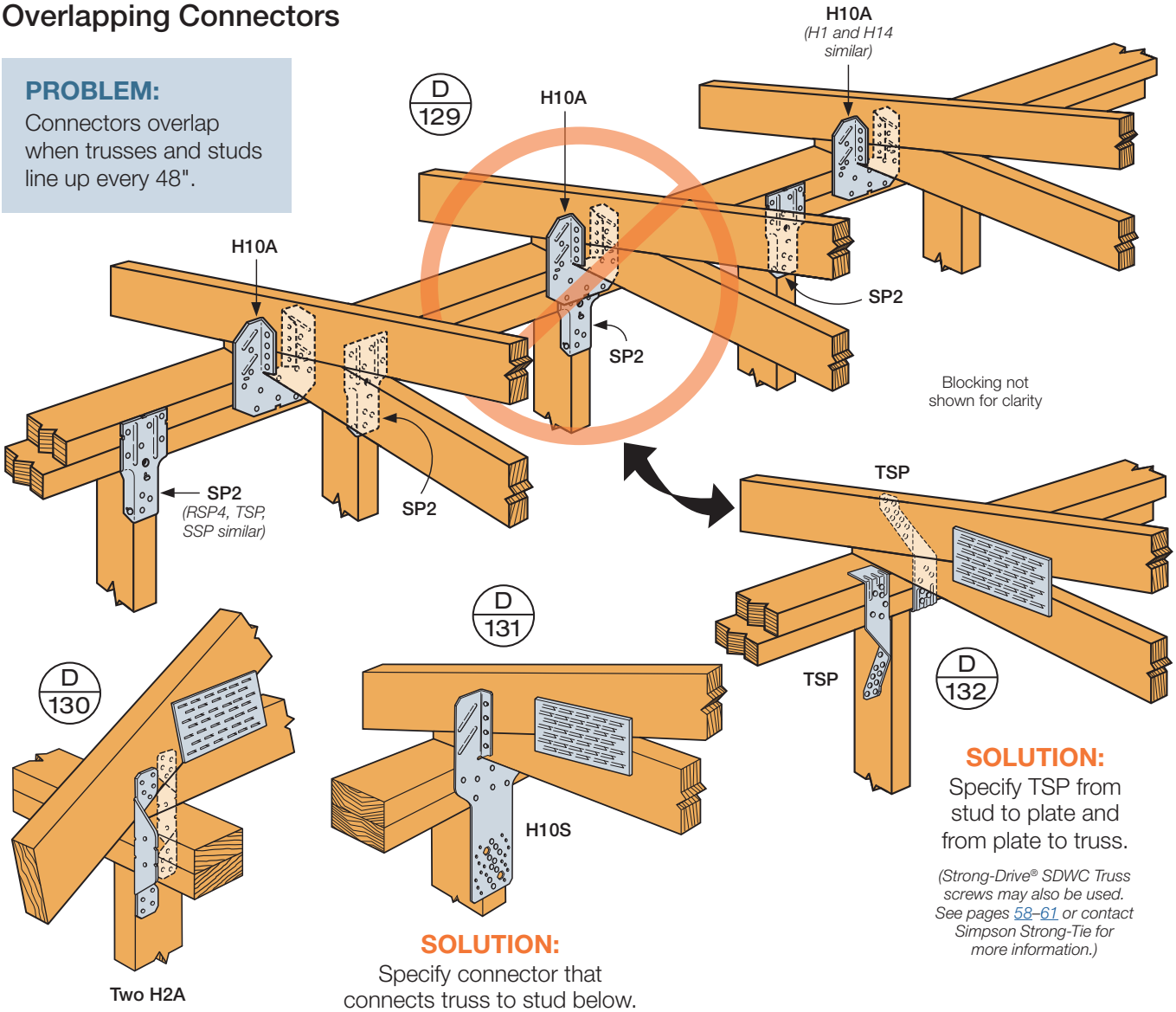
Products can be on the same side of the wall provided they are configured as shown.

Nailing into both sides of a single ply 2x truss may cause the wood to split.

Installations using multiple connectors are limited to specific table references.

Overlapping Connectors

PROBLEM:
Connectors overlap when trusses and studs line up every 48".



SOLUTION:
Specify connector that connects truss to stud below.

SOLUTION:
Specify TSP from stud to plate and from plate to truss.

(Strong-Drive® SDWC Truss screws may also be used. See pages 58–61 or contact Simpson Strong-Tie for more information.)

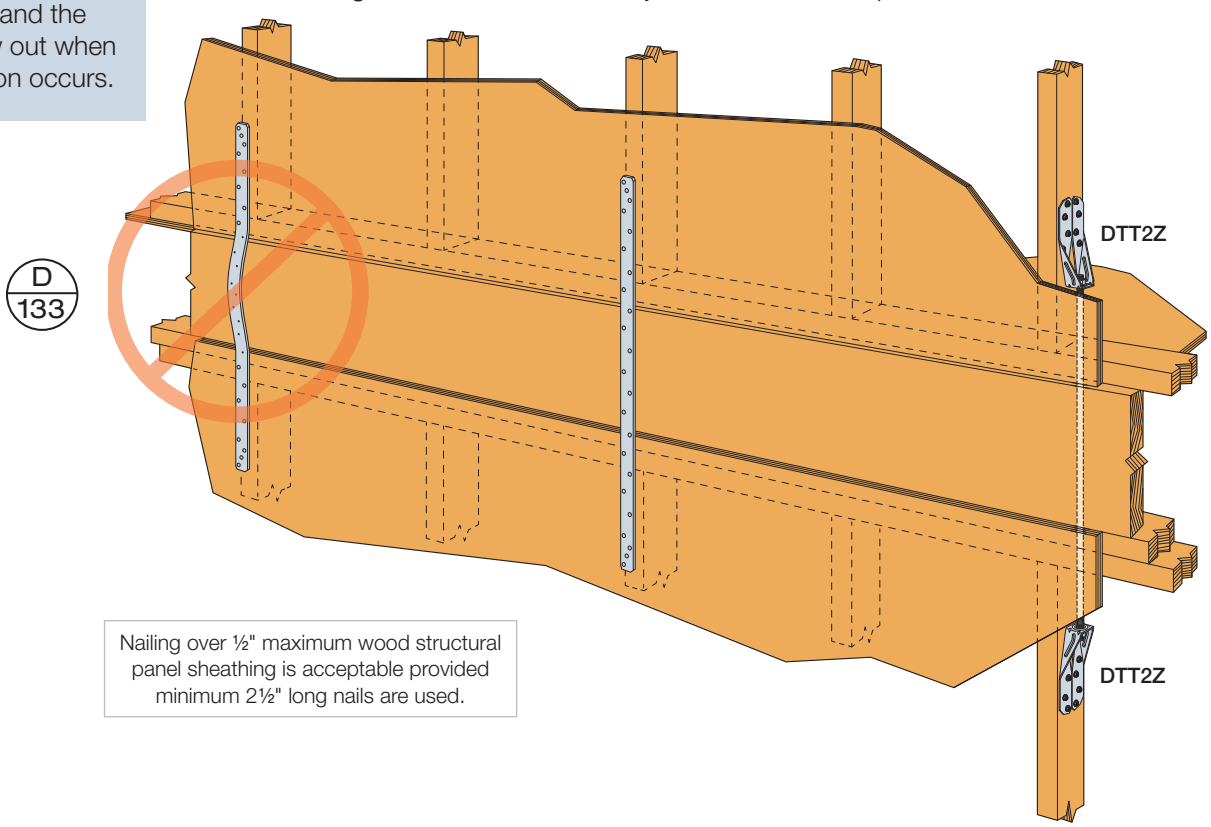
Building Floor-to-Floor Straps

PROBLEM:
All stud nails are filled before the roof is installed and the straps bow out when compression occurs.

SOLUTION 1:
Fill the nail holes in the rim joist area to limit the bowing.

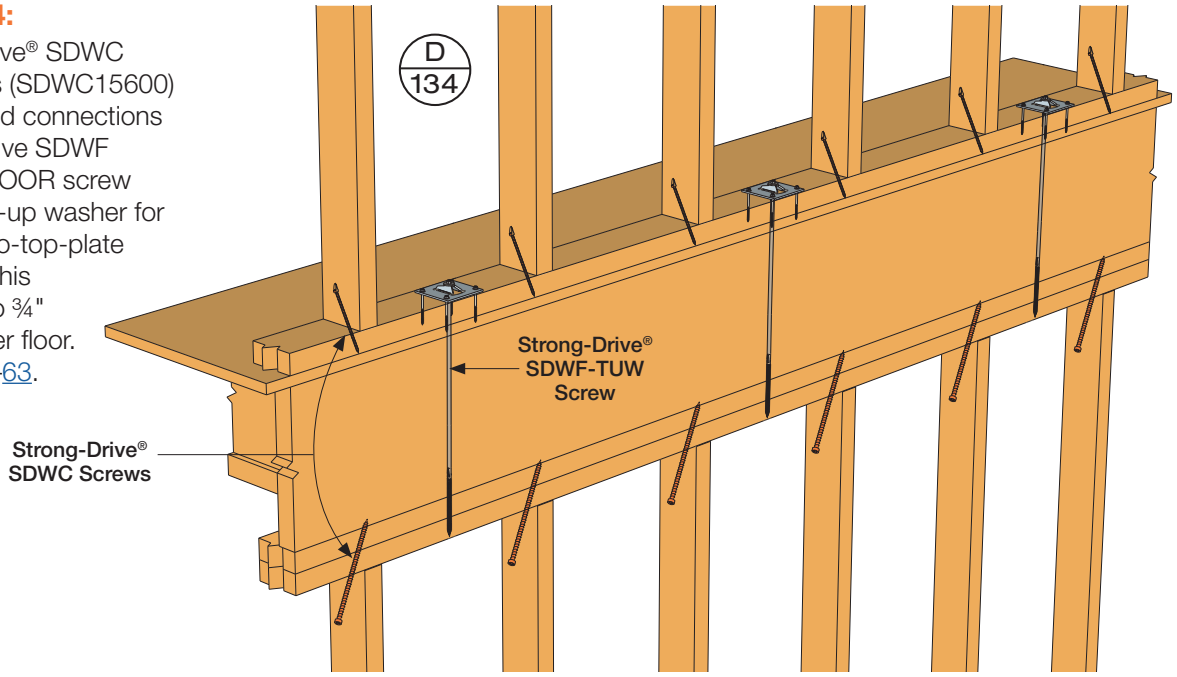
SOLUTION 2:
Fill the nail holes to the top stud before the roof is installed and then fill bottom stud nails after. **Note:** Rim joist nails are not required.

SOLUTION 3:
Use DTT2Z tension ties.



Nailing over ½" maximum wood structural panel sheathing is acceptable provided minimum 2½" long nails are used.

