

## 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 catalog 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. Loads are provided for a 160% load duration increase on the calculated capacity of the nails. No further load duration increase is allowed by the building code. Load values on every product DO NOT include a one-third increase on the steel capacity.
4. Unless otherwise noted, the allowable loads published in this catalog are limited to the lowest of: average recorded test load at 1/8" deflection, lowest ultimate recorded test load of 3 tests 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. Unless otherwise noted, allowable loads are for use with Douglas Fir Larch or Southern Pine lumber.
7. Allowable simultaneous loads in more than one direction on a single connector must be evaluated as follows:  
Design Uplift/Allowable Uplift + Design Lateral Parallel to 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 three possible directions that exist to generate force on a connector. The number of terms that must be considered for simultaneous loading is at the sole discretion of the Designer and is dependent on their method of calculating wind forces and the utilization of the connector within the structural system.
8. All references to bolts or MBs are for structural quality through bolts equal to or better than ASTM Standard A307, Grade A. Lag bolts and carriage bolts are not acceptable. All threaded rod or ATR shall be equal to or better than ASTM A36, Grade C.
9. Unless otherwise noted, all nails are common nails (refer to page 10).
10. Refer to Simpson Strong-Tie technical bulletin T-ANCHORSPEC for anchorage to concrete design.
11. Hurricane ties are shown installed on the outside of the wall for clarity. Installation on the inside of the wall is acceptable. For uplift Continuous Load Path, connection in the same area (i.e. truss-to-plate connector and plate-to-stud connector) must be on same side of the wall.
12. When installing hurricane ties on the inside of the wall special considerations must be taken to prevent condensation on the inside of the completed structure in cold climates.
13. Loads are in pounds, dimensions are in inches, unless otherwise noted.
14. Truss plates shown are not 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.

## LIMITED WARRANTY

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

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

Due to the particular characteristics of a potential event, 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](http://www.strongtie.com) for current information.**

## CORROSION INFORMATION

### Understanding the Issues

Metal connectors, anchors, and fasteners will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials. There are many environments and materials which may cause corrosion including ocean salt air, fire retardants, fumes, fertilizers, preservative-treated wood, dissimilar metals, and other corrosive elements.

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

It is common to see some corrosion on connectors especially in outdoor applications. Even stainless steel can corrode. The presence of some corrosion does not mean that load capacity has necessarily been affected or that a failure will occur. If significant corrosion is apparent or suspected, then the wood, fasteners and connectors should be inspected by a professional engineer or general contractor and may need to be replaced.

In the last several years, preservative-treated wood formulations have changed significantly. Many of the new formulations are more corrosive to steel connectors and fasteners than the traditionally used formulation of CCA-C. Simpson Strong-Tie testing has shown that ACQ-C, ACQ-D (Carbonate), CBA-A and CA-B treated woods are approximately 2 times more corrosive than CCA-C, while SBX-DOT (Sodium Borate) treated woods were shown to be less corrosive than CCA-C. Refer to technical bulletin T-PTWOOD for more information.

Due to the many different preservative formulations, fluctuating retention levels, moisture content, and because the formulations may vary regionally, or change without warning, understanding which connectors and fasteners to use with these materials 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, and also by viewing information and literature provided by others. This information pertains to Simpson Strong-Tie® connectors only. For corrosion information on other product lines, such as fasteners, see the specific Simpson Strong-Tie product line catalogs. Additionally, because the issue is evolving, it is important to get the very latest connector information on the topic by visiting our website at [www.strongtie.com/info](http://www.strongtie.com/info).

Stainless steel is always the most effective solution to corrosion risk. However, it is also more expensive and sometimes more difficult to obtain. To best serve our customers, Simpson Strong-Tie is evaluating the options to identify the safest and most cost-effective solutions. Based on our testing and experience there are some specific applications that are appropriate for ZMAX/HDG or G90 connectors (see chart on page 9.)

Because increased corrosion from some newer preservative-treated wood is a new issue with little historical data, we have to base our recommendations on the testing and experience we have to date. It is possible that as we learn more, our recommendations may change, but these recommendations are based on the best information we have at this time.

# CORROSION INFORMATION

## General Simpson Strong-Tie Recommendations

- Outdoor environments are generally more corrosive to steel. If you choose to use ZMAX® or HDG finish on an outdoor project (*i.e. deck, patio cover*), you should periodically inspect your connectors and fasteners or have a professional inspection performed. Regular maintenance including water-proofing of the wood used in your outdoor project is also a good practice.
- For wood with actual retention levels greater than 0.40 pcf for ACQ and MCQ, 0.41 pcf for CBA-A, or 0.21 pcf for CA-B (*Ground Contact*), stainless-steel connectors and fasteners are recommended. Verify actual retention level with the wood treater.
- When using stainless-steel connectors, use stainless-steel fasteners. When using ZMAX/HDG galvanized connectors, use fasteners that meet the specifications of ASTM A153.

- Testing indicates wood installed dry reduces potential corrosion. If dry wood is used, see our website for additional information.
- Using a barrier membrane can provide additional corrosion protection, see technical bulletin T-PTBARRIER.

Due to the many variables involved, Simpson Strong-Tie cannot provide estimates on service life of connectors, anchors or fasteners. We suggest that all users and Designers also obtain recommendations for HDG, ZMAX (G185), mechanically galvanized, or other coatings from the treated wood supplier for the type of wood used. However, as long as Simpson Strong-Tie recommendations are followed, we stand behind product performance and our standard warranty applies.

