

STEEL STRESS INCREASE

Recent changes in building codes and standards have affected the way allowable loads on some connectors are determined when using Allowable Stress Design. Building codes and material standards have traditionally allowed designers and manufacturers to take a one-third stress increase on the calculated design capacities of some building materials and components when designing for forces generated from wind and seismic events. Specifically, the codes allowed Simpson Strong-Tie to take a one-third stress increase on the calculated tensile capacity of steel connectors.

Newer codes and standards only allow steel stress increase when using an alternate set of load combinations. For example, the International Building Code and Uniform Building Code do not allow a stress increase when designing with the Basic load combinations of Allowable Stress Design. However, these codes do allow the use of a stress increase when using the Alternate (or *Alternative*) basic load combinations, as long as the referenced material standard/section permits it. The ASCE7 Standards do not have Alternate basic load combinations, so stress increases are not permitted.

Simpson Strong-Tie determines allowable loads in accordance with building codes and steel design standards (*AISI and AISC*). In the past, these steel standards have permitted the use of a one-third stress increase when designing for wind and seismic forces. However, the latest editions of these standards have discontinued that practice.

Because of these changes, Simpson Strong-Tie re-evaluated its entire product line to determine which loads were governed by calculated steel strength and included an allowable stress increase on the steel. The majority of the Simpson Strong-Tie® product line was not affected, since the allowable loads are governed by a tested value, not a calculated value. Those products which were affected are shown with their revised capacities with no steel stress increase.

In this catalog, load values shown under (100) column do not include a steel stress increase. Load values shown under (133) column include a 1/3 stress increase on the steel and should only be used where permitted by code.

Additionally, it must be clarified that the load duration factors for wood permitted by the National Design Specification for Wood Construction are separate and distinct from the one-third stress increase. Load duration factors for wood are permitted to be used in design calculations for all load combinations in the codes and standards covered by this catalog. For that reason there will be loads listed that include a load duration increase for wood or fasteners in wood, such as 1.33 or 1.6 for wind or seismic loading, with no further 1/3 stress increase permitted.

The table below summarizes when stress increases are permitted.

Code	Load Combination	C _d (Wood) Allowed	1/3 Stress Increase (Steel) Allowed
ASCE 7-05, ASCE7-02	Basic	Yes	No
1997 Uniform Building Code	Basic	Yes	No
	Alternate	Yes	Yes
2000 International Building Code	Basic	Yes	No
	Alternate	Yes	Yes
2003/2006 International Building Code	Basic	Yes	No
	Alternate	Yes	No
Florida Building Code 2004	Basic	Yes	No
	Alternate	Yes	No

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, pressure 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 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 pressure treatment 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. 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.

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 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 13*.)

Because increased corrosion from some newer pressure-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.

See www.strongtie.com/info for additional critical information.