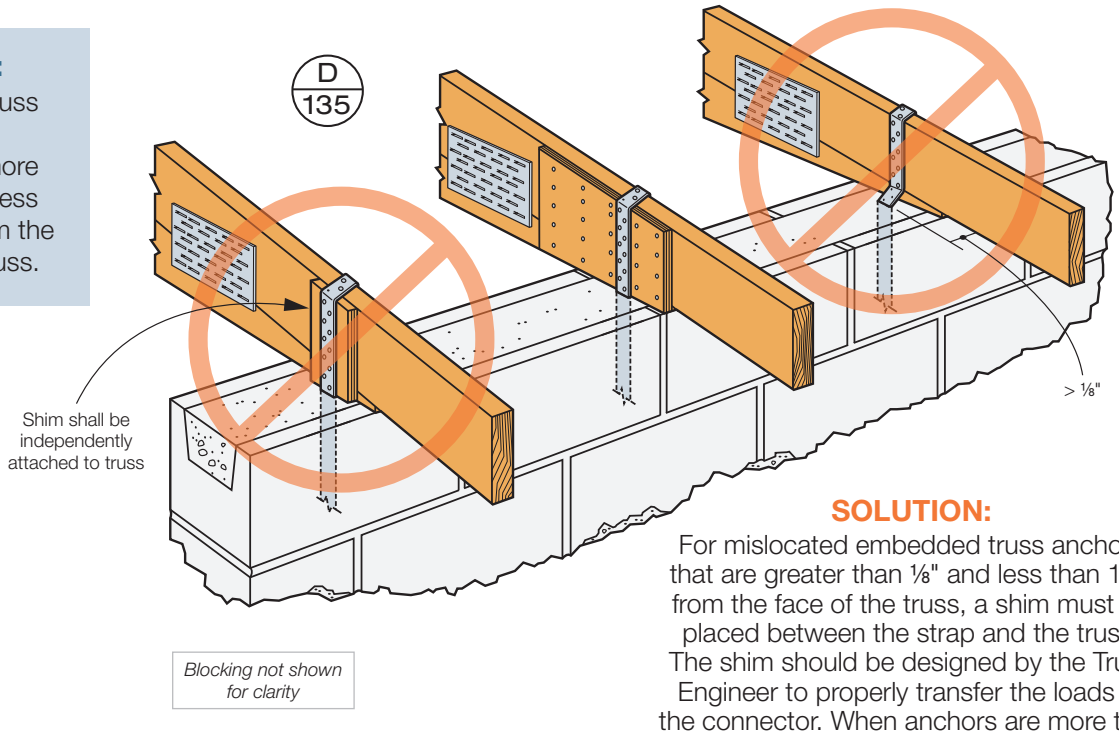
SOLUTION 4:
Use Strong-Drive® SDWC TRUSS screws (SDWC15600) for plate-to-stud connections with Strong-Drive SDWF FLOOR-TO-FLOOR screw with TUW take-up washer for bottom-plate-to-top-plate connections. This allows for up to ¾" of shrinkage per floor. See pages 60–63.



Load Path Installation Considerations (cont.)

Mislocated Truss Anchors

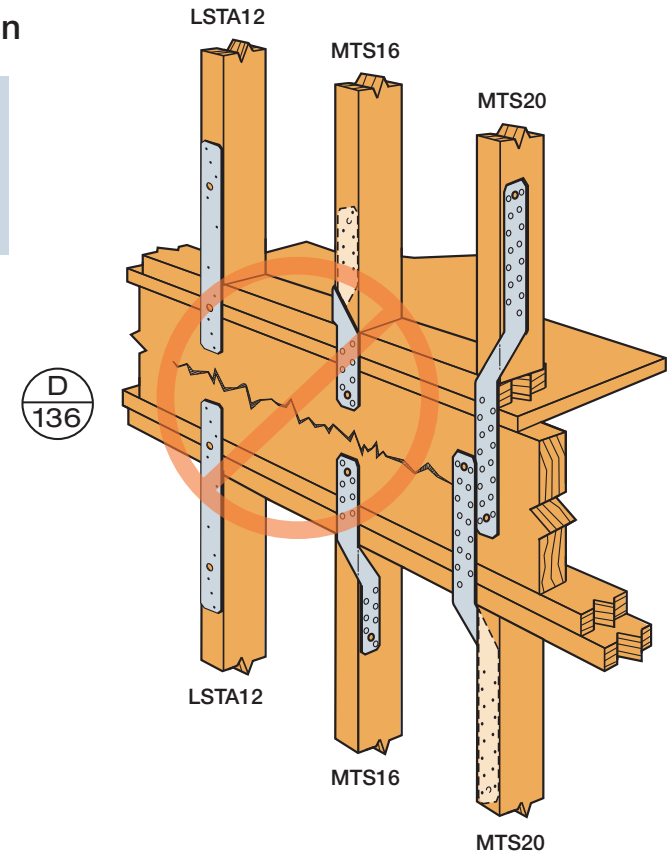
PROBLEM:
Embedded truss anchors are mislocated more than ⅛" and less than 1½" from the face of the truss.



SOLUTION:
For mislocated embedded truss anchors that are greater than ⅛" and less than 1½" from the face of the truss, a shim must be placed between the strap and the truss. The shim should be designed by the Truss Engineer to properly transfer the loads to the connector. When anchors are more than 1½" from the face of the truss, add new connectors as shown on page 21.

Cross-Grain Tension

PROBLEM:
Wood has very low tension capacity perpendicular to grain.

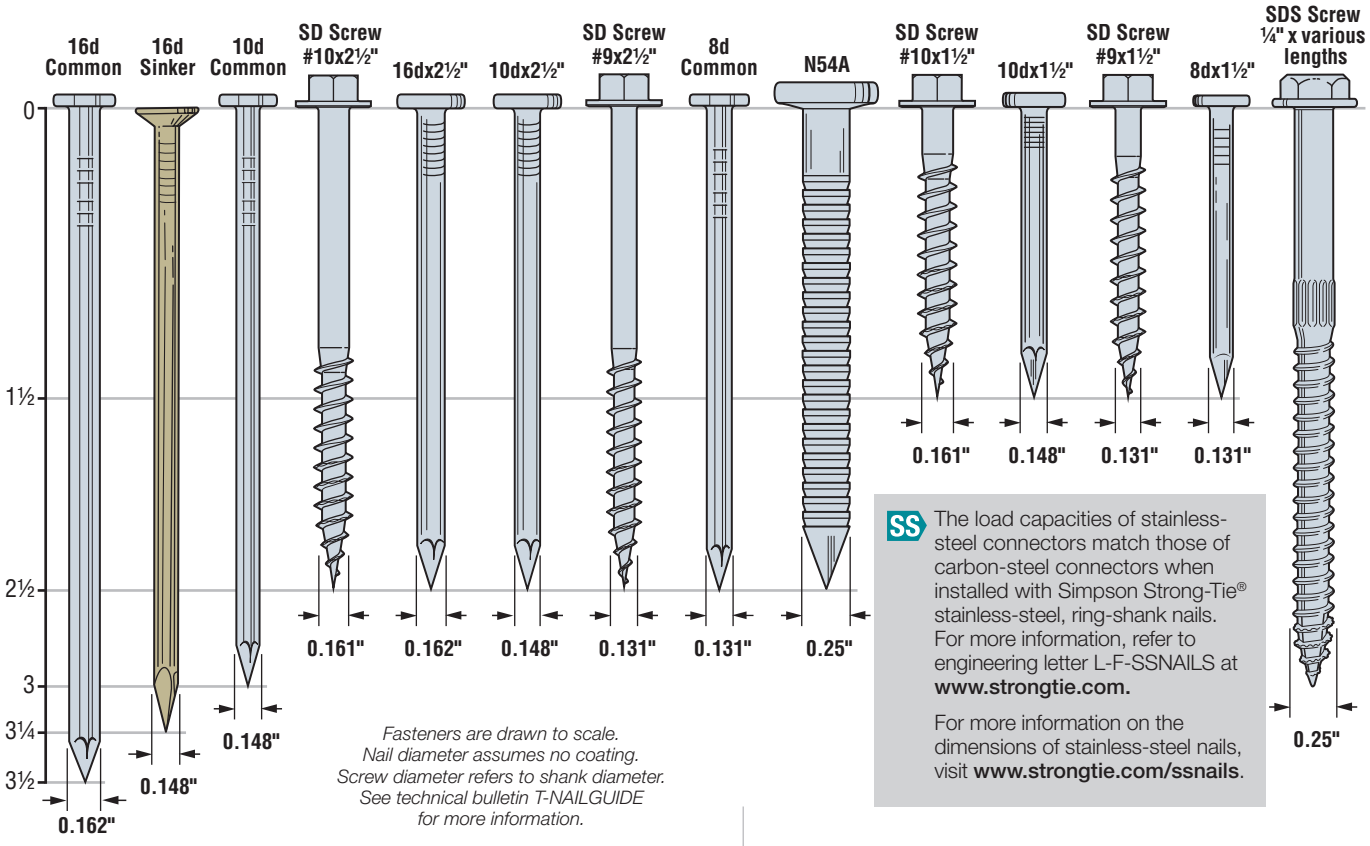


SOLUTION:
Avoid cross-grain tension by strapping stud to stud (see D133, page 52) or by mechanically reinforcing the lumber by overlapping MTS straps on rim board beyond centerline of rim board (as drawn).

Fastener Types

Many Simpson Strong-Tie connectors have been designed and tested for use with specific types and sizes of fasteners. The specified quantity, type and size of fastener must be installed in the correct holes on the connector to achieve published loads. Other factors, such as fastener material and finish, are also important. Incorrect fastener selection or installation can compromise connector performance and could lead to failure.

Simpson Strong-Tie does not offer all of these fasteners. For more information about fasteners, see our *Fastening Systems* catalog or access our Fastener Finder software at **www.strongtie.com/software**.



Fasteners are drawn to scale.
Nail diameter assumes no coating.
Screw diameter refers to shank diameter.
See technical bulletin T-NAILGUIDE for more information.

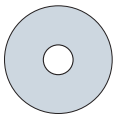
SS The load capacities of stainless-steel connectors match those of carbon-steel connectors when installed with Simpson Strong-Tie® stainless-steel, ring-shank nails. For more information, refer to engineering letter L-F-SSNAILS at **www.strongtie.com.**

For more information on the dimensions of stainless-steel nails, visit **www.strongtie.com/ssnails**.

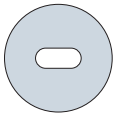
Load Adjustment Factors for Optional Nails Used with Straight Straps

Catalog Nail	Replacement	Adjustment Factor
16d common (0.162"x3½")	10dx1½ (0.148"x1½")	0.84[2]
	10d common (0.148"x3") 16d sinker (0.148"x3¼")	0.84
16d common (0.162"x3½")	16dx2½ (N16) (0.162"x2½")	1.00
10d common (0.148"x3") 16d sinker (0.148"x3¼")	10dx1½ (0.148"x1½")	1.00[3]
10d common (0.148"x3")	16d sinker (0.148"x3¼")	1.00
8d common (0.131"x2½")	8dx1½ (0.131"x1½")	1.00
10d common (0.148"x3")	8d common (0.131"x2½")	0.83

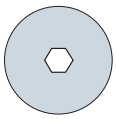
1. For straps installed over sheathing, use a 2½" long nail minimum.
2. Where noted, use 0.80 for 10 ga., 11 ga. and 12 ga. products when using SPF lumber.
3. Where noted, use 0.92 for 10 ga., 11 ga. and 12 ga. products when using SPF lumber.
4. For applications involving pneumatic nails, refer to Simpson Strong-Tie® bulletin T-PNEUMATIC.