## Guidelines for Selecting the Proper Connector

### 1 Evaluate the Application.

Consider the type of structure and how it will be used. These recommendations may not apply to non-structural applications such as fences.

### 2 Evaluate the Environment.

Testing and experience indicate that indoor dry environments are less corrosive than outdoor environments. Determining the type of environment where a connector or fastener will be used is an important factor in selecting the most appropriate material and finish for use on the connectors and fasteners. To help in your decision making, consider the following general exposure information:

**Interior Dry Use:** Includes wall and ceiling cavities, and raised floor applications of enclosed buildings that have been designed to ensure that condensation and other sources of moisture do not develop.

**Exterior – Dry:** Includes outdoor installations in low rainfall environments and no regular exposure to moisture.

**Exterior – Wet:** Includes outdoor installations in higher moisture and rainfall environments.

**Higher Exposure Use:** Includes exposure to ocean-salt air, fire retardants, large bodies of water, fumes, fertilizers, soil, some preservative-treated woods, industrial zones, acid rain, and other corrosive elements. Type 316 stainless steel contains slightly more nickel than other grades, plus molybdenum, giving it better corrosion resistance in high-chloride environments.

### 3 Evaluate and select a suitable preservative-treated wood for the intended application and environment.

The treated wood supplier should provide all the information needed regarding the wood being used. This information should include: the specific type of wood treatment used, if ammonia was used in the treatment, and the chemical retention level. If the needed information is not provided then Simpson Strong-Tie would recommend the use of stainless-steel connectors and fasteners. You should also ask the treated-wood supplier for a connector coating or material recommendation.

### 4 Use the chart on the right, which was created based on Simpson Strong-Tie testing and experience to select the connector finish or material.

If a preservative-treated wood product is not identified on the chart, Simpson Strong-Tie has not evaluated test results regarding such product and therefore cannot make any recommendation other than the use of stainless steel with that product. Manufacturers may independently provide test results or other product use information; Simpson Strong-Tie expresses no opinion regarding any such information.

### 5 Compare the treated-wood supplier's recommendation with the Simpson Strong-Tie recommendation.

If these recommendations are different, Simpson Strong-Tie recommends that the most conservative recommendation be followed.

### Simpson Strong-Tie recommendations are as follows:




- Low** = Use standard painted and G90 galvanized connectors, or Simpson Strong-Tie® Strong-Drive® screws (SDS) with the double-barrier coating, as a minimum.
- Med** = Use ZMAX/HDG galvanized connectors as a minimum. Use HDG fasteners which meet the specifications of ASTM A153 or Simpson Strong-Tie® Strong-Drive® screws (SDS) with double-barrier coating.
- High<sup>e</sup>** = Use Type 303, 304, 305 or 316 stainless-steel connectors and fasteners.

CONNECTOR COATING RECOMMENDATION – STRUCTURAL APPLICATIONS								
Environment	Untreated Wood	SBX/ DOT & Zinc Borate	MCQ	ACQ-C, ACQ-D (Carbonate), CA-B & CBA-A			ACZA	Other or Uncertain
				No Ammonia	With Ammonia	Higher Chemical Content <sup>1</sup>		
Interior – Dry	Low	Low	Low <sup>5</sup>	Med <sup>5</sup>	Med	High	High	High
Exterior – Dry	Low	N/A <sup>2</sup>	Med	Med	High	High	High	High
Exterior – Wet	Med	N/A <sup>2</sup>	Med <sup>3,4</sup>	Med <sup>3,4</sup>	High	High	High	High
Higher Exposure	High	N/A <sup>2</sup>	High	High	High	High	High	High
Uncertain	High	N/A <sup>2</sup>	High	High	High	High	High	High

1. Woods with actual retention levels greater than 0.40 pcf for ACQ and MCQ, 0.41 pcf for CBA-A, or 0.21 pcf for CA-B (Ground Contact level).
2. Borate treated woods are not appropriate for outdoor use.
3. Test results indicate that ZMAX/HDG and the SDS double-barrier coating will perform adequately, subject to regular maintenance and periodic inspection. However, the nationally-approved test method used, AWPA E12-94, is an accelerated test, so data over an extended period of time is not available. If uncertain, use stainless steel.
4. Some treated wood may have excess surface chemicals making it potentially more corrosive. If you suspect this or are uncertain, use stainless steel.
5. Where noted in the table, applications where the wood is dry (*moisture content less than 19%*) when installed and will remain dry in-service may use a minimum coating recommendation of "Low".
6. Type 316 stainless-steel connectors and fasteners are the minimum recommendation for ocean-salt air and other chloride environments.

## 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 ( <i>total both sides</i> ).	Low
	Galvanized (G185) 1.85 oz. of zinc per square foot of surface area ( <i>hot-dip galvanized per ASTM A653 total both sides</i> ). These products require hot-dip galvanized fasteners ( <i>fasteners which meet the specifications of ASTM A153</i> ).	Medium
	Products are hot-dip galvanized after fabrication (14 ga. and thicker). The coating weight increases with material thickness. The minimum specified coating weight is 2.0 oz./ft <sup>2</sup> ( <i>per ASTM A123 total both sides</i> ). These products require hot-dip galvanized fasteners ( <i>fasteners which meet the specifications of ASTM A153</i> ).	Medium
Double-Barrier Coating (SDS Screws)	Simpson Strong-Tie® Strong-Drive® screws (SDS) that are manufactured with two different finishes that provide a level of corrosion protection that exceeds that provided by the previous HDG coating.	Medium
	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

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