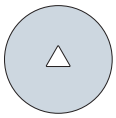
ROUND HOLES
Purpose: to fasten a connector to wood.
Fill Requirements: always fill, unless noted otherwise.



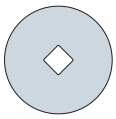
OBROUND HOLES
Purpose: to make fastening a connector in a tight location easier.
Fill Requirements: always fill.



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 maximum strength.
Fill Requirements: when the Designer specifies maximum nailing.

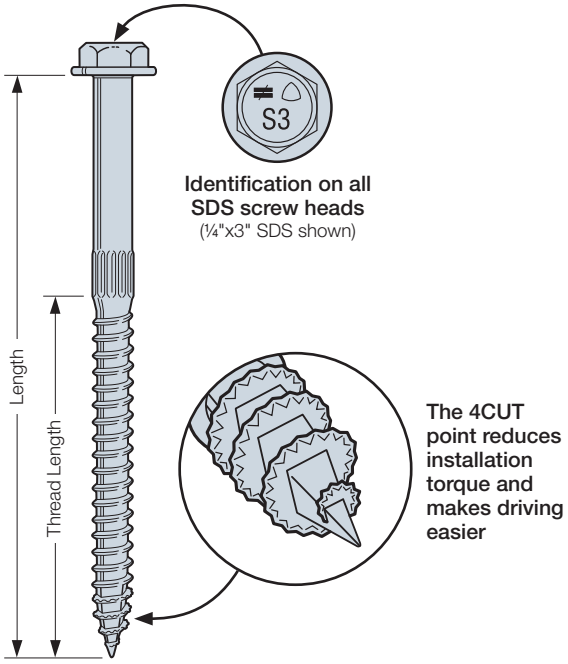


DIAMOND HOLES
Purpose: to temporarily fasten a connector to make installing it easier.
Fill Requirements: none.

Strong-Drive® SDS HEAVY-DUTY CONNECTOR Screw

The Simpson Strong-Tie® Strong-Drive® SDS Heavy-Duty Connector screw is a ¼" diameter structural wood screw ideal for various connector installations as well as wood-to-wood applications. It installs with no predrilling and has been extensively tested in various applications. The SDS Heavy-Duty Connector screw is improved with a patented easy-driving 4CUT™ point and a corrosion-resistant double-barrier coating. It is available in a corrosion-resistant, double-barrier coating and in Type 316 stainless steel for use in severe corrosion environments.

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments.



¼"x3" Strong-Drive® SDS HEAVY-DUTY CONNECTOR Screw
U.S. Patent 6,109,850; 5,897,280; 7,101,133

Strong-Drive® SDS **HEAVY-DUTY CONNECTOR** Screw

	Size (in.)	Model No.[7]	Thread Length (in.)	Fasteners per Carton[5]	DF/SP Allowable Loads[3] (lb.)						SPF/HF Allowable Loads[3] (lb.)					
					Shear (100)					Withdrawal[4] (100)	Shear (100)					Withdrawal[4] (100)
					Wood Side Plate[2]		Steel Side Plate				Wood Side Plate[2]		Steel Side Plate			
					1½"	1¾" SCL	16 ga.	14 ga. and 12 ga.	10 ga. or Greater	Wood or Steel Side Plate	1½"	1¾" SPF LVL	16 ga.	14 ga. and 12 ga.	10 ga. or Greater	Wood or Steel Side Plate
SS	¼ x 1½	SDS25112	1	1,500	—	—	250	250	250	170	—	—	180	180	180	120
SS	¼ x 2	SDS25200	1¼	1,300	—	—	250	290	290	215	—	—	180	210	210	150
SS	¼ x 2½	SDS25212	1½	1,100	190	—	250	390	420	255	135	—	180	280	300	180
SS	¼ x 3	SDS25300	2	950	280	—	250	420	420	345	200	—	180	300	300	240
SS	¼ x 3½	SDS25312	2¼	900	340	340	250	420	420	385	245	245	180	300	300	270
SS	¼ x 4½	SDS25412	2¾	800	350	340	250	420	420	475	250	245	180	300	300	330
	¼ x 5	SDS25500	2¾	500	350	340	250	420	420	475	250	245	180	300	300	330
	¼ x 6	SDS25600	3¼	600	350	340	250	420	420	560	250	245	180	300	300	395
	¼ x 8	SDS25800	3¼	400	350	340	250	420	420	560	250	245	180	300	300	395

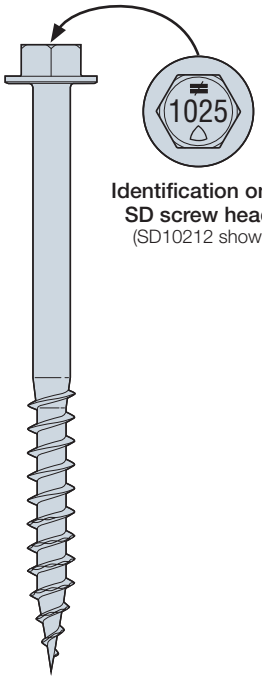
1. Strong-Drive® SDS Heavy-Duty Connector screws install best with a low-speed ½" drill with a ⅜" hex head driver.
2. All applications are based on full penetration into the main member.
3. Allowable loads are shown at the wood load duration factor of C_D = 1.00. Loads may be increased for load duration per the building code up to a C_D = 1.60.
4. Withdrawal loads shown are in pounds (lbs.) and are based on the entire threaded section installed into the main member. If thread penetration into the main member is less than the thread length as shown in the table, reduce allowable load by 172 lb. x inches of thread not in main member. Use 121 lb./inch for SPF.
5. Fasteners per Carton represents the number of screws which are available in bulk packaging. Screws are also available in mini-bulk and retail packs. Refer to Simpson Strong-Tie® List Price book or contact Simpson Strong-Tie for more information.
6. LSL wood-to-wood applications that require 4½", 5", 6" or 8" Strong-Drive SDS Heavy-Duty Connector screws are limited to interior-dry use only.
7. Add "SS" to model no. for Type-316 stainless steel.

Strong-Drive® SD CONNECTOR Screw

Simpson Strong-Tie offers the Strong-Drive® SD Connector screw for use with our connectors. Designed to replace nails in certain products, the load-rated SD Connector screw has been tested and approved for use in many popular Simpson Strong-Tie® connectors. In certain applications, screws are easier and more convenient to install than nails, and the single-fastener load values achieved by the SD9 and SD10 exceed those of typical 10d common or 16d common nails, respectively. In addition, the galvanized coating makes the SD Connector screw ideal for interior and most exterior conditions.

The Strong-Drive® SD Connector screw features an optimized shank, specifically designed for capability with the fastener holes in Simpson Strong-Tie connectors. The hex head virtually eliminates cam-out and helps avoid stripping of the head during installation. The sharp point of the screw enables fast starts, and the patented serrated threads reduce torque for improved drivability.

For a current list of approved connectors, load values and applications, visit **www.strongtie.com/strongdrive**.



Identification on all SD screw heads
(SD10212 shown)

Strong-Drive® SD CONNECTOR Screw (SD10)
(SD9 similar)
U.S. Patent 7,101,133

The Simpson Strong-Tie® Strong-Drive® SD Connector screw is the only screw approved for use with our connectors.

Product Information

Model No.	Shank Size	Length (in.)
SD9112R100	#9 (0.131")	1½
SD9112R500		
SD9112MB		
SD9212R100		2½
SD9212R500		
SD9212MB		
SD10112R100	#10 (0.161")	1½
SD10112R500		
SD10112MB		
SD10212R100		2½
SD10212R500		
SD10212MB		

Strong-Drive® SD **CONNECTOR** Screw

Size (in.)	Model No.	Thread Length (in.)	DF/SP Allowable Loads (lb.) (100)		SPF/HF Allowable Loads (lb.) (100)	
			Shear Steel Side Plate 20 ga. - 12 ga.	Withdrawal	Shear Steel Side Plate 20 ga. - 12 ga.	Withdrawal
#9x1½	SD9112	1	171	173	112	122
#9x2½	SD9212	1	200		112	
#10x1½	SD10112	1	173	173	138	122
#10x2½	SD10212	1	215		165	

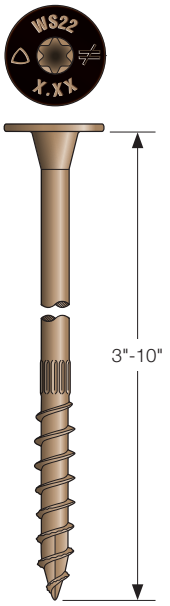
1. Withdrawal loads and steel-side-plate shear loads are based on testing per AC233.
2. Allowable loads are shown at the wood load duration factor of C_D = 1.00. Loads may be increased for load duration per the building code up to a C_D = 1.60.
3. Withdrawal loads are based on the entire threaded section installed into the main member.
4. Visit **www.strongtie.com** for wood-to-wood shear values and wood-side-plate details.

Sole Plate and Ledger Connections

Strong-Drive® SDWS **TIMBER** Screw Allowable Shear Values for Sole Plate-to-Rim Connections

Size (in.)	Model No.	Sole Plate Nominal Size	Minimum Penetration into Rim Board (in.)	Allowable Loads (lb.)							
				2x DF/SP Rim Board		2x SPF/HF Rim Board		1¼" Min. LVL Rim Board		1¼" Min. LSL Rim Board	
				DF/SP Sole Plate	SPF/HF Sole Plate	DF/SP Sole Plate	SPF/HF Sole Plate	DF/SP Sole Plate	SPF/HF Sole Plate	DF/SP Sole Plate	SPF/HF Sole Plate
0.220 x 4	SDWS22400DB	2x	1.75	345	295	295	295	275	275	275	275
0.220 x 5	SDWS22500DB	2x	2	345	295	295	295	275	275	275	275
0.220 x 6	SDWS22600DB	2x or 3x	2	345	295	295	295	275	275	275	275

1. Allowable loads are based on testing per ICC-ES AC233 and are limited to parallel-to-grain loading.
2. Allowable loads are shown at the wood load duration factor of C_D = 1.00. Loads may be increased for load duration by the building code up to a C_D = 1.60.
3. Minimum spacing of the SDWS is 6" o.c., minimum end distance is 6", and minimum edge distance is ⅝".
4. Wood structural panel up to 1⅛" thick is permitted between the sole plate and rim board provided it is fastened to the rim board per code and the minimum penetration of the screw into the rim board is met.
5. A double 2x sole plate is permitted provided it is independently fastened per the code and the minimum screw penetration per the table is met.



Strong-Drive® SDWS TIMBER Screw
U.S. Patent 5,897,280; 7,101,133

Strong-Drive® SDWS **TIMBER** Screw Allowable Shear Loads – Douglas Fir–Larch and Southern Pine

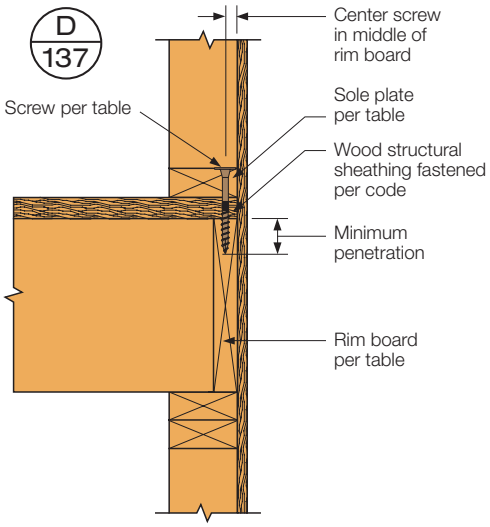
Size Dia.x L (in.)	Model No.	Thread Length TL (in.)	DF/SP Allowable Loads								
			Shear (100)								
			Wood Side Member Thickness (in.)								
			1.5	2	2.5	3	3.5	4	4.5	6	8
0.220 x 3	SDWS22300DB	1½	255	—	—	—	—	—	—	—	—
0.220 x 4	SDWS22400DB	2⅜	405	405	305	—	—	—	—	—	—
0.220 x 5	SDWS22500DB	2¾	405	405	360	360	325	—	—	—	—
0.220 x 6	SDWS22600DB	2¾	405	405	405	405	365	365	355	—	—
0.220 x 8	SDWS22800DB	2¾	405	405	405	405	395	395	395	395	—
0.220 x 10	SDWS221000DB	2¾	405	405	405	405	395	395	395	395	395

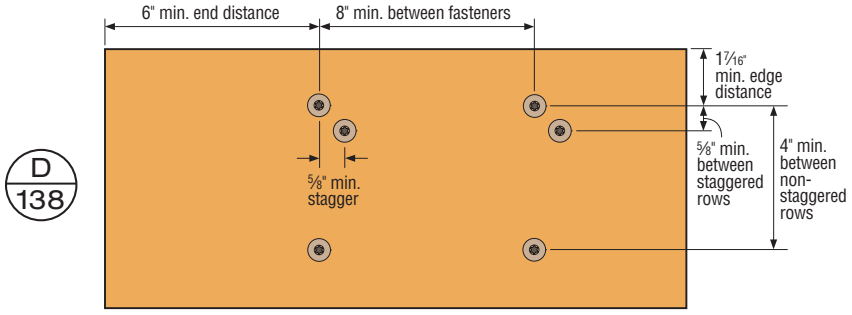
See footnotes below.

Strong-Drive® SDWS **TIMBER** Screw Allowable Shear Loads – Spruce-Pine-Fir and Hem-Fir

Size Dia.x L (in.)	Model No.	Thread Length TL (in.)	SPF/HF Allowable Loads								
			Shear (100)								
			Wood Side Member Thickness (in.)								
			1.5	2	2.5	3	3.5	4	4.5	6	8
0.220 x 3	SDWS22300DB	1½	190	—	—	—	—	—	—	—	—
0.220 x 4	SDWS22400DB	2⅜	385	285	215	—	—	—	—	—	—
0.220 x 5	SDWS22500DB	2¾	405	290	290	290	195	—	—	—	—
0.220 x 6	SDWS22600DB	2¾	405	365	365	365	310	310	210	—	—
0.220 x 8	SDWS22800DB	2¾	405	365	365	365	310	310	280	280	—
0.220 x 10	SDWS221000DB	2¾	405	365	365	365	310	310	280	280	280

1. All applications are based on full penetration into the main member. Full penetration is the screw length minus the side member thickness.
2. Allowable loads are shown at the wood load duration factor of C_D = 1.0. Loads may be increased for load duration per the building code up to a C_D = 1.6. Tabulated values must be multiplied by all applicable adjustment factors per the NDS.
3. Minimum fastener spacing requirements to achieve table loads: 6" end distance, 1⁷⁄₁₆" edge distance, ⅝" between staggered rows of fasteners, 4" between non-staggered rows of fasteners and 8" between fasteners in a row.
4. For in-service moisture content greater than 19%, use C_M = 0.7.





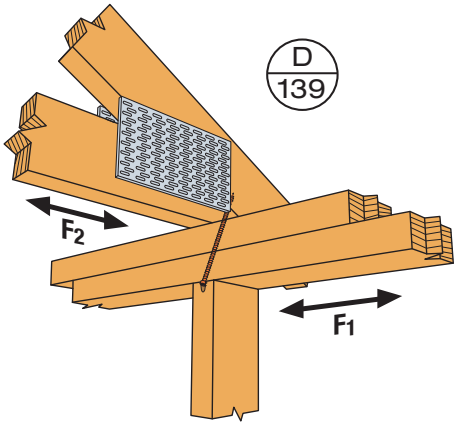
Strong-Drive® SDWS TIMBER Screw Spacing Requirements

Strong-Drive® SDWC **TRUSS** Screw
Allowable Roof-to-Wall Connection Loads – DFL, SP, SPF, HF[1-8]

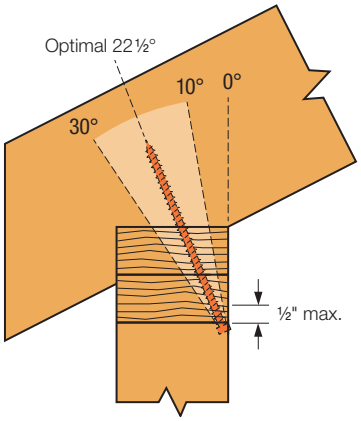
Model No.	Minor Diameter (in.)	Length (in.)	Thread Length (in.)	Allowable Loads					
				DF/SP			SPF/HF		
				Uplift	F_1	F_2	Uplift	F_1	F_2
SDWC15600	0.152	6	5¾	615	130	225	485	115	192

1. Loads have been increased for wind and earthquake (C_D = 1.6); no further increases allowed. Reduce when other loads govern.
2. Allowable loads are for a Strong-Drive® SDWC Truss screw installed per the "Recommended" or "Optional" installation instructions. The Strong-Drive SDWC Truss screw is to be installed through a double 2x top plate into a minimum 2x4 truss or rafter.
3. A Strong-Drive SDWC Truss screw may be used in each ply of 2- or 3-ply rafters or trusses. The allowable uplift load for each screw shall be multiplied by 0.90, but may be limited by the capacity of the plate or the connection between the top plate to the framing below. Strong-Drive SDWC Truss screws in multi-ply assemblies must be spaced a minimum of 1½" o.c.
4. Screws are shown installed on the interior side of the wall. Installations on the exterior side of the wall are acceptable when the rafter or truss overhangs the top plates a minimum of 3½".
5. For Uplift Continuous Load Path, top-plate-to-stud connectors such as the H2.5A, TSP or MTS12 must be located on the same side of the wall as the screw.
6. When the screw is loaded simultaneously in more than one direction, the allowable load must be evaluated using the following unity equation: (Design Uplift ÷ Allowable Uplift) + (Design F_1 ÷ Allowable F_1) + (Design F_2 ÷ Allowable F_2) ≤ 1.0.
7. Table loads do not apply to trusses with end-grain bearing.
8. Top plate, stud and top-plate splice fastened per applicable Building Code.

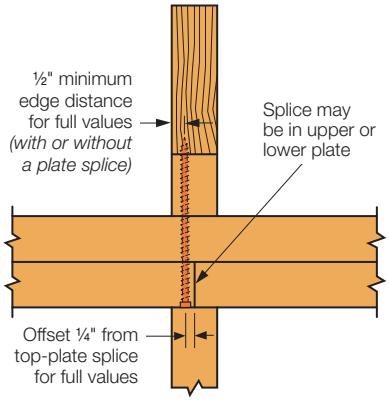
Typical Roof-to-Wall Connection



Typical SDWC Installation – Truss Aligned with Stud
(Offset truss similar)

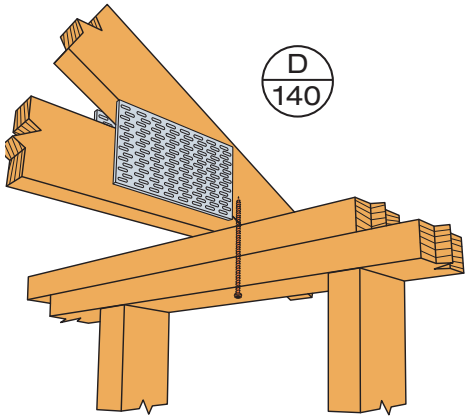


Installation Angle Limit

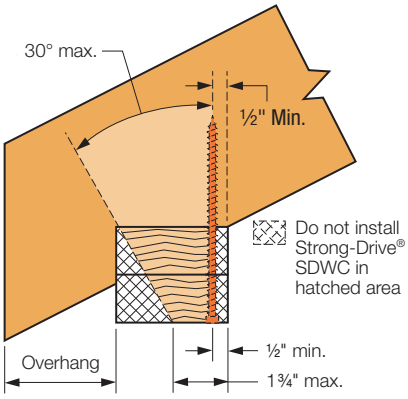


Minimum Edge Distance for Top-Plate Splice

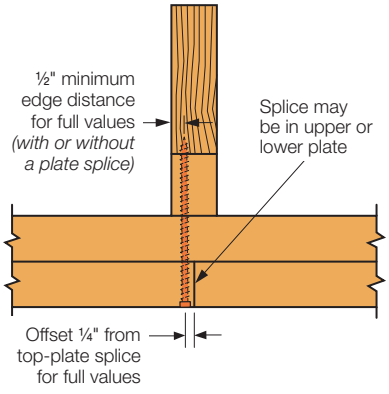
Optional Roof-to-Wall Connection



Optional SDWC Installation – Truss Offset from Stud



Allowable Installation Range
(Truss offset from stud only)

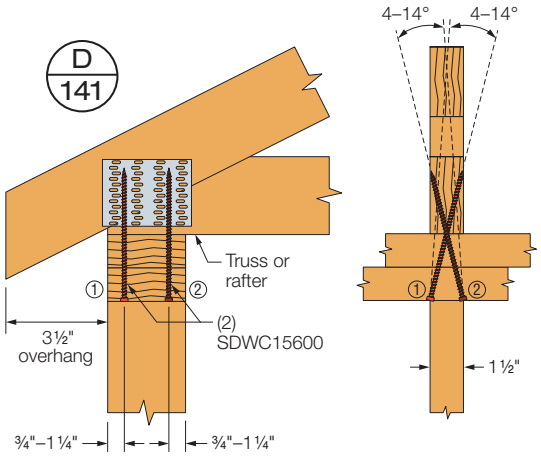


Minimum Edge Distance for Top-Plate Splice

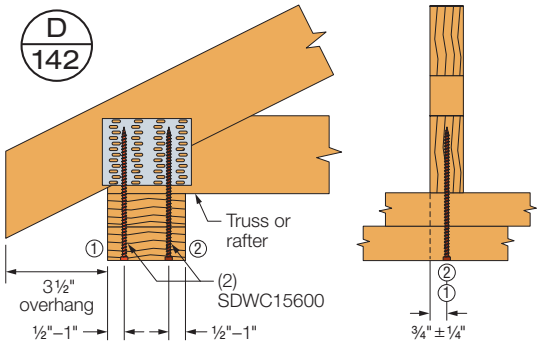
Roof to Wall (cont.)

Model No.	Minor Diameter (in.)	Length (in.)	Thread Length (in.)	Quantity Required	Allowable Uplift Loads (lb.)		Configuration
					DF/SP	SPF/HF	
SDWC15600	0.152	6	5¾	2	1,200	1,045	A
					1,195	1,195	B
					905	850	C
					1,115	960	D

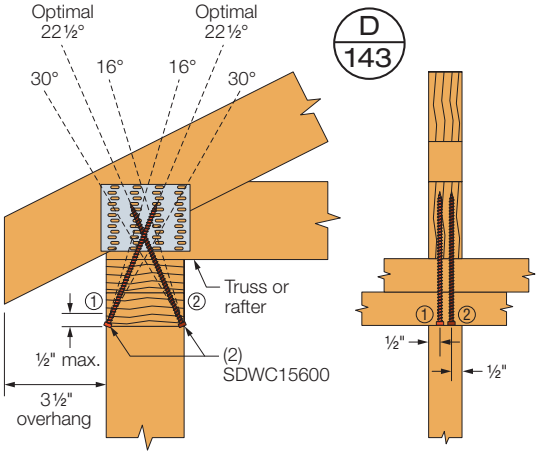
1. Loads have been increased for wind and earthquake loading (C_D = 1.6) with no further increase allowed; reduce where other loads govern.
2. For Uplift Connection Load Path, the Designer shall verify complete continuity of the uplift load path.
3. When cross-grain tension cannot be avoided, supplemental reinforcement shall be considered by the Designer.
4. The SDWC screws shall not interfere with other fasteners or truss plates. Where truss plates must be penetrated for Configuration D, a truss Designer approval is required in accordance with ANSI/TPI 1-2007/2014, Section 7.5.3.4 and 8.9.2. To predrill through truss plate, use a ⅛" drill bit.
5. The metal installation guide provided with the screw is angled at 22.5° and can be used for Configurations C & D; proper installation angles for all configurations are the responsibility of the installer.
6. SDWC screws must be offset minimum ¼" from top plate splices for full values.
7. Loads assume minimum overhang of 3½".



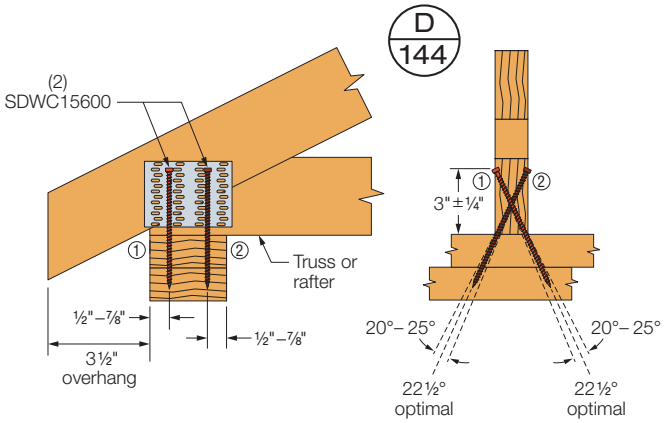
CONFIGURATION A
(Truss Aligned with Stud)
Install through Top Plate into Truss/Rafter
Both screws installed at a 4°–14° angle, offset ¾" to 1¼" from opposite edges of the top plate.



CONFIGURATION B
(Truss Offset from Stud)
Install through Top Plate into Truss/Rafter
Both screws installed vertically ±5° into the center of the truss/rafter from the underside of the top plate, ½" to 1" from opposite edges of the top plate.



CONFIGURATION C
Install through Top Plate into Truss/Rafter
Both screws installed at a 16°–30° angle, offset ½" from the opposite edges of truss/rafter. Use metal installation guide included in screw kits for optimal 22.5° installation.



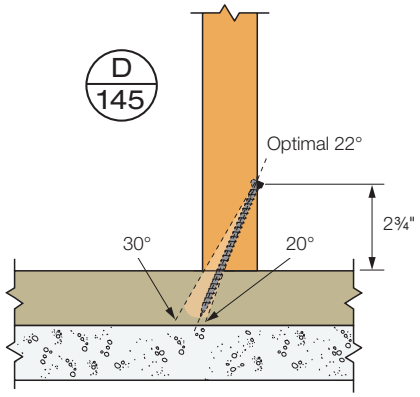
CONFIGURATION D
Install through Truss/Rafter into Top Plate
Both screws installed at a 20°-25° angle with a ½" to ⅞" offset from the opposite edges of top plate and 3"±¼" above top plate. Use metal installation guide included in screw kits for optimal 22.5° installation. To predrill through truss plates, use a ⅛" drill bit.

Stud to Plate (Wide Face)

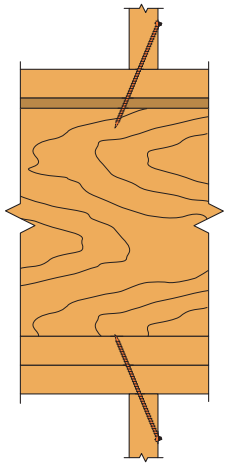
Model No.	No. of Screws Installed	Minor Diameter (in.)	Length (in.)	Thread Length (in.)	Plate Size	Allowable Loads (160)			
						DF/SP		SPF/HF	
						Uplift	F_2	Uplift	F_2
SDWC15450	1	0.152	4½	4¼	2x	360	215	310	153
	2					690	390	595	280
	3					1,035	585	895	420
SDWC15600	1	0.152	6	5¾	2x	450	189	310	153
	2					865	345	595	280
	3					1,295	515	895	420
SDWC15600	1	0.152	6	5¾	(2) 2x	590	177	510	152
	2					1,135	320	980	275
	3					1,700	485	1,470	415

1. Loads have been increased 60% for wind or earthquake loading (C_D = 1.6) with no further increases allowed; reduce where other loads govern.
2. Allowable loads are for Strong-Drive® SDWC installed per the installation instructions.
3. The Strong-Drive SDWC15450 is to be installed through the face of 2x stud into a single 2x bottom plate over a concrete/masonry foundation.
4. The Strong-Drive SDWC15600 is to be installed through the face of 2x stud into a single 2x bottom plate over a wood floor system.
5. The Strong-Drive SDWC15600 is to be installed through the face of 2x stud into a double 2x top or bottom plate.
6. Double-top plates shall be fastened together as required by applicable Code.
7. When the screw is loaded simultaneously in more than one direction, the allowable load must be evaluated using the following unity equation: (Design Uplift ÷ Allowable Uplift) + (Design F_2 ÷ Allowable F_2) ≤ 1.0.

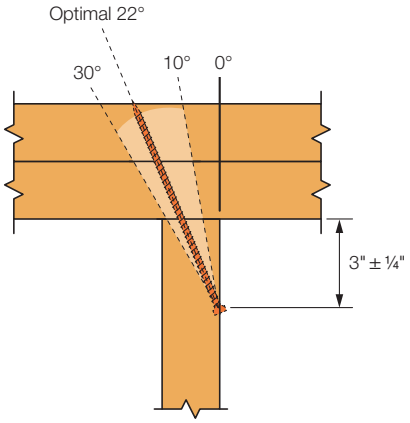
Stud-to-Plate Connections



Stud-to-Bottom-Plate Connection over Concrete/Masonry Foundation
(This application requires SDWC15450.)



Stud-to-Bottom-Plate Connection over Wood Floor
(Strong-Drive SDWC15600 shown. See pages 62–63 for Strong-Drive® SDWF FLOOR-TO-FLOOR Connections)



Stud-to-Top Plate Connection
(This application requires SDWC15600)

Strong-Drive® SDWC15450-KT and SDWC15600-KT contain:

- (50) Strong-Drive SDWC Truss screws
- (1) Matched-tolerance driver bit *(Part no. BIT30T-2-RC3; also sold separately)*
- (1) Metal installation guide tool
  - SDWC-GUIDE *(for SDWC15600 only; also sold separately)* or
  - SDWC-GUIDE275 *(for SDWC15450 only; also sold separately)*

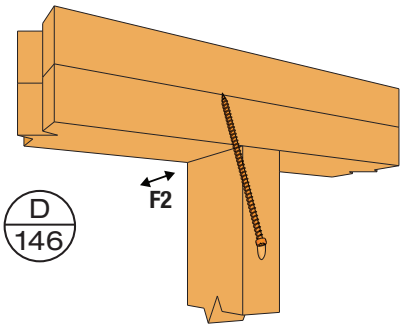
Strong-Drive® SDWC15450B-KT and SDWC15600B-KT contain:

- (500) Strong-Drive SDWC Truss screws
- (2) Matched-tolerance driver bit *(Part no. BIT30T-2-RC3; also sold separately)*
- (2) Metal installation guide tool
  - SDWC-GUIDE *(for SDWC15600 only; also sold separately)* or
  - SDWC-GUIDE275 *(for SDWC15450 only; also sold separately)*

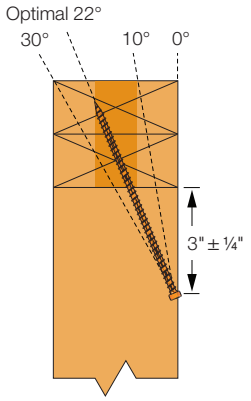
Stud to Plate (Narrow Face)

Type of Connection	Model No.	Qty. Required	Minor Diameter (in.)	Length (in.)	Thread Length (in.)	Plate Size	Allowable Loads (lb.)			
							DF/SP		SPF/HF	
							Uplift	F_2	Uplift	F_2
1	SDWC15600[1]	1	0.152	6	5 ¾	(2) 2x	590	170	510	145
2	SDWC15600[2]	1	0.152	6	5 ¾	2x	450	155	310	135
3	SDWC15450[3]	1	0.152	4 ½	4 ¼	2x	295	150	255	130

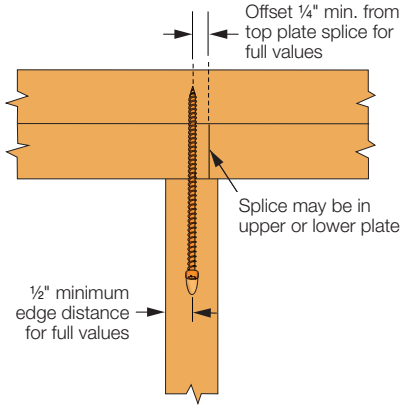
1. Loads have been increased for wind and earthquake (C_D = 1.6); no further increase is allowed; reduce when other loads govern.
2. The SDWC15600 is to be installed through the narrow face of 2x stud into a single 2x bottom plate over a wood floor system.
3. The SDWC15450 is to be installed through the narrow face of 2x stud into a single 2x bottom plate over a concrete/masonry foundation.
4. Double-top plates shall be fastened together as required by applicable Code.
5. The F_2 direction is perpendicular to the wall. When the screw is loaded simultaneously in more than one direction, the allowable load must be evaluated using the following equation:
(Design Uplift ÷ Allowable Uplift) + (Design F_2 ÷ Allowable F_2) ≤ 1.0
6. One SDWC screw per stud maximum when installed in the narrow face of the stud. Where the SDWC screws are installed on multiple adjacent studs, the minimum spacing between screws must be 1½".
7. For uplift Continuous Load Path, connections in the same area (i.e. truss to plate connector and plate to stud connector) must be on the same side of the wall.



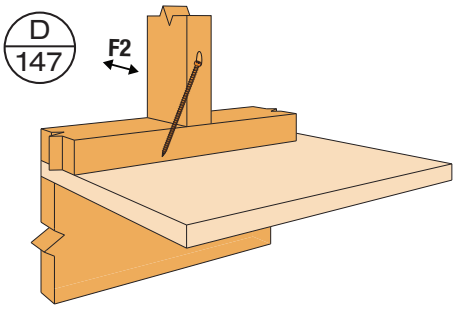
1 Narrow Face of Stud-to-Top Plate Connection
(This application requires SDWC15600)



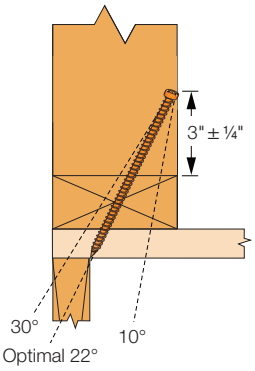
Installation Angle Range



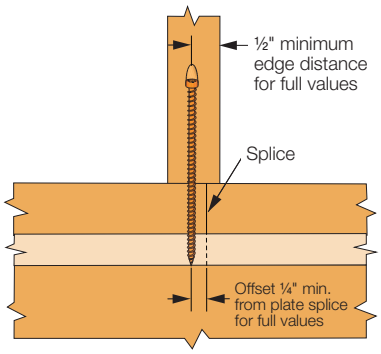
Minimum Edge Distance and Splice Offset Requirements



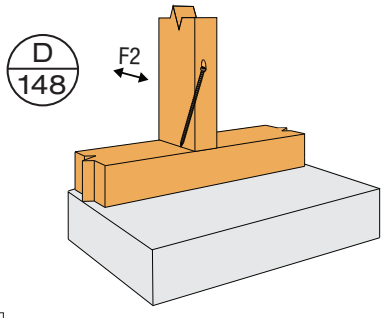
2 Narrow Face of Stud-to-Bottom Plate Connection over Wood Floor
(SDWC15600 shown)



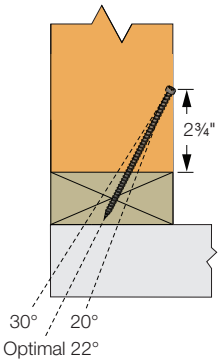
Installation Angle Range



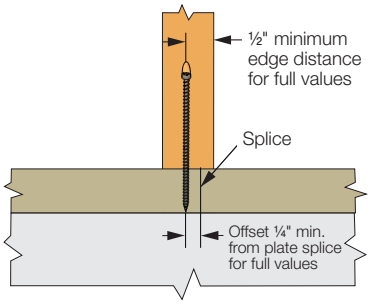
Minimum Edge Distance and Splice Offset Requirements



3 Narrow Face of Stud-to-Bottom Plate Connection over Masonry/Concrete Foundation
(This application requires SDWC15450)



Installation Angle Range

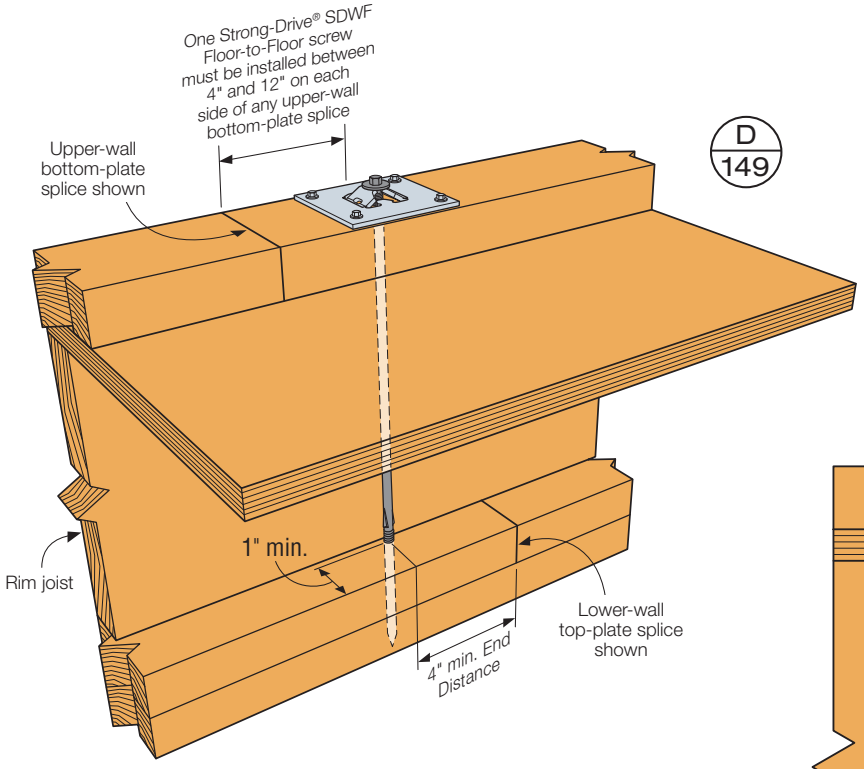


Minimum Edge Distance and Splice Offset Requirements

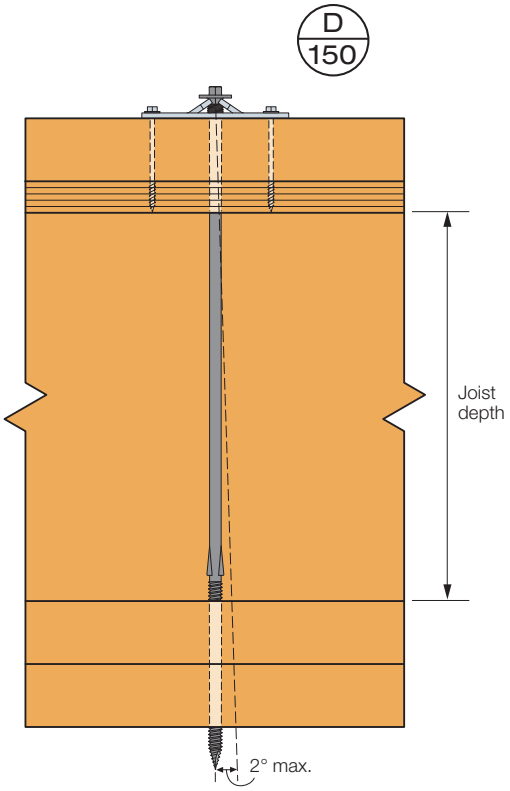
Strong-Drive® SDWF **FLOOR-TO-FLOOR** Screw Product Information and Withdrawal Loads

Model No	Size (in.)	Thread Length (in.)	Allowable Joist Depth Below (in.)				Allowable Withdrawal per Thread Penetration (lb./in.) (100)		
			Single Bottom Plate		Double Bottom Plate				
			Min.	Max.	Min.	Max.	SP	DF	SPF
SDWF2716-TUW	0.27 x 16	5	8½	10½	6⅞	9	295	250	180
SDWF2720-TUW	0.27 x 20	5	12½	14½	10⅞	13			
SDWF2724-TUW	0.27 x 24	5	16½	18½	14⅞	17			
SDWF2726-TUW	0.27 x 26	5	18½	20½	16⅞	19			

1. Allowable loads may be increased for load duration up to C_D = 1.6.
2. Joist depth listed based on the ¾" subfloor and 3" of thread penetration into double top plates.
3. For joist depths of 11¼", 11⅞" and 16", please refer to L-F-SDWFALTHT at **www.strongtie.com**.



**Typical Strong-Drive®
SDWF FLOOR-TO-FLOOR Screw
and TUW Take-Up Washer Installation**



**Typical Strong-Drive®
SDWF FLOOR-TO-FLOOR Screw
Angle Limit Installation**

Strong-Drive® SDWF **FLOOR-TO-FLOOR** Screw Uniform Uplift Loads

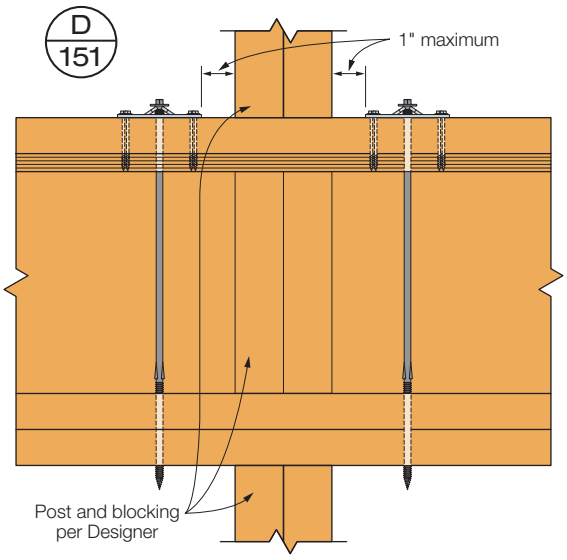
Maximum Strong-Drive SDWF FLOOR-TO-FLOOR Screw Spacing (in.) Along Wall Bottom Plate for Wind Uplift											
Bottom Plate	**Interstory Unit Wind Uplift Lbs. per Lineal Foot (plf)**										
Single 2x4	**100 plf**	**150 plf**	**200 plf**	**250 plf**	**300 plf**	**350 plf**	**400 plf**	**450 plf**	**500 plf**	**550 plf**	**600 plf**
SP	46	40	36	34	30	28	26	24	24	22	22
DF	48	42	38	34	32	30	30	26	24	22	20
SPF	46	40	36	34	32	30	26	22	20	18	16
Single 2x6	**100 plf**	**150 plf**	**200 plf**	**250 plf**	**300 plf**	**350 plf**	**400 plf**	**450 plf**	**500 plf**	**550 plf**	**600 plf**
SP	56	48	44	40	38	36	34	34	32	30	28
DF	56	48	44	40	38	34	30	26	24	22	20
SPF	52	46	42	38	34	30	26	22	20	18	16

1. Spacing listed based on the smallest of the following: single bottom plate bending allowable load, single bottom plate deflection limited to spacing/240 and ¼" max; screw allowable withdrawal load; and take-up washer allowable load.
2. Withdrawal load is based on a C_D = 1.6 and minimum 3" penetration into lower-wall double top plates.
3. Stud-to-plate connections are required to complete the load path. These connections shall not exceed the lesser of 48" o.c. or Strong-Drive® SDWF Floor-To-Floor screw spacing.
4. Spacing values listed for SP lumber consider new base values adopted by AWC on June 1, 2013.
5. Spacing does not apply for joist depths of 11¼", 11⅞" and 16". Please refer to L-F-SDWFALTHT at **www.strongtie.com**.

Strong-Drive® SDWF **FLOOR-TO-FLOOR** Screw Concentrated Uplift Loads

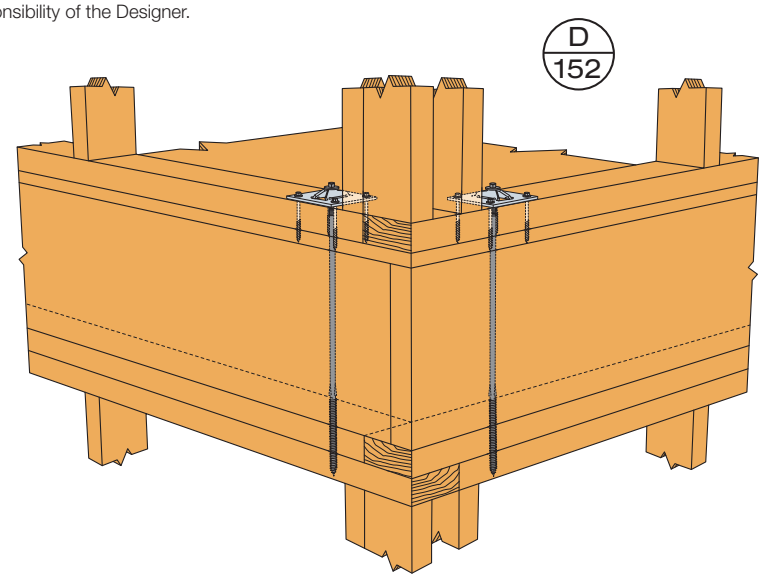
Model No	Single Strong-Drive SDWF-TUW				Double Strong-Drive SDWF-TUW			
	Allowable Tension Load (160)			Deflection at Highest Allowable Load (in.)	Allowable Tension Load (160)			Deflection at Highest Allowable Load (in.)
	SP	DF	SPF		SP	DF	SPF	
SDWF2716-TUW	1,410	1,200	865	0.095	2,270	2,125	1,730	0.142
SDWF2720-TUW								
SDWF2724-TUW								
SDWF2726-TUW								

1. Allowable loads listed include a wood load duration factor of C_D = 1.6 for wind or earthquake loading with no further increase allowed.
2. Single and double Strong-Drive SDWF applications listed are for concentrated load uplift restraint conditions (i.e., end of header, at girders, or at the end of shearwalls).



Double SDWF Concentrated Load Restraint Detail at Continuous Wall
(Single SDWF similar)

Note: Stud-to-plate connections are required to complete the load path and are the responsibility of the Designer.

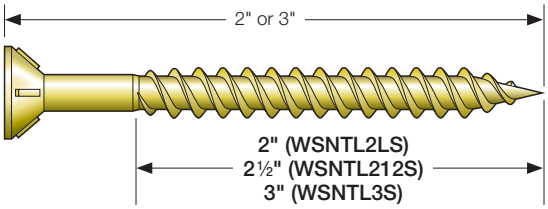


Perspective View of Corner Conditions with Double SDWF
(Single SDWF similar)

Strong-Drive® WSNTL SUBFLOOR Screw

Fasteners for the Simpson Strong-Tie® Quik Drive® auto-feed screw driving systems offer superior performance and reduced installation time in subfloor applications. The holding power of screws reduces the gaps that cause floor squeaks, and the tool extension enables stand-up-and-drive installation.

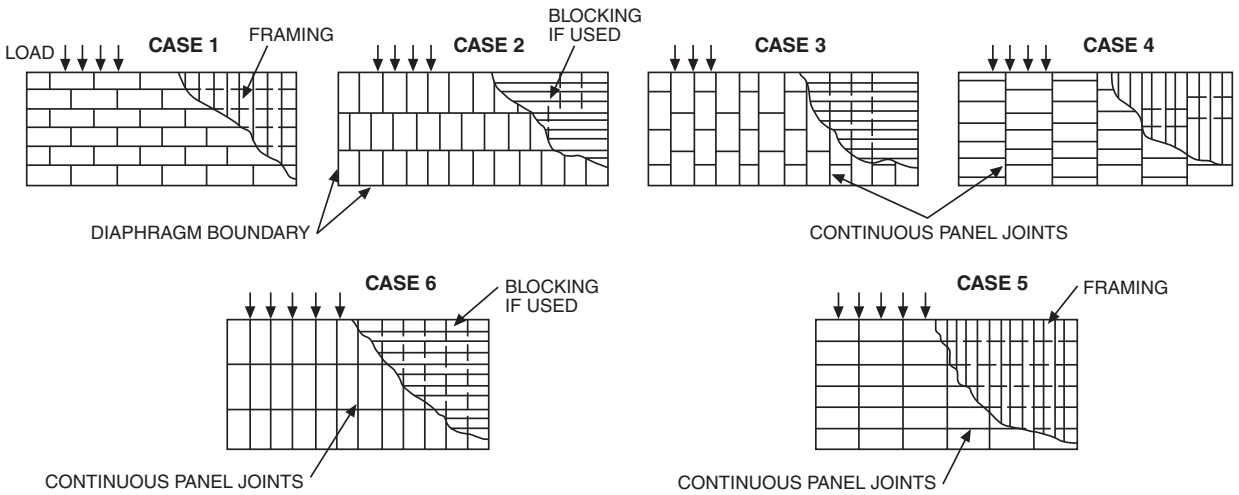
CODES: ICC-ES ESR-1472; City of L.A. RR25661; Florida FL 13731



Allowable Shear (in Pounds per Foot) for Wood Structural Panel Diaphragms with Framing of Douglas Fir-Larch or Southern Pine for Wind or Seismic Loading

Panel Grade	Minimum Nominal Panel Thickness (in.)	Minimum Nominal Width of Framing Members at Adjoining Panel Edges and Boundaries[4,5] (in.)	BLOCKED DIAPHRAGMS				UNBLOCKED DIAPHRAGMS	
			Screw spacing (inches) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 and 4), and at all edges (Cases 5 and 6)[6]				Screws spaced 6 inches, maximum, at support edges[6]	
			6	4	2½[7]	2[7]	Case 1 (no unblocked edges or continuous joints parallel to load)	All other configurations (Cases 2, 3, 4, 5 and 6)
			Screw Spacing (inches) at Other Panel Edges					
			6	6	4	3		
Structural 1/OSB	3/8	2	270	360	530	600	240	180
		3	300	400	600	675	265	200
	15/32	2	320	425	640	730	285	215
		3	360	480	720	820	320	240
Sheathing single floor, and other grades covered in DOC PS1 and PS2	3/8	2	240	320	480	545	215	160
		3	270	360	540	610	240	180
	7/16	2	255	340	505	575	230	170
		3	285	380	570	645	255	190
	15/32	2	290	385	575	655	255	190
		3	325	430	650	735	290	215
	19/32	2	320	421	640	730	285	215
		3	360	480	720	820	320	240

1. Minimum fastener penetration of 1¼" into the framing member is required.
2. For wind design, shear capacities may be increased 40% per section 2306.2.1 of the 2009 IBC and section 2306.2 of the 2012 IBC.
3. For shear loads of normal or permanent load duration as defined by the AF&PA NDS, the values in the table above must be multiplied by 0.63 or 0.56, respectively.
4. The minimum nominal width of framing members not located at boundaries or adjoining panel edges must be 2 inches.
5. Framing at adjoining panel edges must be 3 inches nominal or wider, and screws must be staggered where both of the following conditions are met: (1) screws penetrate into framing more than 1½ inches and (2) screws are spaced 3 inches o.c. or less.
6. Space screws maximum 12 inches o.c. along intermediate framing members (6 inches o.c. where supports are spaced 48 inches o.c.).
7. Framing at adjoining panel edges must be 3-inch nominal or wider, and screws must be staggered where screws are spaced 2 inches or 2½ inches on center.
8. See ESR-1472, Table 1 for illustrations showing Cases 1 through 6.
9. See ESR-1472 for allowable shear loads for high-load diaphragms.
10. WSNTL withdrawal and pull-thru values exceed those for a 10d common nail.
11. See ESR-1472 for high-load diaphragm design values.



Titen® Concrete and Masonry Screws

Titen® screws are 3⁄16"- and 1⁄4"-diameter masonry screws for attaching various components to concrete and masonry. Available in hex and phillips head and both carbon and stainless steel (see the current Simpson Strong-Tie® *Anchoring and Fastening Systems for Concrete and Masonry* catalog for more information). Use with appropriately sized Titen® drill bits included with each box.

CAUTION: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Steps must be taken to prevent inadvertent sustained loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie® Titen installation tool kit as it has a bit that is designed to reduce the potential for overtightening the screw.

Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity.

Titen® Hex-Head Screw
(Phillips flat-head screw available in white and standard blue)

Titen® Allowable Tension and Shear Loads in Normal-Weight Concrete

Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Spacing in. (mm)	Critical Edge Dist. in. (mm)	Tension Load				Shear Load	
					$f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete		$f'_c \geq 4{,}000$ psi (27.6 MPa) Concrete		$f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete	
					Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)
3⁄16 (4.8)	5⁄32	1 (25.4)	2 1⁄4 (57.2)	1 1⁄8 (28.6)	500 (2.2)	125 (0.6)	640 (2.8)	160 (0.7)	1,020 (4.5)	255 (1.1)
3⁄16 (4.8)	5⁄32	1 1⁄2 (38.1)	2 1⁄4 (57.2)	1 1⁄8 (28.6)	1,220 (5.4)	305 (1.4)	1,850 (8.2)	460 (2.0)	1,670 (7.4)	400 (1.8)
1⁄4 (6.4)	3⁄16	1 (25.4)	3 (76.2)	1 1⁄2 (38.1)	580 (2.6)	145 (0.6)	726 (3.2)	180 (0.8)	900 (4.0)	225 (1.0)
1⁄4 (6.4)	3⁄16	1 1⁄2 (38.1)	3 (76.2)	1 1⁄2 (38.1)	1,460 (6.5)	365 (1.6)	2,006 (8.9)	500 (2.2)	1,600 (7.1)	400 (1.8)

1. Maximum anchor embedment is 1 1⁄2" (38.1 mm).
2. Concrete must be minimum 1.5 x embedment.

Titen® Allowable Tension and Shear Loads in Face Shell of Hollow and Grout-Filled CMU

Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Spacing in. (mm)	Critical Edge Dist. in. (mm)	Values for 6" or 8" Lightweight, Medium-Weight or Normal-Weight CMU			
					Tension Load		Shear Load	
					Avg. Ult. lb. (kN)	Allowable lb. (kN)	Avg. Ult. lb. (kN)	Allowable lb. (kN)
3⁄16 (4.8)	5⁄32	1 (25.4)	2 1⁄4 (57.2)	1 1⁄8 (28.6)	542 (2.4)	110 (0.5)	1,016 (4.5)	205 (0.9)
1⁄4 (6.4)	3⁄16	1 (25.4)	3 (76.2)	1 1⁄2 (38.1)	740 (3.3)	150 (0.7)	1,242 (5.5)	250 (1.1)

1. The tabulated allowable loads are based on a safety factor of 5.0.
2. Maximum anchor embedment is 1 1⁄2" (38.1 mm).

Titen® Concrete and Masonry Screws (cont.)

Stainless-Steel Titen® Allowable Tension and Shear Loads in Normal-Weight Concrete

Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Spacing in. (mm)	Critical Edge Dist. in. (mm)	Tension Load				Shear Load	
					$f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete		$f'_c \geq 4{,}000$ psi (27.6 MPa) Concrete		$f'_c \geq 2{,}000$ psi (13.8 MPa) Concrete	
					Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)
¼ (6.4)	3⁄16	1 (25.4)	3 (76.2)	1 ½ (38.1)	600 (2.7)	150 (0.7)	935 (4.2)	235 (1.0)	760 (3.4)	190 (0.8)
¼ (6.4)	3⁄16	1 ½ (38.1)	3 (76.2)	1 ½ (38.1)	1,040 (4.6)	260 (1.2)	1,760 (7.8)	440 (2.0)	810 (3.6)	200 (0.9)

1. Maximum anchor embedment is 1 ½" (38.1 mm).
2. Minimum concrete thickness is 1.5 x embedment.

Stainless-Steel Titen® Allowable Tension and Shear Loads in Face Shell of Hollow and Grout-Filled CMU

Dia. in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Critical Spacing in. (mm)	Critical Edge Dist. in. (mm)	Values for 6" or 8" Lightweight, Medium-Weight or Normal-Weight CMU			
					Tension Load		Shear Load	
					Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)
¼ (6.4)	3⁄16	1 (25.4)	4 (101.6)	1 ½ (38.1)	550 (2.4)	110 (0.5)	495 (2.2)	100 (0.4)

1. The tabulated allowable loads are based on a safety factor of 5.0.
2. Maximum anchor embedment is 1 ½" (38.1 mm).

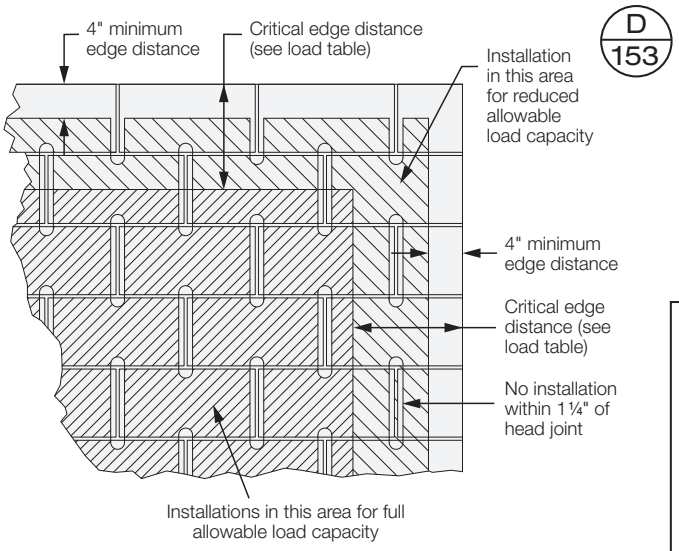
Titen® Stainless-Steel Hex-Head Screw
(Phillips flat-head screw also available)

Titen HD® Heavy-Duty Screw Anchors

Titen HD® Tension and Shear Loads in Face Shell of 8-inch Lightweight, Medium-Weight and Normal-Weight Grout-Filled CMU

Size (in.)	Drill Bit Dia. (in.)	Min. Embed. Depth (in.)	Critical Edge Dist. (in.)	Critical Spacing Dist. (in.)	Values for 8-inch Lightweight, Medium-Weight or Normal-Weight Grout-Filled CMU	
					Allowable Tension Load (100)	Allowable Shear Load (100)
⅜	⅜	2¾	12	6	480	870
½	½	3½	12	8	690	1,385
⅝	⅝	4½	12	10	1,060	2,085
¾	¾	5½	12	12	1,600	3,000

1. The tabulated allowable loads are based on a safety factor of 5.0 for installations under the IBC and IRC.
2. Values for 8-inch wide, lightweight, medium-weight and normal-weight concrete masonry units.
3. The masonry units must be fully grouted.
4. The minimum specified compressive strength of masonry, f'_m, at 28 days is 1,500 psi.
5. Embedment depth is measured from the outside face of the concrete masonry unit (CMU).
6. Allowable loads may be increased 33⅓% for short-term loading due to wind or seismic forces where permitted by code.
7. Grout-filled CMU wall design must satisfy applicable design standards and be capable of withstanding applied loads.
8. Refer to the Simpson Strong-Tie® *Anchoring and Fastening Systems for Concrete and Masonry* catalog (C-A-2016) for allowable load-adjustment factors for spacing edge and end distance.



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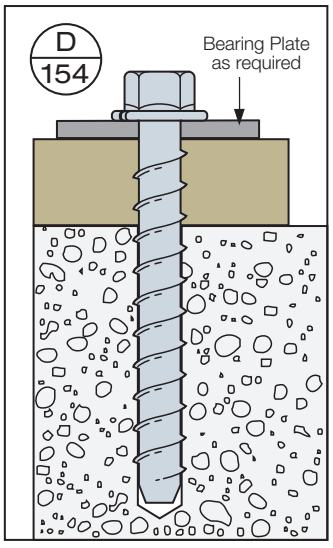
Shaded Area = Placement for Full and Reduced Allowable Load Capacity in Grout-Filled CMU

Titen HD® anchor
U.S. Patent 5,674,035 and 6,623,228

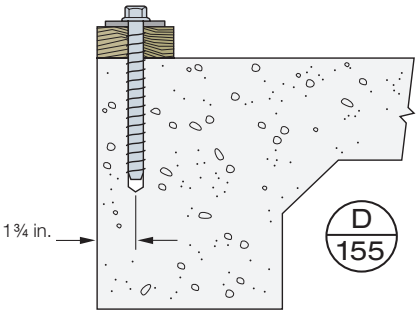


Titen HD® anchor

Titen HD® Shear Loads in Normal-Weight Concrete, Load Applied Parallel to Concrete Edge

Size in. (mm)	Drill Bit Dia. in.	Embed. Depth in. (mm)	Minimum Edge Dist. in. (mm)	Minimum End Dist. in. (mm)	Minimum Spacing Dist. in. (mm)	Shear Load Based on Concrete Edge Distance		
						f'c ≥ 2,500 psi (17.2 MPa) Concrete		
						Ultimate lb. (kN)	Std. Dev. lb. (kN)	Allowable lb. (kN)
½ (12.7)	½	2¾ (70)	1¾ (45)	8 (203)	8 (203)	4,660 (20.7)	575 (2.6)	1,165 (5.2)
		3¼ (83)				—	—	1,530 (6.8)
		3½ (89)				6,840 (30.4)	860 (3.8)	1,710 (7.6)
		4½ (114)				7,800 (34.7)	300 (1.3)	1,950 (8.7)
⅝ (15.9)	⅝	2¾ (70)	1¾ (45)	10 (254)	10 (254)	4,820 (21.4)	585 (2.6)	1,205 (5.3)
		3¼ (83)				—	—	1,580 (7.0)
		3½ (89)				7,060 (31.4)	1,284 (5.7)	1,765 (7.9)

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.



Note: Rebar not shown for clarity.

High-Strength Anchoring Adhesives

Simpson Strong-Tie provides high-strength anchoring adhesives formulated for anchoring and doweling in concrete and masonry applications. Two of our most applicable solutions for high winds, epoxy-based SET-XP® and acrylic-based AT-XP®, are suitable for use under static and seismic loading conditions in cracked and uncracked concrete. Both offer easy hole cleaning without power-brushing required. When properly mixed, these low-odor adhesives will be a uniform, dark-teal color for easy post-installation identification.

Additional SET-XP Features:

- 1:1 two-component, high-solids, epoxy-based anchoring adhesive formula
- Cure times: 24 hours at 70°F, 72 hours at 50°F

Additional AT-XP Features:

- 10:1 two-component, high-strength, acrylic-based anchoring adhesive formula
- Dispenses easily in cold or warm environments and in below-freezing temperatures with no need to warm the cartridge
- Passed the demanding ICC-ES AC308 adverse-condition tests pertaining to reduced and elevated temperatures and long-term sustained loads

For more information about Simpson Strong-Tie anchoring solutions, visit **www.strongtie.com**.

SET-XP®

AT-XP®

Simpson Strong-Tie offers several software solutions and mobile apps designed to significantly enhance the specification and installation processes of its anchoring solutions.

Anchor Designer™ Software for ACI 318, ETAG and CSA – Anchorage design tool for structural engineers to satisfy the strength design provisions of ACI 318 Appendix D, CAN/CSA A23.3 Annex D, ETAG 001 Annex C or EOTA TR029 design methodologies.

Anchor Designer Software for Allowable Stress Design – This software enables you to analyze and design anchorages using the traditional allowable stress design method.

Adhesive Cartridge Estimator – This app quickly calculates the number of cartridges of Simpson Strong-Tie Anchoring Adhesive necessary to complete your specific installation.

Anchor Reference Tool – An app that easily identifies the Simpson Strong-Tie alternative to specified mechanical or adhesive anchor product(s), either by specified product name or code listing.

Resources and Links

Guidelines referred to here can be found in documents published by the Federal Emergency Management Administration (FEMA) and other organizations.

DHS-FEMA

National Flood Insurance Program
www.floodsmart.gov

FEMA

www.fema.gov/library

- Home Builder's Guide to Coastal Construction (FEMA 499)
  - – Fact Sheet No. 10: Load Paths
  - – Fact Sheet No. 17: Use of Connectors
  - – Fact Sheet No. 28: Decks, Pools, and Accessory Structures
  - – Fact Sheet No. 30: Repairs, Remodeling, Additions, and Retrofitting
- Coastal Construction Manual (FEMA P-55)
- Local Officials Guide for Coastal Construction (FEMA P-762)
- Wind Retrofit Guide for Residential Buildings (FEMA P-804)
- Recommended Residential (foundation) Construction for Coastal Areas (FEMA P-550)

AMERICAN SOCIETY OF CIVIL ENGINEERS

www.asce.org

- Flood Resistant Design and Construction (ASCE 24)
- Minimum Design Loads for Buildings and Other Structures (ASCE 7)

INSTITUTE FOR BUSINESS AND HOME SAFETY

www.disastersafety.org

- *Fortified for Safer Living* guide

SIMPSON STRONG-TIE

www.strongtie.com

- *Flood-Resistant Construction Guide* (F-C-FLOODCON)
- *High Wind-Resistant Construction Application Guide* (F-C-HWRCAG16)
- *Companion to the 2001 AF&PA Wood Frame Construction Manual for Wind Design* (T-01WFCM)
- Connector-Anchor Selector software available at **www.strongtie.com/software**

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